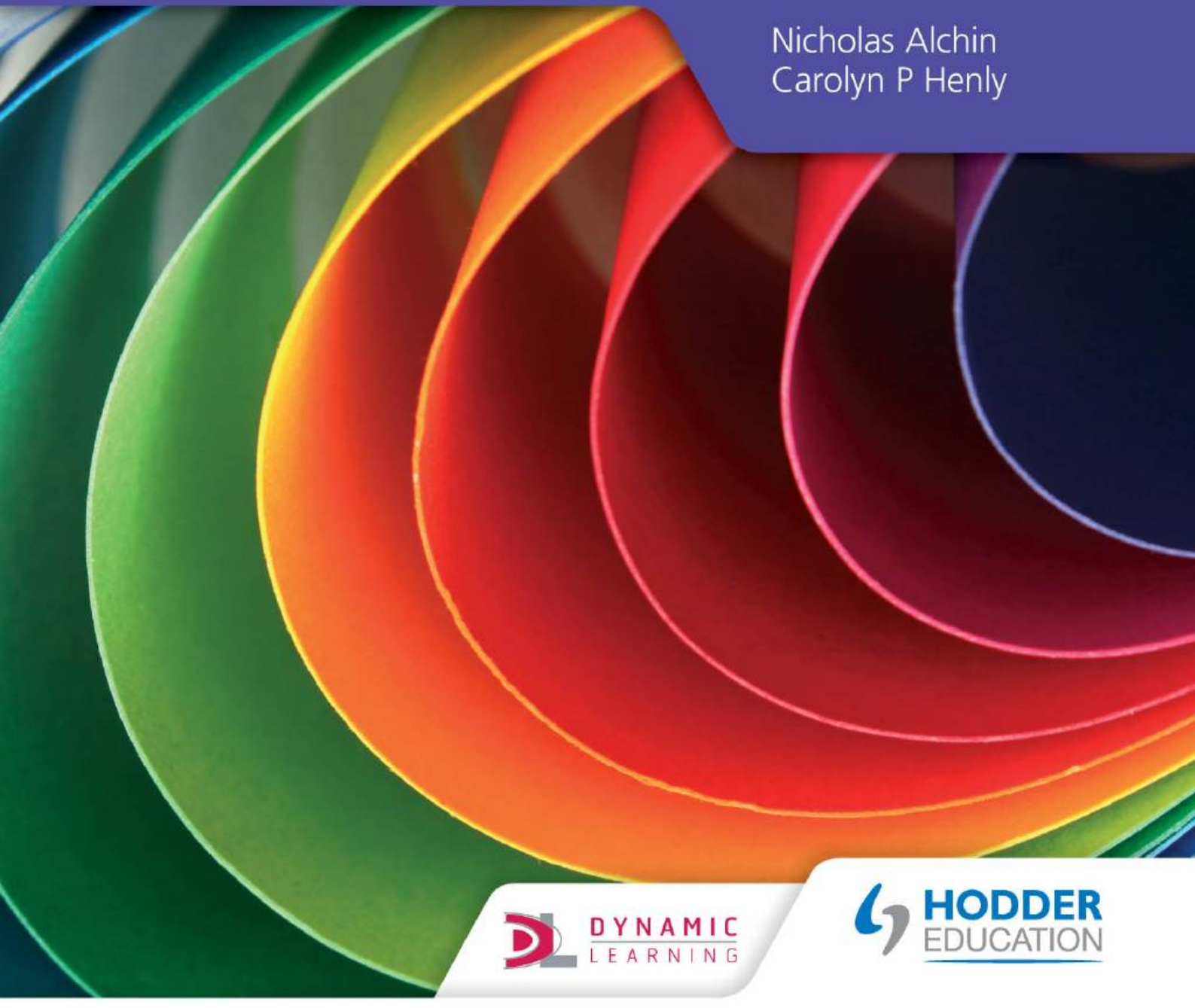
FOR THE
IB DIPLOMA

THIRD EDITION

Theory of Knowledge

Nicholas Alchin
Carolyn P Henly



DYNAMIC LEARNING
HODDER EDUCATION

Theory of Knowledge

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Nicholas Alchin: For my wife and children: Ellie, Ruth, Millie and Tom
Carolyn Henly: For my husband, Tim, the most knowledgeable person I know

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Contents

Course narrative

What are we trying to do? Why is knowledge problematic? What is the difference between personal knowledge and shared knowledge? How can we compare areas of knowledge and ways of knowing?

If Theory of Knowledge is about a search for reliable knowledge and certainty, then **memory** is a clear source of our beliefs; but we can see that this personal source of knowledge can result in problems, for many reasons.

One solution here is to subject personal knowledge to public testing; relying on shared knowledge leads to a solution for some problems. We turn, therefore, to **natural sciences** as the current triumphant model for knowledge, with its basis in observation and experiment and its many great successes.

But despite scientific successes something is missing – as students will tell us, science isn't everything, and there are other, non-scientific questions such as those involving religion, morality and aesthetics, for example, that we should examine. So we can consider **the arts** as having the capability of dealing with questions which are not amenable to scientific method. The arts may be a more human endeavour – but at the cost of loss of objectivity and certainty.

So why do we have different opinions about art? Are there 'truths' there to be found? What is artistic (cf. scientific) truth? And how do we reach these truths via **imagination**? Is imagination, that is, knowledge conjectured about the unknown, on the basis of the known, a strong way of knowing?

We investigate the personal way that imagination crosses the sceptical gap, and note that it does not help us reach certainty. So if imagination cannot help us be certain, where can we look next? How about 1 + 1 = 2? Is **mathematics** the most certain discipline? We discuss mathematics as an axiomatic deductive system, and see how it can be both compelling and maybe even beautiful. We contrast mathematical truth with the other types already seen, and then ask if we can broaden the mathematical method to embrace other areas.

This then leads us into **reason** as the general system of logical processing. We will deal with such methods as inductive logic, deductive logic, axioms, hidden assumptions, fallacies, cognitive biases, and lateral thinking. Of course, reasoning about reasoning leads us to consider its own limitations, and we can immediately see that as a model for human behaviour, rationalism is seriously flawed. (Even if it is not, we have to consider the question of how we choose our axioms.)

Given these problems with reasoning, we turn to **emotion** as a contrasting way of knowing. What are emotions? Are they really opposed to reason? What is their basis? Do they provide a reliable way of knowing?

We turn to **religious knowledge systems** next, because we can use them as a case study in the different perspectives that arise through reason and emotion. These two ways of knowing may not be enough to explain how we get religious knowledge, but investigating their role in religion will highlight their strengths and weaknesses, as well as the interplay between them.

Investigating this fascinating area will raise the question of what role our **intuitions** should play in determining what to believe, and we can examine intuition as a way of knowing in its own right. When is it reliable and how does it work?

We then move to **ethics** as an area that naturally arises from religion. Here we can investigate the nature of intuition and compare competing ethical knowledge systems. In doing so, we see the similarities between areas using reason and areas using intuition; this reflects the very human nature of ethics, and leads us to look next at the human sciences.

So we consider the **human sciences** and their combination of prescriptive and descriptive claims. Questions that arise include: Aren't we all unique and unpredictable? What are the problems of trying to understand human nature? We cover the general issues and then use these to motivate a discussion of the classic problems of free will and nature versus nurture.

Issues here lead to another way of understanding human behaviour – via **history** – in fact, is it a social science? Why does it have a different place in the TOK diagram? What are the problems of history?

We stress the issue of selection and interpretation and use this as motivation to introduce empirical knowledge – i.e. **sense perception** – as an area worthy of detailed scrutiny.

We can consider the (perhaps artificially) distinct issues of both practical and philosophical problems, and the provisional and interpretative nature of sensory knowledge can lead us straight to **paradigms** and **culture** as the paradigm par excellence. This will review many areas and also be closely related to students' own experience, and there is room to reflect on our own and others' cultures. The study of **indigenous knowledge systems** offers a wide range of possibilities for students (and teachers) and here we look at just a small selection.

Paradigms will have many components, and in particular, **language** as a possible influence on what we know and how we know it. There are some 'obvious' and important points here – language and values, misleading language, language and thought – and also some very difficult ones – language and meaning, language and experience.

To conclude, we look at where we have come from, and more importantly, where we can go from here. We see that 100 per cent certainty is impossible, so this means we need to have, one way or another, **faith** (and not just religious faith). So what are the issues there? Are there several types of faith? How are they related to intuition? Is faith innate or culturally related and what does either view mean for *knowledge*?

Finally, we offer some advice on **Assessment**.

Nick Alchin and Carolyn Henly
April 2014

Using the QR codes

Look out for the QR codes throughout the book. They are placed in the margin alongside the web links, such as http://tinyurl.com/amg4c, for quick scanning. They look like the one on the left.

To use the QR codes to access the web links you will need a QR code reader for your smartphone/tablet. There are many free readers available, depending on the smartphone/tablet you are using. We have supplied some suggestions below, but this is not an exhaustive list and you should only download software compatible with your device and operating system. We do not endorse any of the third-party products listed below and downloading them is at your own risk.

- For iPhone/iPad, Qrafter – http://itunes.apple.com/app/qrafter-qr-code-reader-generator/id416098700
- For Android, QR Droid – https://market.android.com/details?id=la.droid.qr&hl=en
- For Blackberry, QR Scanner Pro – http://appworld.blackberry.com/webstore/content/13962
- For Windows/Symbian, Upcode – www.upc.fi/en/upcode/download/

Once you have downloaded a QR code reader, simply open the reader app and use it to take a photo of the code. The website, podcast or video will then load on your smartphone/tablet.

If you cannot read the QR code or you are using a computer, the web link next to the code will take you directly to the same website or video.

Source referencing

Throughout this text, we have made a concerted effort to document our sources. We felt that this was important because, since Theory of Knowledge is a course about learning how to evaluate the quality of the 'facts' you encounter, we are obligated to make our claims as transparent as possible. The referencing system we have used throughout is the MLA system; this is a standard system used in many liberal arts subjects.

In MLA style, we put a parenthetical citation after every statement that is paraphrased or quoted from an external source. The parentheses contain the author's last name and the page number in the source. For example, on page 391 in Chapter 16, we have cited '(Davis 57)'; Wade Davis is the author and the quote is from page 57 of his original work. If you look in the Works cited section for Chapter 16 for a source written by someone named Davis, you will find full details of the source. If you then look on page 57 in the actual source, you will see the material we have quoted.

If the author is named in the sentence preceding the quote, only the page number will appear. If there is more than one source by the same author in a chapter, then the year of publication will also appear. For example on page 35 in Chapter 3, we have cited '(2011: 2.1)'. This is one of two sources written by Richard Feynman that we referred to in Chapter 3. We named Feynman in the preceding sentence, so his name does not appear in the parentheses. 2011 refers to the year the source was published, and 2.1, in this case, is the page number. (That is a rather odd page number, but that is how the publisher did it!) If there is no author, such as with a web source, then there will be an abbreviated title in the parentheses, such as the reference ('USA Memory Championships') on page 26 in Chapter 2. As with other types of sources, full details are given in the Works cited section for that chapter, in this case the URL.

You will be required to use an academic referencing system when you write your TOK essay. MLA is a fairly easy one to use, though you can use any system as long as you use it correctly and consistently. You can even use the free service at http://bibme.org to create your Works cited pages and to figure out how to format your parenthetical references.

Chapter colour coding

The Theory of Knowledge course is divided into two main branches: Ways of Knowing and Areas of Knowledge. Areas of Knowledge are specific branches of knowledge and the eight areas addressed in the course are mathematics, the natural sciences, the human sciences, the arts, history, ethics, religious knowledge systems and indigenous knowledge systems. The eight Ways of Knowing, which arise from these areas and are identified by the course are language, sense perception, emotion, reason, imagination, faith, intuition and memory. Throughout the book, the Areas of Knowledge chapters are indicated by a solid coloured bar at the foot of each page and the Ways of Knowing chapters are indicated by a dashed bar, like those shown on the left.

1 Introduction to Theory of Knowledge

Perplexity is the beginning of knowledge.

Khalil Gibran

Ignorance is the curse of God; knowledge is the wing wherewith we fly to heaven.

William Shakespeare

When you know a thing, to hold that you know it, and when you do not know a thing, to allow that you do not know it – this is knowledge.

Confucius

The learning and knowledge that we have, is, at the most, but little compared with that of which we are ignorant.

Plato

When you know better you do better.

Maya Angelou

I mean, you could claim that *anything's* real if the only basis for believing in it is that nobody's *proved* it doesn't exist!

J.K. Rowling

The possession of knowledge does not kill the sense of wonder and mystery. There is always more mystery.

Anaïs Nin

For me, it is far better to grasp the Universe as it really is than to persist in delusion, however satisfying and reassuring.

Carl Sagan

Aims

By the end of this chapter you should:

- understand that, perhaps contrary to what you have so far found in your formal education, certainty and truth are not easily found
- recognize that there are many dubious pieces of 'knowledge' available and that even the word of a world authority is no guarantee of truth
- understand that 'certainty' is a matter of degree and that some opinions are better than others
- be able to give at least an initial definition of 'knowledge' and distinguish between 'knowledge' and 'belief'
- be able to list and give a simple critique of different reasons for saying that you 'know' something
- be able to discuss how these different reasons relate to the standard academic subjects.

Introduction

You have probably been in full-time education for a number of years, and in that time you have acquired a vast amount of knowledge. With the help of your teachers and your textbooks, the number of facts you know and the depth of your knowledge are probably amazing. What is more, you are learning more and more, and will probably go on to do so for several more years. In the sciences, for example, many of you will know about Einstein's theories. Einstein is widely regarded as one of the greatest geniuses of all time, and yet the physicists among you will be using his ideas in your exams. In English literature, many of you will be able to analyse and discuss the work of Shakespeare, possibly the greatest English playwright the world has ever seen – maybe even the greatest it will ever see. The same goes for any other subject: you will be studying ideas developed by thinkers of great genius.

When we scale up your experience to all the people alive today, we realize that the amount of knowledge out there is truly staggering. What is more, we have access to so much of it. You want to know what animals were walking the Earth 200 million years ago? Look it up in a book. You want to know what it's like in Antarctica in the middle of winter? Watch a documentary. And it's getting easier all the time – with newspapers, magazines, TV and the internet, you can find out all about the world without leaving the comfort of your own home. And what could be more reliable than journalism and the internet?

Well, recent headlines that have been seen in one, admittedly less than illustrious, newspaper include 'Alien Spaceships to Attack Earth in March 2013!' and 'How to Sell Your Soul to the Devil!' and 'Obama was Born – On Mars!' The internet, too, is hardly a totally trustworthy source of information – just look for the 'End of the World 2018' websites! So can we trust the information that we have?

We can imagine what you are thinking at this stage: that these are stupid examples. Only really gullible people would believe stories as ridiculous as these, and nobody with any sense would make errors as obvious. So now consider the following predictions. They are slightly different from the newspaper headlines in that they are all claims about the future, but they still tell us something about the possibility of error.

There is no likelihood that humans will ever tap the power of the atom.
Robert Millikan, Nobel Prize Winner in Physics (1923)

The atom bomb will never go off and I speak as an expert.
Admiral W. Leahy, advisor to the US President (1945)

I think there will be a world market for five computers.
Thomas Watson, founder of IBM (1958)

By 2000 women will wear pants, men will wear skirts, both sexes will go bare-chested (weather permitting) and clothes will be see-through.
Rudi Gernreitch, American fashion expert (1970)

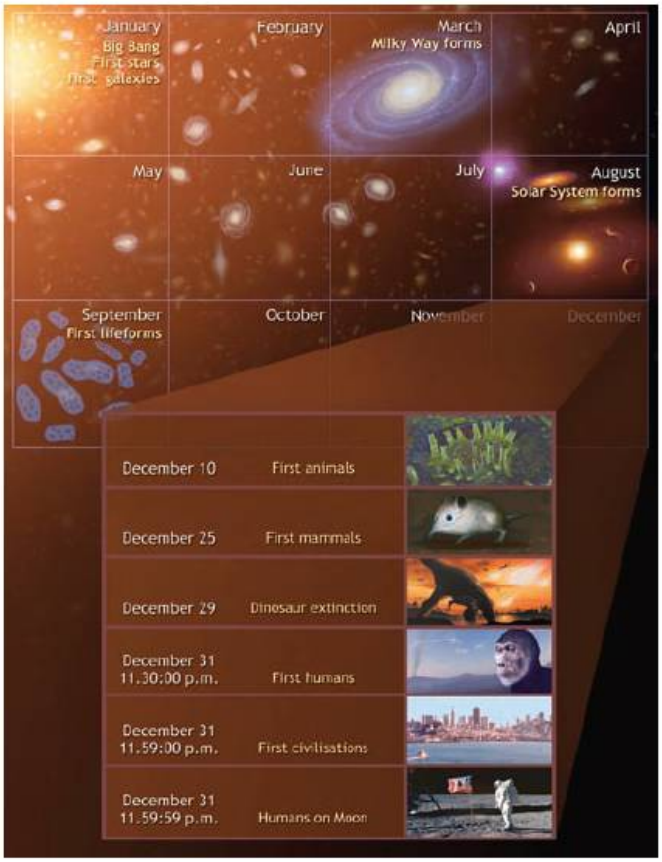
The internet will never take off.
Bill Gates, founder of Microsoft (1988)

So it is not just stupid people who get things wrong. Perhaps there are errors in what you are told every day, even in what you are reading now. It could be that what you learn in school isn't totally correct. So when we said that you have a lot of knowledge, maybe we should have been more careful. How much of what you know is true?

Answering this question is the central theme of this book, and sometimes the answers can be quite surprising; they can force us to look at the world in a different way. As a brief example, let's consider how much we know in light of how long we have been around. Geographers often comment how the impact of humans can be felt all over the world, even in the remotest places. We humans dominate the Earth. In many ways, we are the supremely powerful species on Earth at the moment – there is no doubt about that. However, astronomer Carl Sagan used an analogy of a calendar year to show how brief a time humans have existed, and this idea may call into question our certainties and our claims to knowledge.

Sagan, in his series *Cosmos*, suggested that if we took the whole history of the universe and compressed it into one year, starting 1 January, then current theory would suggest our galaxy formed on 1 May. Earth was formed around 14 September. After life begins on 25 September, it may seem like things are speeding up, but it then takes until 12 November for the oldest photosynthetic plants to develop, and it isn't until 1 December that there is a significant quantity of oxygen in the atmosphere. So for the first eight-and-a-half months there was no Earth, and even then for another two-and-a-half months there was no conceivable way for humans, had they been around, to survive. But at least now we are beginning to approach human history – humans appeared on 31 December. The University of Victoria, in Victoria, Canada, presents Sagan's 'cosmic year' metaphor on its website at http://tinyurl.com/amg4c. Here, the physicists make the point that an average human life takes up only about 16/100ths of a second, in these cosmic terms.

On the cosmic scale, therefore, it is only in the last fraction of a second, on the last day in the entire year, that anyone alive today has existed, that you were born. Most people feel this to be profoundly humbling. And where does it leave humans' feelings of grandeur, sense of power and sense of certainty?



■ **Calendar of the Universe**

1 What is the human's place in the universe? How likely is it that humans have found out any profound truths about the universe?
2 What are humankind's greatest successes?
3 Does it really matter how long we have been around?

Certainly, Sagan's concept alerts us to the fact that our point of view is just one, perhaps very recent and very modest, perspective and it gives us good reason to approach grand claims to knowledge with some humility. We'll examine this important question of perspective in Chapter 15, but for now we have skirted around the subject of knowledge itself for long enough. We need to find out what knowledge actually is before we begin properly to question it.

What is knowledge?

This may seem like a ridiculous question. We all know what knowledge is, don't we? Well, maybe, but explaining it may prove to be a little tricky. One definition of knowledge that is commonly cited is one developed by Plato many centuries ago: Knowledge is something that we believe, that is true, and that we have justification for – or, more simply, *knowledge is justified, true belief*. Despite its popularity, this definition of knowledge is not very helpful – and for a very simple reason. If we claim to know something then we believe it, and we believe it to be justified and to be true. But how do we *know* if it is justified and/or true?

There is, in fact, no way to determine whether something is true or not independent of our justification. Suppose, for example, you ask me how I know that the chemical composition of water is H_2O. I will tell you that I know it because I studied chemistry in high school, that I learnt about the periodic table of elements,

and that I learnt about how the elements in that table combine to create different substances. I might even tell you that I trust my father, who is a scientist, and who has confirmed for me that he has extensive experience with chemical bonds. These experiences are my evidence – my justification – for my claim. I can tell you that because this evidence is true, my claim is also true. I have, therefore, justified, true belief, or knowledge. The problem is that I have no way of establishing the truth of my assertion about the chemical formula for water other than that I believe that my justifications are true. Even if I could directly see the hydrogen atoms and the oxygen atom, I would point to my sensory perception as my justification for the truth of my claim. Any justification that we offer – and truly believe – necessarily convinces us that what we believe is true and thus allows us to say that we have 'knowledge'. You should see the problem here – we are trying to define knowledge in terms of justification and truth, but we are using the concept of knowledge in doing so! Our definition is circular and, therefore, unhelpful.

4 Plato's definition suggests that you can believe something without knowing it. Is it possible to know something without believing it?
5 Is knowledge the same as true belief? Can you imagine a case where someone believes something which is true, but where we would not say that she knows it?
6 One night my watch broke at 11.51, but I didn't realize. I was asleep at the time, and when I woke up I just put the watch on without looking at it. The next time I looked at it, it was, by chance, 11.51. I believed it was 11.51, and it was, in fact, 11.51. So did I know it? If not, why not?

A problem arises when we think someone has an incorrect claim; the problem is that we only decide if the claim is indeed incorrect once we agree on what makes a good justification. There is no way to verify which one of us has the 'truth' except by using our processes of justification. Consider, for example, some suspicious 'knowledge' claims. What do you make of the person who claims that she knows that the world is going to end on a particular date (as happened in October 2010 and again in December 2012)? Or what of the person who claims that he knows he was abducted by aliens, experimented upon, and then returned to Earth? Can we really say we 'know' such things? People who make these claims say that they do indeed 'know' them, but most people would say that these claims are not knowledge because they are not true. Such claims do not cause us much of a problem in terms of defining knowledge, because they are extremely difficult to justify. If we ask people who make these claims for the evidence, they may offer some, but we will (perhaps) respond that what they take as evidence is so tenuous and open to interpretation that the degree of certainty is very low, and so, we would suggest, most people would not wish to accept these claims as knowledge. The people who make these claims, however, would say that they are convinced by their own justifications, and that they therefore believe that their claims are true. They would say that, according to Plato, they have knowledge.

7 Does the 'justified, true belief' definition fit our understanding of the term 'knowledge', or does it wrongly include or exclude anything? That is, can you think of a situation where:
- someone might have justified, true belief but we wouldn't say that they knew something
- someone did not have justified, true belief but we would say they knew something?

So does this mean that, since we all believe what we say is true, that there is no real distinction between what we believe and what we know? We all make

many knowledge claims every day. You might say, for example, that you know that 9×4 is 36 or that Australia was colonized by British prisoners who were sent to Botany Bay, or that today is Tuesday. If asked how certain you are of these knowledge claims, you can justify them by offering evidence or an explanation in their support. You might, for example, justify your claim that 9×4 is 36 by explaining how the multiplication tables work, or, more simply, by lining up four rows of nine pebbles and then having someone count them. You might justify your claim that Australia was colonized by British prisoners by referring the listener to a well-documented book on Australian history, such as Robert Hughes' *Fatal Shore*. You could justify your claim that today is Tuesday by pointing to a calendar. There are many knowledge claims which can similarly be justified with facts well enough established and easily enough understood that they cannot be disputed except by someone wilfully disregarding reality; such claims are often easy to recognize and we can comfortably say that they do, indeed, constitute knowledge. So the strength of justification is crucial; in simple terms, we can say that the better justified a belief, the more likely we are to say that the belief is knowledge. We'll explore this in the 'Good reasons' section of this chapter, and indeed throughout the whole TOK course.

There is another common problem that we must deal with in terms of trying to define knowledge. Sometimes we say we know something, but despite our strong justification it turns out, much later, that our interpretation of the evidence was wrong, or that we didn't have all the evidence needed to make a good judgement. That is, we were wrong, and we realize that what was once claimed to be knowledge was not. We wouldn't now, for example, say that people once knew the Sun revolved around the Earth; we would say that they thought that they knew it, or that they believed it, but that they were proven wrong. Similarly, we would not say that children *know*, but rather that they only *believe*, that Santa Claus is coming to town. Some 'knowledge' turns out to be wrong, and we sometimes have to alter what we think we know once more facts become available to us, as they did to Galileo and others after he invented the telescope and as they do to children who, as they grow older, come to understand that their parents are the ones who eat the cookies left out for Santa.

8 Identify something that you have been told, which you believed at the time but which you now recognize is false. How did you find out the truth?
9 It has been claimed that this problem is not really a problem for defining knowledge; but that it is simply just that humans are not perfect and can make errors. To what extent do you agree?
10 What is the difference between 'I am certain that …' and 'It is certain that …?'

You can see that in the two cases above, we use the word 'believe' to describe wrong knowledge. That is a common usage, but it can be misleading because it tends to suggest that all beliefs are necessarily false (and that cannot be right – We believe $1 + 1 = 2$ and that humans exist and that we are TOK teachers and all sorts of things that you would likely concede really are knowledge). To take a negative view of belief is to diminish the very concept of belief, and we will want to develop a more nuanced understanding of when it is appropriate to say that we believe something as opposed to when we should say that we know something. Consider, for example, the claim that the Canadian curling team led by Kevin Martin will win the next Olympic trial. You cannot call this knowledge, because you quite obviously cannot predict the future, however much you might admire Mr Martin's team and however much confidence you have in its superior curling

skills. You would have to say that you *believe* that Kevin Martin's team will win the Olympic trial. Your belief may, in the end, turn out to be perfectly true. You call it a belief now because the evidence that is available is open to a wide variety of interpretations and cannot, therefore, be used to substantiate a single, incontrovertible point of view.

11 How is the Kevin Martin example similar to the examples above in which great thinkers such as Galileo made assertions that later turned out to be wrong?
12 List five things you believe and five things you know. Why did you include the items in one list but not the other?
13 What is something that you once believed to be true but which you later found out was not? What was your justification for believing it? Why do you no longer believe it? Would you now say that you know it is not true?

So we see that 'belief' is not just a word that means something that someone used to 'know' but was proved wrong; it is a word that expresses a particular kind of claim about our understanding of the world, which may, in fact, turn out to be true, once the facts are available (in the case of the curling team, after the Olympic trial). Similarly, religious claims about the existence of a god or gods, for example, are not universally accepted as knowledge, because there are multiple contradictory interpretations of the evidence which provides for their justification. Such claims are properly called beliefs; and in this case it is possible that we may never gather the kind of irrefutable facts that will decide the matter one way or the other. Belief, therefore, is, in its own right, an important concept for the TOK course.

This illustrates one more problem with Plato's definition of knowledge as justified, true belief; it does not offer a clear distinction between knowledge and belief; rather, it classifies belief as a subset of knowledge.

14 Molière once wrote that a sleeping potion worked by virtue of its 'dormitive faculty'. How is this related to what was said in the previous paragraph?
15 Can you find a solution to the problem that defining knowledge as 'justified, true belief' may be a circular definition? (See Chapter 7 for more on this.)

We have explored the influential 'justified, true belief' conception of knowledge, and found it problematic. So what alternatives are there? Let's look at what we are trying to *do* with knowledge. One possibility is that we are trying to describe reality in some way. We can think of knowledge simply as a description of how things are; and once we do that, some of the problems melt away. To see why, think of a map – that is, a model of a city or state. It is a simplified version of the thing itself (and it is useful precisely for that reason). A map allows us to understand certain features of a vast and complex system, the whole of which we cannot deal with all at once. Different types of maps tell us different things about the territory: a street map tells us where the roads are, which roads are one way, which roads are dead end, and so on. We know, from such a map, various different routes we can take to get from place to place. This type of map leaves out features of the city that we do not need to know for our purpose: elevation, population density, socio-economic distribution, and so on. Other maps might give us exactly this or different types of knowledge about the same territory: we can use rainfall maps to determine possible areas of flooding, population maps to tell us where we need to provide energy and water, and so on. The map gives us knowledge so long as it continues to be functional, and we can rely on it until the region changes. If new roads are built or global warming alters the rainfall patterns significantly, then we need to update our

maps in order to accommodate the new facts. So, in this way of thinking, *knowledge is a map of some aspect of reality*; it's a specific model, for a specific purpose, and so it is imperfect (or at least incomplete) by definition. It can be revised and updated as we have access to more facts or our ability to interpret them changes. Truth, in this conception of knowledge, is determined by the functionality of the model. We can believe what the model tells us so long as it works, and we can consider our model to have given us an accurate picture of reality so long as the model is logically consistent and accounts for all the known facts.

16 There are many different types of map. If knowledge is a type of map, what different types of knowledge are there?
17 If knowledge is a map, what counts as a good justification for that knowledge? If it is simply 'what works', are there any kinds of knowledge for which this definition does not really 'work', such as ethical knowledge or artistic knowledge?
18 To what extent does this map-like idea of knowledge solve the problem that arises when we learn that our 'knowledge' is actually wrong?

Thinking of knowledge in this way allows us to avoid the trap of the circular definition of knowledge as justified, true belief. It allows us to say that we can know something based on grounds other than personal belief. It also releases us from the all or nothing thinking that something must be 'true' to be knowledge, and, if not 'true', then it is not knowledge (we shall see that this word 'truth' causes a lot of problems, not least because it can mean different things in different contexts). Thinking of *knowledge as a model of reality* allows us to adapt, refine and correct our knowledge as better information comes along. The model of the atom, for example, has been updated several times over the centuries to reflect the new understanding that results from each new technological advance or documented experimental result. Our knowledge about what happened aboard the *Titanic* in April 1912 was revised significantly when the wreckage was found by Robert Ballard and his team in 1985; it has subsequently been further revised as updated technology has provided us with precise images and data documenting where the pieces of the ship actually landed, and as mathematical modelling has determined what sequence of events was possible, according to the laws of physics. Our ethical models change over time as well; slavery was once accepted in many places around the world as part of a model that reflected the current cultural values, economic practices, and social structures. Now slavery is no longer accepted – and is, indeed, reviled, because the values by which the institution was once justified have changed. The new map reflects more humane values. As ethical understanding changes, so does the map which reflects it. We don't have to be worried that having been 'wrong' about the atom, the *Titanic* and slavery means that we cannot know anything; if knowledge is a model, then to know something is to have accounted for many or all of the pertinent available facts. So long as that model is carefully made and rigorously tested, then it is satisfactory.

Considering knowledge as a model of reality allows us to use the knowledge that we have based on current facts, beliefs and understanding, but it also allows for growth and learning. We must still justify our claims, but there is more range for testing the rigour of our justifications. Rather than saying 'this is justified' or 'this is not justified', maybe we should talk about the **validity** of the justification – for example, 'poor justification', 'strong justification' or 'excellent justification' – leading to greater or lesser degrees of certainty of our knowledge claims.

19 What sort of justifications would lead to 'strong' knowledge or 'weak' knowledge?
20 Revisit the examples in this section and describe the validity of the justifications. Is the 'knowledge' 'strong' or 'weak'?
21 Which of your school subjects give you 'strong knowledge'? Which give you 'weak knowledge'?

How do we proceed from here? We have been arguing about the meaning of words for long enough (this is something that, rightly or wrongly, philosophers are often accused of doing!). Perhaps we need to start looking in greater depth at examples of what we consider to be knowledge, and see how we justify these claims.

What types of knowledge are there?

It is very easy to read, often in reputable newspapers, that news is about facts, and opinions on those facts. **Facts** are disputable (for example, we can argue about the number of computers sold in India in 2012) but there is a right answer to a factual question. Answers which deviate from the facts are wrong. **Opinions** are rather different – you may hear it said that an opinion can never be wrong because everybody is entitled to their own opinion. The notion of freedom is sometimes interpreted as meaning that anyone's opinion is as good as anyone else's.

This is actually pure nonsense. Suppose you are a keen runner, but you break your leg in an accident. Your leg is put in plaster for a month, and when the plaster is removed you are keen to start training straight away. In your opinion, you should start training immediately, and push yourself really hard, ignoring any pain, until you are as fit as you were before the accident. In your doctor's opinion, you should take things very slowly, and stop as soon as you feel any pain.

Which opinion is better? Although it can be argued that this is a matter of belief, because we are trying to predict the future, clearly the belief that is based on reason and experience is a better one; that is, it has a greater chance of being right. This is the kind of opinion most important to educated people, and the kind we will concentrate on in this book. Most people would agree that some opinions are better than others – the difficult thing is to decide how to tell a good opinion from a bad one. In the case of the injured runner, it seems reasonable to trust a doctor, as she will have better reasons for her judgement than a layperson.

Another way to think of this question of reason and experience is to consider that there is personal knowledge and there is shared knowledge. Each of us has our own personal knowledge, some of which is the result of our own highly individual combination of experience and personality. Much of that experience, however, is second-hand. I know, from work done by other people, that the Earth is round. I have seen physical models of the solar system, I have seen photos of the Earth taken from outer space on NASA missions, and I have read about Greek conclusions about the shape of the Earth deduced from shadows and the gradually growing masts of tall sailing ships approaching from the horizon. I do not have personal, direct knowledge of the shape of the Earth, as I have never been in a position to observe or calculate the fact for myself. I know that Beethoven wrote the famed *Moonlight Sonata* because I have heard about it in a class on music history, I have read it on album covers, and I have seen his name on programmes for concerts at which the *Moonlight Sonata* was being played. Beethoven has been dead for 400 years, so I never had a chance to witness his writing for myself. For this and much other knowledge which I personally have, I rely on shared knowledge – knowledge amassed by learning communities

around the world. If I am to rely, for so much of my knowledge, on the work of others, then it behoves me to ensure, as much as possible, that the opinion which I accept is the best-informed opinion available to me. It is better, in other words, to rely on the expertise of the doctor than on the fly-by-night wishful-thinking opinion of the layperson when it comes to treating a broken leg!

This means that we might plausibly argue that there are three types of questions.

- Questions that have one correct answer. Example: how many atoms of hydrogen are there in a water molecule?
- Questions that have multiple possible answers but which require justification and reasoned judgements. Example: what is the best way to tackle the developing world's debt problem?
- Questions that have no correct answer but depend totally on the person answering the question. Example: which type of chocolate tastes best?

Sometimes it is possible to argue about which category a question falls into – for example, 'Is this painting good art?' If in doubt, it is worth assuming that it is a question worthy of debate and exploring how a discussion develops. If it turns out to be pure personal choice, with nothing to be said for one side more than the other, then it will probably turn out to be a short and boring discussion!
If you find yourself coming up with reasons that appeal to 'universal' intellectual standards, such as clarity, consistency, honesty, factual accuracy and so on, then the question is certainly a 'Type 2' question.

22 Do you think three categories of question are enough? Are there any others you could add?

23 For each of the following questions, decide which of the three categories the answer fits into.

- **a** How many planets are there in the solar system?
- **b** Who is the Singaporean minister with responsibility for education?
- **c** When was the French Revolution?
- **d** Is it wrong to kill?
- **e** What is the colour of the nearest wall?
- **f** Does God exist?
- **g** Are you happy?
- **h** Is your teacher happy?
- **i** Is one plus one always two?
- **j** Does violence on television contribute to violence in the community?
- **k** Was Hitler a good leader?
- **l** Can a male doctor know more about childbirth than a mother of ten children?
- **m** Is it possible to know something but be unable to say what it is that you know?
- **n** Will science eventually tell us how and why the universe started?

24 Three categories may not really seem to do the variety of questions justice. If we want to analyse different types of knowledge, it might be helpful to be more specific. What categories might you divide knowledge up into?

It is the appeal to 'universal' intellectual standards which is important, and it is these standards which we shall be looking at in some detail. (Of course, we might argue about 'universal' but to argue at all requires some agreement.) The standards mean that we can at least try to make coherent intellectual progress towards a well-reasoned and justified answer with even the hardest questions.

Good reasons

In answering the questions above, you have begun to justify your thinking. In one sense, this whole book is about justifying our thoughts on various topics; about arguing for what we believe in. We naturally do this all the time – when we explain

why we want to see a particular film, how we solved a maths problem, or the nature of our religious beliefs. Given that justifying our opinions is such an important topic, it is surprising that we usually spend so little time examining whether or not our reasons are actually good reasons, or if some types of reasons are better than others. In fact, most of us probably don't even know the different types of reasons that we have, so this must be our starting point.

25 Below is a rather dubious list of things that we might claim to know, and another list of reasons that we might give to support these pieces of knowledge. Match the reasons to the claims.

Claims	Justification
a I know that the sky is blue.	i Value judgement
b I know that 1 + 1 = 2.	ii Faith
c I know that it is wicked to murder a person.	iii Memory
d I know that I have a fear of spiders.	iv Authority
e I know that I went out for a run yesterday.	v Intuition
f I know that what the doctor said is true.	vi Revelation
g I know that women are more emotional than men.	vii Sense perception
h I know exactly what God wants of me.	viii Logic
i I know that I am going to Heaven.	ix Self-awareness
j I know that a lake is more beautiful than a sewage works.	x Common knowledge
k I know that I love my brother.	xi Instinct

26 Are there any other ways to justify things that we know?

27 Are any of these ways of knowing really the same thing?

28 Which of these do you think are the most reliable ways of finding the truth? Justify your answer.

We can argue about the distinctions, differences and overlaps between the categories given here as there are several possible ways to categorize knowledge. For our purposes, we will suggest that **sense perception** and **logic** form two vital categories of justifying our knowledge claims; later on we shall see how they arise naturally from an examination of everyday, personal knowledge and academic, shared knowledge.

Where do we go from here?

We have seen that there may be good reasons to think carefully about what we claim to know; that knowledge is a multifaceted and complex concept; and that humans are only recent additions to the universe. What hope do we have for certainty and truth when we are so limited? And yet, we seem to have made so much progress, even in the short time we have been around. Our societies are radically different to those of any animals; we know how the stars shine, and we have the power to destroy the Earth. So far we have even had the wisdom not to! Have we overplayed the weaknesses of humankind?

We can begin with the idea that in considering the nature of knowledge and knowledge acquisition, there are two angles from which to proceed: there are things that we already know, and there are the processes by which we gain more knowledge. Perhaps we can begin with a positive approach and start with existing knowledge. Where is that knowledge contained? In our individual and collective memories.

Further study

★ We suggest the rest of this book!

2 Memory

Memories of the past are not memories of facts but memories of your imaginings of the facts.
Philip Roth

Wisdom is founded on memory; happiness on forgetfulness.
Mason Cooley

I think it is a matter of love; the more you love a memory, the stronger and stranger it is.
Vladimir Nabokov

The true art of memory is the art of attention.
Samuel Johnson

Every journey into the past is complicated by delusions, false memories, false namings of real events.
Adrienne Rich

His memory is like wares at the auction – going, going, and anon it will be gone.
Herman Melville

Memory ... is the diary that we all carry about with us.
Oscar Wilde

That is my major preoccupation – memory, the kingdom of memory. I want to protect and enrich that kingdom, glorify that kingdom and serve it.
Elie Wiesel

Human memory is a marvellous but fallacious instrument. The memories which lie within us are not carved in stone; not only do they tend to become erased as the years go by, but often they change, or even increase by incorporating extraneous features.

Primo Levi

The difference between false memories and real ones is the same as for jewels: it is always the false ones that look the most real, the most brilliant.

Salvador Dali

We are able to find everything in our memory, which is like a dispensary or chemical laboratory in which chance steers our hand sometimes to a soothing drug and sometimes to a dangerous poison.

Marcel Proust

The things that come into being change continually. The man with a good memory remembers nothing because he forgets nothing.

Augusto Roa Bastos

Woe to that nation whose literature is cut short by the intrusion of force. This is not merely interference with freedom of the press but the sealing up of a nation's heart, the excision of its memory.

Alexander Solzhenitsyn

. . .
most of the moments of our life . . . are completely lost by the remembering self. And yet, somehow you get the sense that they should count, that what happens during these moments of experience is our life.

Daniel Kahnenam

. . .
memory is the only way home

Terry Tempest Williams

Aims

By the end of this chapter you should:

- be able to discuss the difference and relationship between personal and shared memories
- be able to explain how we form memories individually
- be able to explain how we retrieve memories
- be able to identify problems with memory
- understand the ways in which we counteract potential problems with memory
- understand the way that formal areas of knowledge function as centres of shared memory for memories on a cultural, national or international level
- understand why it is important for researchers to adhere to ethical practices.

Introduction

If we ask you what 9×12 equals or what city is the capital of Australia or what you did to celebrate your last birthday, you will consult your memory for the answer. In the case of all these questions, you will likely be able to retrieve an answer on the spot, as these are subjects to which you have had past exposure, and the answers are stored in your brain. How easily you can come up with an answer will depend on how well the answer was stored when you originally encountered it and how often you have had to retrieve it before, as it is generally easier to recall information we use often than it is to recall information we haven't had to think about for a long time. As you give us your answers, however, you may realize that you are more certain of some than of others. Perhaps the personal question about your birthday would be the easiest to answer, as you were there and experienced it directly – and because it was likely to have been something important to you. If you memorized the times tables when you were young and have a good understanding of number relationships in multiplication, you'll have no trouble with the maths question. If you live in Australia, then you will certainly know the capital city without having to think twice, but if you live half a world away, maybe you can immediately think of the name of a city, but then you might second-guess yourself: that's a city in Australia, for sure, but is it the capital? You might have to look it up to be certain.

1 Which of the questions above would be easiest for you personally to answer? Why?
2 Are there any you could not answer? Why or why not?
3 Of which of the answers you gave are you the most certain? Why?

Primary source of knowledge

With questions such as these, nevertheless, your first step, when asked for knowledge, would be your memory. Only if your memory failed you would you move on to try some other means of knowledge making – here, perhaps, a calculator, an atlas, a photo. Our memories, then, are the primary source of knowledge that we have already acquired. So it's hard to imagine how we could get by practically in our daily lives without constantly using our memory for solving all kinds of problems: which way to get to school, which classrooms to go to, how to greet our friends, how to write … in fact, how to **function**. Memory is

What if you could not remember any of your life story?

so integral to everything we do that it is difficult to imagine life without it. And because it is integrated so tightly into our daily lives, in fact, the importance of memory goes far beyond the immediate practical details. Imagine that you forgot all your personal stories, the people in your family, where you live, your friends, your interests … everything. You'd have to ask yourself the question … would this still be you?

Strange as it may seem, there have been cases with patients who have just such neurological problems. The neurologist Oliver Sacks, in his book *The Man Who Mistook His Wife for a Hat*, tells stories of many such people. A patient he calls Jimmie, for example, although 49 years old, thinks it is 1945 and that he is 19 years old, because not only has he forgotten everything since 1945, but he also cannot form any new memories. In the most extreme cases, people with no ability to form or access their memories seem, tragically, to have lost their sense of identity. So, as we shall see and explore, memory is about far more than just recording facts. It's also central to establishing who we are as human beings and to engaging with the world in a much broader sense.

How does memory work? How do we get knowledge into our memories, and how do we get it back out? How do we know whether the memories we have stored and have retrieved are accurate? My memories are my memories – no one else has access to them, and I have no access to anyone else's memories. Or do I? In this chapter, we will explore the answers to these questions.

What do we know from memory?

If memory is a **way of knowing**, perhaps the first question we ought to pursue is the question of just what it is that we know through memory. We saw in the introduction to this chapter that there seems to be quite a lot that we know through using memory. In fact, one way to think of it is that we know everything that we have ever encountered in the past because of our memory. This includes all of our personal knowledge, knowledge that we have derived from direct, individual, experience.

Procedural knowledge

One type of personal knowledge that we have stored in our memories is the knowledge of how to do things. Your knowledge of how to walk, ride a bike, brush your teeth, log on to your computer and launch your browser, answer the telephone, and hit a tennis ball are all examples of things you know how to do. Philosophers call this **procedural knowledge** – and for most of these things, this type of knowledge is so deeply ingrained in your memory that you don't have to think about how to do them. Some, such as how to walk, you might even be hard put to explain to someone else. Hitting a tennis ball might be a slightly different kind of skill, and, like many other similar skills, how conscious you are of what you are doing depends on the degree to which you have mastered the skill. If you are a new tennis player, you may still be very conscious with each attempt of trying to organize your feet and hands and arms, of how to hold the racket, and when and where to swing it. If you are a seasoned player, you probably do not think about these things while in the middle of the game; the knowledge is so deeply embedded in memory that it can be called on with no conscious processing at all. In fact, it may well be that the price of real expertise is that it *cannot* be conscious, but must rely on memory. If a tennis player has to think about the precise stance of the body, the position of the head, the relative

motions of shoulder, elbow and wrist to generate just the sort of spin he wants, he probably has missed the shot. Perhaps expertise is all about memory; that would certainly explain why experts have always trained for so many thousand hours.

4 Think of five things you know how to do. How did you learn them?
5 Are you conscious of *how* you do the things you mentioned in Question 4? If not, what role does memory play? Does it play the same role for all people, regardless of experience? And for all skills, regardless of their nature?

Personal knowledge

Another kind of personal knowledge that we have stored in our memory is the knowledge of our likes and dislikes. This is a highly personal kind of knowledge, dependent on individual taste. If we ask you, for example, what your favourite kind of soup is, you might tell us that it's Borscht or Chicken Noodle or Egg Drop. You know because you have eaten many kinds of soup before, and you remember which one you liked the best. Based on that memory, you probably ask for it over and over again at home or in restaurants. Similarly, you can easily tell us who your best friend is, who your favourite singer is, and which soccer team you like best, as well as what your favourite colour or book or television programme is. All of these things you remember because you have had extensive direct experience with them in the past, and you can easily compare and contrast the various experiences to determine which one gave you the most pleasure.

6 Who is your favourite singer? How do you know that this person is your favourite singer? How easy is it for you to remember his or her songs? Does that memory reinforce your affection or undermine it? Why?

Personal experience

Related to this kind of knowledge about our personal tastes is a third, and very important, kind of knowledge that we have because of our memory: the memory of our personal experiences, which comprise the memory of ourselves, for as long as we have been alive. This kind of memory has been called **episodic memory**, and it is regarded by many philosophers as what gives us our identity – that is, what makes us *us*. In a way this seems obvious – our string of memories gives us a story, a context in which we can know ourselves.

Try to imagine what it would be like to wake up one morning to find the narrative is gone. You would have no memory of anything that had ever happened to you. Your memory of skills would be intact, so you could still think, eat and walk and speak your native language, but you couldn't recognize anyone, or remember anything you'd ever experienced or accomplished. You wouldn't know what a tennis racket is when you see it, but if someone puts one in your hand, you would know how to use it to hit a ball. If someone told you, however, that you were a champion tennis player on your high school team, you wouldn't remember anything about it – when or where it happened, what you did, or how winning the regional tournament made you feel. How do you think such a catastrophic loss of your memory would make you feel?

7 The situation above may seem far-fetched, but remarkable cases of amnesia have been observed, often related to neurological damage. Try to imagine what it would be like to be in such a situation. What does the thought experiment tell you about the relationship between our sense of self and our memory?

Shared knowledge

So we have seen that each of us, individually, has a mind full of memories of various types, and that that knowledge is important to us for a great deal of the activity that we engage in on a daily basis, from getting out of bed in the morning to reflecting on the kind of person we managed to be over the course of the day. That kind of knowledge derives directly from our personal interactions with the world. Much – maybe even most – of our personal knowledge, however, derives from shared knowledge. That is, much of what you have stored in your memory you only know because someone else told you – you have not had any opportunity to experience it for yourself. Think about how much of what you know you have learnt from your parents, your friends, your teachers, television programmes, the internet or the newspaper, to name just a few sources.

How do you know, for example, that men have walked on the moon? You haven't personally been to the moon, nor were you present in Apollo 11 to witness the first manned lunar landing with your own eyes. When we ask you, then, to tell us what you remember about the moon landing, and you tell us that you know that the Lunar Module, *Eagle*, landed on the moon as part of the Apollo 11 mission on 20 July 1969, and that Neil Armstrong, as he took the first human steps on the moon, famously marked the occasion with the memorable description: '*One small step for man; one giant leap for mankind*', you are remembering information that other people amassed and recorded and shared with you. Perhaps you have a relative who remembers watching the moon landing on television. Perhaps you have seen the video footage – you can view this at http://tinyurl.com/pz7pza5. Perhaps you have read about the event in history books, or you've seen the news articles from the time. Your knowledge of the moon landing is **personal**, in that you personally know it, but it is also **shared** with other people. That is, the reason you know it is that other people – the vast majority of whom you have not met – have documented it and stored it in our cultural memory. They have done this using a variety of forms that allow for many people to have access to something that was directly experienced by only a relatively few people.

8 Consider the following list of knowledge claims. Which of these claims would you say that you know because you have already learnt them and can call them up from your memory? Which do you know from direct personal experience and which from exposure to shared knowledge? Are there any that you cannot answer because the knowledge is not in your memory?

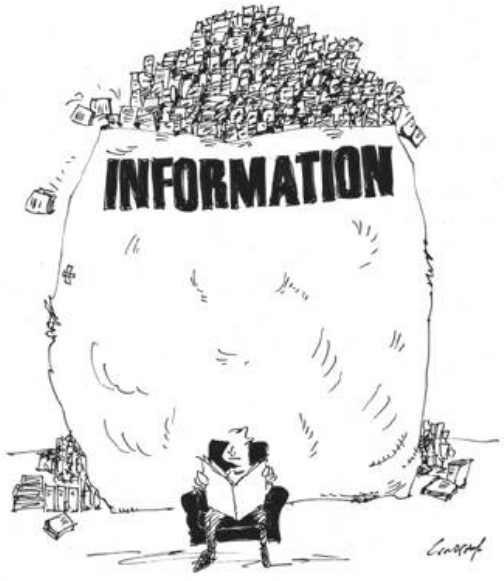
- **a** Neil Armstrong landed on the moon on 20 July 1969.
- **b** I know how to swim.
- **c** I like chocolate.
- **d** The longest known period of diapause in insects is 30 years.
- **e** Einstein's theory of relativity includes the equation $E=mc^2$.
- **f** Stravinsky composed *The Rite of Spring*.

Cultural and shared memory

We can, then, talk about **cultural** or **shared** memory as well as **personal** memory. Our shared memory consists of the sum total of all knowledge that has been amassed and stored. The means by which this knowledge has been stored ranges from all the individual personal memories of everyone alive today to all the media in which information, events and experiences have been formally or incidentally documented for posterity: tapes of television programmes, microfilms of old newspapers and the newspapers themselves, books, photographs,

audiotaped interviews, websites, personal letters and diaries, professional journals, published and unpublished doctoral dissertations, and on and on.

The number of resources containing information about past events is not quite literally endless, but the collection is so vast that no one person could possibly know more than a fraction of the shared knowledge which is collected and available for perusal.



Cartoon from www.cartoonstock.com

9 Where is most cultural knowledge stored these days?
10 Suppose there is a book that no one alive has read, and the knowledge in it is not recorded anywhere else. Is this knowledge part of personal knowledge? Is it part of cultural knowledge?
11 If you said, in answer to Question 10, that the knowledge can be cultural but not personal, do you think there are any issues with something being *knowledge* but not known *personally* by anyone?
12 Does the same issue apply to knowledge that is automatically collected in a computer database? Is it knowledge if no one has looked at it?

We will examine the advantages of, and problems associated with, this massive collection as we investigate the various **areas of knowledge** (especially history), but for now let's consider some of the basics.

How do we create memories?

Using memory as a way of knowing consists of (at least) two important processes: the making of memories (or the storing of knowledge in our brains) and the retrieval of memories. Storing information in our brains occurs as a biochemical process. Sensory data (sounds, smells, tastes, images and physical sensations) are converted into electrical–chemical signals that travel from the sense organs to the brain, where they are filtered and stored.

This process causes changes in the physical make-up of your brain – but this is not like simply writing a sentence in a book, or storing a number on a spreadsheet. The key is that the memories are laid down *connected to existing memories*. To oversimplify, we can say that each time you experience something your brain cells forge new connections with other brain cells housing similar experiences,

■ Electrical impulses in the brain

so that your experiences are encoded in a vast network which joins similar things together. This simple-sounding but remarkable feature (it is a mystery how we can automatically know what is similar to what) allows us to remember things more easily, because they are connected to other similar things. You can imagine that if you had to remember every experience you ever had as a separate experience, unrelated to all the others, it would be extremely difficult to keep track of them all.

Using memory

To understand something about how your memories are stored in networks, try this exercise. Get together several of your friends (this works best with a group of people), and tell them that you are going to ask them a series of easy questions. You want them to answer the questions out loud, in unison, without stopping to think about their answers. Then ask five or six simple questions. These need to be questions with very easy answers – yes/no questions, for instance – such as 'What is your name?' 'Is today Wednesday?' 'Are we on Mars?' and 'Where do you live?' Ask the questions at a steady pace; don't pause between questions. After a few questions, when the group is answering easily, hold up a blank sheet of white paper and ask: 'What colour is this?' The group will answer: 'White'. Then ask: 'What do cows drink?' The group will answer: 'Milk'. At this point, you can just stop and wait. It will take a moment before everyone realizes that that was a silly answer. Cows do not drink milk; they drink water. (Though don't be surprised if the clever one in the group argues that at least baby cows drink milk!) If you then ask your friends why they all said 'milk', they will probably be able to figure out that their brains made a natural association linking 'white', from the previous question, to 'cows' and 'drink' in your last question. A white drink related to cows is, of course, milk, and because they were not stopping to think, what came out as their answer was the logical result of those associations. This is a simple example, but similar **priming** effects have been shown in a variety of contexts; for example, if people are asked to complete the word 'sto–' then people who have previously been primed by being asked to read a list of words containing the word 'story' would be more likely to write 'story' than those who have not.

Connected concepts

The exercise on page 19 provides you with a clever way to catch your brain at work. Your memory is not a tidy collection of DVDs stored on shelves; it is, instead, quite literally, a vast web of connected concepts. 'White' is associated not only with milk, but may also be associated with paper, snow, swans, clouds, ghosts, cotton balls, weddings, purity, and any number of other objects and symbols that you have encountered in your life. 'Cows' may be associated with milk, cheese, farms, black and white spots, calves, horns, sheep, the picture in your grandmother's kitchen, and a large number of other experiences you've had that caused you to connect the idea of 'cow' to something else.

13 Make a list of as many things as you can think of that you associate with cows. Compare your list with that of a friend. What are the similarities and differences? What do you think accounts for them?

14 View this short video from the American Public Broadcasting System programme *NOVA Science Now* on 'How Memory Works': http://tinyurl.com/nkyqdsl. What does it reveal about the relationship between short-term and long-term memories?

Improving your memory

Because your memory consists of this vast web of connections, you can improve your memory of any one thing by making as many connections between that thing and other things as possible. You are familiar with the experience of 'memorizing' something by repeating it over and over – using flashcards, perhaps. The repetition strengthens the physical connections that that concept has made in your brain and makes it easier to remember. So does connecting it to other concepts, which is why it is easier to learn things in context than in isolation. Think, for example, of a student required to remember all the American presidents in order. Most American students can rattle off the first two and the most recent three or four, but few others. The first two can be remembered because American students usually learn them within the rich context of the Revolutionary War and the writing of the US Constitution of the United States, and the last few are those who were president during the students' lifetime. It's much easier to remember the other presidents once you start learning the historical context – Abraham Lincoln and the Emancipation Proclamation, Harry Truman and the Second World War, John F. Kennedy and the race to the moon, and so on.

15 Did you have to memorize the multiplication tables? Was it easy for you or difficult? How did you set about it? How well do you know them now? Do you know the 12 times table as well as you know the 5 times table? Why or why not?

16 Think of a time that you crammed for a test by repeating certain information over and over again. Was that a successful strategy? How long did you remember the material?

17 Think of a subject – from schoolwork or elsewhere – that you know a lot about and about which you can recite a great many facts without looking them up (the First World War, your favourite cricket team or Beethoven's symphonies, for example). Why are you able to do so? How is this different from your learning when you have to cram for a test?

How do we retrieve memories?

Retrieving memories is a matter of activating the network so that it calls the relevant knowledge up into consciousness. Most of the time, you probably remember things without even noticing that you are doing it. You don't have to

try, for example, to remember how to get from home to school, or how to brush your teeth, or how to set up your harp for the concert you are about to play in. If someone asks you, as we did above, to remember your birthday last year, most likely the experience just pops into your head without any conscious effort on your part. That's because the system operates automatically. The brain receives cues, in the form of sensory data, and it responds to those cues automatically, which is why most people experience a running commentary in their minds.

Improving memory recall

We can control memory recall to some degree, however, by focusing on certain cues. If you're trying to remember the name of the artist who painted *Starry Night*, then you feed a set of cues to your brain – most probably an image of the painting and the idea of a painter – and your brain, if it has Vincent van Gogh's name stored, gives you back the information you wanted. If the system is working smoothly, you experience no difficulty and no passage of time.

In order for that system to work smoothly, though, several things need to have happened: first, you need to have encoded the information well, so that among the many neural connections to *Starry Night* is one to the name of an artist, Vincent van Gogh, and from both of them to the idea of creation, paintbrushes, canvases and so on. The better encoded the information, the easier it is to access. Second, you need to have paid attention at the time you heard or read about the artist who painted *Starry Night*, or saw the painting. Finally, the retrieval system needs not to be broken. Only if some part of this system doesn't work do you experience a struggle to remember. In such a case, you have to search through your mind for the information you want.

18 Are there certain things that you find it difficult to remember? Directions? Dates? What does this tell you about your memory system?

19 When you know you need to remember something later, what do you do to make sure you remember it?

Storing memories

One common, but misleading, model of memory

Because the experience of remembering is so often experienced as a simple system of cause and effect, we tend to conceptualize our memories in simple terms. One common metaphor for memory is the filing cabinet.

We store our experiences in files and when we want them, we simply open the drawers, skim through the tidily organized files, select the right one and use it. This is not really an accurate depiction, however. As we saw with the white paper and cow activity, the information isn't stored tidily, in alphabetical order. It's probably just as well for us that it isn't; if information in our brains were stored the way information is stored in filing cabinets, we would not have the rich array of connections to each piece of data that helps us see relationships between things and which allows access from many different directions in many different contexts. Remembering would also be much harder, as we would have to access everything we ever knew via its own unique pathway.

In addition to experiencing your own memory as a smoothly functioning library, you probably also experience your memories as something like a movie playing back, but that is not a reflection of how the experiences are

stored in the brain. In fact, current understanding of the brain suggests that different aspects of experience are stored separately. The taste, smell, texture and colour of the chocolate chip cookie you ate with your lunch last week are stored in different areas of your brain. When you remember the chocolate chip cookie, your brain pulls up those separate features and reconstructs the cookie, which you then experience as a whole object. The critical word here is 'reconstructs'. You don't remember the cookie. You remember a bit of smell and a bit of flavour and a bit of colour, and then your brain correctly deduces, based on the context in which you are remembering those particular things, that the idea of a chocolate chip cookie would be useful right now, and so generates one for you.

20 Try remembering what you ate for lunch yesterday. Do you have a clear memory? Did you eat something you have eaten many times before? Do you think that your memory of yesterday's lunch is a precise memory of that exact experience, or do you think you are remembering just generally what it's like to eat a turkey sandwich in the school cafeteria?

21 Try to remember three or four other distinct experiences of eating the same kind of lunch in the same place. Can you do it? Or are all the memories pretty similar? If you can tell them apart with certainty, what allows you to do so?

22 How do you experience your memory of yesterday's lunch? Do you have a strong visual impression? Can you remember tastes and smells? If you ate your lunch with someone else, try asking that person or those people what they remember about what you ate. How well do your memories coincide?

Problems with memory

We can already see that the way we store memories and the way we retrieve them leads to some problems, both in terms of our ability to remember things at all and in terms of our ability to know whether what we remember is actually true. Daniel Schacter, Chairman of the Department of Psychology at Harvard University, has identified what he calls the seven sins of memory; they identify various types of problems with which you are probably familiar, ranging from the inability to stop having memories that you don't want (this is a common problem suffered by people who have suffered a traumatic experience) to simple absent-mindedness. You can see that many of these problems arise from the fact that we don't record our memories in exact detail, like a movie camera recording events perfectly.

Daniel Schacter's seven sins of memory

- **Transience**: the loss of memory over time
- **Absent-mindedness**: the loss of memory due to a lapse of attention
- **Blocking**: temporary inability to access a memory
- **Suggestibility**: the altering of memory due to suggestion
- **Bias:** alteration of a memory due to later knowledge of a situation
- **Persistence**: the recurrence of a memory that one doesn't want to recall
- **Misattribution**: assignment of memories to an incorrect source, or believing you remember things that you did not experience

Constructing memories

One particularly important implication of the fact that memory is actually an act of construction – a creative act – is that the powerful sense of accuracy and reality that we experience and the trust we place in our memories are somewhat misleading.

Earlier we said that when you remember something, your brain reconstructs it from separate bits of data. When you remember the goal you scored in the football match you played last Saturday, it seems you don't remember the precise ball, goal cage or jersey worn by the goalkeeper. Instead, you remember a generic ball, a generic goal cage and any jersey from the other team's uniform. Your mind then puts them all together to fill in as details around your memory of kicking the ball over the goalie's head and into the net. Your memory, then, is in some essential ways inaccurate. What you remember as the ball you kicked isn't really the ball you kicked.

The same is true of every memory you have. When you remember what a good time you had at a party last Friday, and you replay it in your mind, you are actually remembering an approximation of that experience created for you by your brain using some key details that are stored there. Now that's not to say, of course, that your brain simply makes most of it up! There will be many facts that constrain or assist the reconstruction – for example, if every day you walk past the house where the party took place, your mind can draw on those experiences to ensure the accuracy of the reconstruction. But in the absence of these fixed points, it's easier for the story to drift. You are probably familiar with the related Chinese-whispers idea, or the fisherman's memory of the 'one that got away'. In this context, perhaps you simply weren't as funny as you think you were at the party! This explains why our memories differ from those of others. A good way of thinking about this is to imagine the difference between a digital recording (exactly the same each time you play it) and a jazz improvisation (different every time, sometimes marginally, sometimes fundamentally). Ironically, since an experience is recreated every time you think about it, the more frequently you think about it, the more it gets distorted.

Eventually, we may end up remembering not our experience, but our memory of the experience, and then our memory of our memory, and so on, without ever knowing the difference. It may, therefore, be that in those cases where we have no independent means of verifying a memory, the more it drifts; and that even if a memory appears to be clear and accurate, that may be no guarantee as to its accuracy.

"Dad, how long before the warm glow of nostalgia makes this a good ole days memory?"

Cartoon from www.cartoonstock.com

23 Think of a memory which you have thought of many times and which you share with other people. Perhaps it is a particularly memorable and cherished family holiday. Maybe it is of the first time you met your best friend. Write down as much detail as you can remember about the event, and then ask the other people who were there to read your account. How accurate do they think it is?

24 Think back to the comparison of your memory of yesterday's lunch with your friends' memory of yesterday's lunch in Question 22. Compare that memory experience with the one in Question 23. Which experience generated the higher degree of similarity? What accounts for the differences in each one? Do you think that the storage of the memory or the recall of the memory was a bigger problem?

Flashbulb memory

For a long time, people argued that there are some events which are so powerful that they imprint themselves on our minds indelibly. One type of memory is known as the **flashbulb** memory, named after the flashbulb on cameras, which lights up a scene brightly enough for a brief moment so that the camera can catch things that the eye cannot see in the prevailing light. The idea with flashbulb memories is that the emotional impact of an event was so powerful that the brain took in every small detail and preserved it for ever, like a photograph. In the United States, for instance, many people who are old enough to remember the assassination of President John F. Kennedy will tell you that they remember exactly where they were, who they were with and what they were doing when they heard the news. More recent events that generated the same feeling of 'I will never forget this moment' include the explosion of the space shuttle *Challenger* and the destruction of the Twin Towers on 11 September 2001. If you ask people to recount those moments to you, many can do so in great detail.

Numerous studies now show, however, that these memories are not as accurate as their possessors think. In his book *Memory Observed: Remembering in Natural Contexts*, Ulric Neisser describes a study of flashbulb memories following the *Challenger* disaster. The study gathered data on the morning after the event in January 1986 and then from the same respondents nearly three years later, in the fall of 1988. The results showed that, despite reporting that they had clear memories of the event after three years, the participants did not, in fact, remember accurately. In some cases, the alterations to the memories were dramatic: one participant reported in 1986, for example, that she was in the cafeteria eating lunch when she heard the news, but three years later she reported that she was in her dorm room and heard the news from a screaming girl, running down the hall (87). Imagine how much worse memories must be of events that seem vivid after 50 years!

Physiological problems

Finally, in addition to the kinds of problems with memory that arise from the way that we make and recover our memories, there are the kinds of problems that arise from physiology. We mentioned earlier the extreme forms of amnesia that sometimes occur after serious injuries to the brain. We are also all increasingly aware of the sorrow and suffering that arise from the deterioration of the brain resulting in senility or Alzheimer's disease.

Do all these problems mean, then, that nothing we remember is actually true? How can we be certain that we have any access to reality, if our minds simply construct the past for us instead of playing it back on tape and we have no way of knowing which problems are interfering with our ability to recall what we once knew?

Compensating for problems of memory

Actually, we needn't be too quick to conclude that nothing we remember is true. In fact, your experience will have taught you that most of the time your memory is entirely functional. You don't get lost on the way to class, you don't forget who your mother is, and you remember the 9 times table very easily. Even in the flashbulb study mentioned earlier in the chapter, not everyone's memories were deeply flawed. Many people recounted a story pretty nearly the same way after three years as they recounted it one day after the event. So in many ways and in many situations our memories work just fine and it is safe to say that not all memories are bad ones. The trick, then, is to find ways to check our memories in order to validate them (we cannot rely on memory to validate itself!).

Since one factor in remembering well is the effectiveness of the encoding process, then one way to combat problems with memory is to encode important information better. There are myriad ways in which we can strengthen and increase our ability to remember accurately. For one thing, repetition of any information or experience will help you remember things better. This is why flashcards can help you learn certain kinds of facts. That kind of repetition, however, is generally only good for the short term. If you've ever memorized various technical terms for, say, your psychology test, you are probably familiar with this. If you simply memorized definitions by using flashcards, you may have remembered the meaning of 'schema' for the test but, two or three days later, found that you couldn't remember it at all. In order to be able to recall something over the long term, you need to generate more connections to other knowledge; to make more associations between the new meaning and what you already know. Reviewing facts you want to memorize in a wider context will thus encode your memories more thoroughly. So, for example, learning the meaning of 'schema' in conjunction with several familiar examples of schema and how they change over time will help you remember better over a longer period.

Using mnemonics

Another strategy for combating memory problems has to do with building a mechanism we can employ to make recall of certain kinds of knowledge easier. You have probably used mnemonic devices (named after Mnemosyne, the Greek goddess of memory). Maybe you were taught some of these in your science classes: Roy G. Biv is a made-up name which contains the first letters, in order, of the colours of the rainbow (red, orange, yellow, green, blue, indigo, violet). 'Richard of York Goes Battling In Vain' is an alternative mnemonic for the same information. If you have learnt this amusing sentence: 'King Phillip come out for goodness' sake!' it will allow you instantly to recall, years after you last thought of them, the names of the various hierarchical levels of the taxonomic categorization of living things: kingdom, phylum, class, order, family, genus and species. Other areas of knowledge use mnemonic devices as well: one easy way to remember the first 15 digits of pi (3.141 592 653 589 79) is to memorize the sentence '*Now I need a drink, milkshake of course, after the heavy lectures involving quantum mechanics*'. Then you need only count the letters in each word (think about it), and the beginning of pi will stay with you for a long time.

25 What are your favourite mnemonic devices? Are there any that you learnt long ago but can still recall without effort?
26 Are there any mnemonic devices that you remember but without remembering what they stand for? Why do you think that happens?

This strategy has been developed to a world-class level by people who wish to demonstrate the power of our brains to remember things if we are properly trained. Participants in the USA and International Memory Championships, for example, rely on an ancient mnemonic technique known as the 'Memory Palace' to allow them to do things like memorize long lists of random numbers in five minutes (the record, according to the USA Memory Championship website, is 303 digits in a row) or memorize all 52 cards in a randomly shuffled deck as fast as possible (the record for that is 1 minute and 3 seconds) ('USA Memory Championships'). Most of us have no need to memorize 52 cards in just over a minute or to recite 303 random digits in a row, but the fact that people can do this as a result of conscious and conscientious effort shows us what is possible in terms of strengthening our ability to remember. You will often hear the brain described as being like a muscle; of course it is not a muscle, but like a muscle it can be strengthened by frequent and reasonably strenuous activity and a good diet. We can improve aspects of memory through use and practice.

Independent verification

We do, however, need to be aware of the 're-creation' problem, for which mnemonic devices are no solution. The best way to compensate for that is to routinely build in checks where we need to get our memories right.
We have many ways in which we can verify our personal memories; the idea is to look for independent verification. Maybe you tell a story at a family gathering about that time you were all travelling in France and took a wrong turn down some country roads and went 60 km out of your way before your father figured it out, and your father speaks up and says, 'No, that wasn't in 2009; that was in 2011,' and your then mother contributes the fact that '… it wasn't just outside of Paris, it was way down in the south of France.' Perhaps your father argues with her, and eventually you all get out the photo album and the map and settle the argument that way. We do this kind of negotiating all the time, and it gives us an excellent way to clarify and correct our memories of past events. For verification of the memories of our personal experiences, we can turn to friends and family members as well as to journals, letters, planning calendars, and many other records of our individual lives.

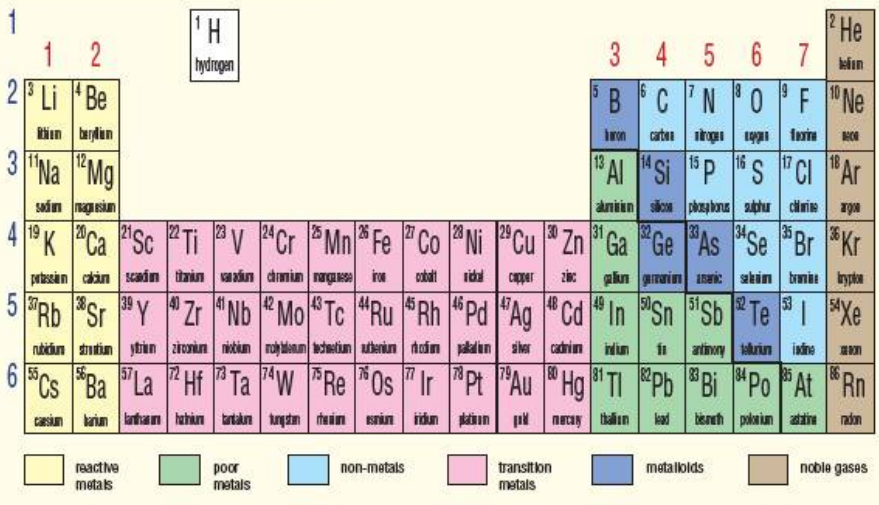
27 Can you think of some times when you have been sure about a memory but it turned out to be wrong? How did you find out it was wrong?
28 Are there any memories you have where you have disagreement with someone, but have no means of verifying the truth? Does this mean that the 'truth' is in some sense 'gone' and all you have is 'belief'?

We have suggested that you look for independent evidence to check personal memories. Of course this may not always be available but, even when it is, there is clearly a problem here. When we look elsewhere for verification, we are essentially turning to cultural and historical memories to help us with our personal memories. But these are hardly likely to be perfect, so how do we go about ensuring that *they* are correct?

Shared memory

One way to think about the rest of the content of this book is as an investigation into how we forge shared memories. The chapters on the various areas of knowledge delve into the means by which we discover or generate knowledge in those areas, with, importantly, an emphasis on how we validate the accuracy of that knowledge. The process, in each area of knowledge, includes the procedures by which the knowledge is recorded and shared and stored for posterity. This does not mean, of course, that all the findings in any given area of knowledge are accurate; just that they are currently believed to be so. Practitioners in each area of knowledge are aware of the need to continuously check current understanding, to update cultural and historical memory. Just to consider one example for now: the ancient Greeks believed that there were four elements: air, earth, fire and water. That incorrect cultural memory has not persisted, however, because of advancing technology and continued research. Over the years we have amassed enough shared knowledge about the relationship of the elements to each other that we can now predict that it is not possible to find any more naturally occurring elements. We now have a very high degree of confidence in that knowledge, which in an important sense simply means that we trust the shared memory that scientists have created.

29 Compare these two tables of the elements. The first is a table developed by John Dalton in 1808, and the second is the modern Periodic Table of the Elements. Each one is a preserved memory of shared or cultural knowledge. How do we access these memories? Which one is more accurate? How do you know?



Fraudulent behaviour

Sometimes the updating of shared memory does not occur as the result of ongoing research, but rather due to a sudden discovery that something we have confidence in turns out to be wrong. One reason that this sometimes happens is that an individual contributor to cultural memory engages in unethical behaviour. Consider, for example, the work done over years by biologist Marc Hauser, formerly of Harvard University, on the evolutionary basis for ethical behaviour. When Hauser was recently discovered to have manufactured data to support his thesis, that discovery sparked a lengthy investigation that ended with his resignation and the initiation of what will surely be a long and laborious process of re-validating his work, some of which may now constitute false shared memories of work done in science ('Scientists revisit a monkey study gone wrong'). Or take, as another example, the journalist Jonah Lehrer, who was caught manufacturing quotations for a recent book. Now the copy on your bedside table contains false memories; and Lehrer had to resign his position with *The New Yorker* ('Jonah Lehrer's Plagiarism Scandal'). Investigation into his other, previous, work has turned up numerous additional problems of attribution and factual accuracy. Interestingly, the fact that both of these people were caught illustrates how shared memories are corrected. Once work is public, the public can serve as a natural army of fact checkers. Sooner or later, a scientist will question the factual basis for claims made in a fraudulent paper. Inevitably, a lifelong fan of Bob Dylan will notice (as one did) that Jonah Lehrer has ascribed opinions to Dylan that have never appeared in any other public document, and the false information will be exposed.

Validation and re-validation

These particular problems arose from fraudulent behaviour – but other problems may stem from the fact that, at any given moment in time, we are limited in our ability to make or discover knowledge by the facts and the methods available to us. We do not have a perfect path to the truth, and we make mistakes. One important aspect of any knowledge-seeking endeavour, therefore, is the **validation** and re-validation of whatever we already think we know.

As new technologies are developed, we are able to revisit old findings with fresh eyes, as it were, and to answer questions or challenges. Let's take, as just one example, a restoration of the video that was televised in 1969 of the first moon landing. Modern digital processes have allowed people to see much clearer images. The video is available on the National Geographic website at http://tinyurl.com/q6u5st8. If you watch it, you will be interested to note that in addition to showing the footage, the people who made the tape are careful to explain how the restoration was done, so that we understand that no information was added to the original footage. It also tells us that no secrets were kept at the time – all the video that was taken was, in fact, played on television during the live broadcast in 1969. This is one of many examples of how modern technology allows us to check and verify our combined social and historical memories.

30 What are some examples of formal shared findings that were once considered to be knowledge, but which had to be updated later because better understanding came along? How did that come about?
31 How important do you think it is for societies to keep checking and re-checking their findings?
32 Should people who engage in professional misconduct in a field of knowledge making have to resign? Why does it matter?

Lost knowledge

Not all knowledge, however, is recorded for posterity, and such knowledge is lost when the individual minds in which it is stored cease to exist. Once no one living remembers a particular experience that was never written down or otherwise recorded, that knowledge is forgotten to the culture, as well as to the individual. That knowledge is, in practical terms, lost, just as some of our personal memories are lost during our lifetimes because we can no longer recall them. Even when knowledge has been recorded, some of it – even much of it – is inevitably going to be lost simply because of the overwhelming amount of shared knowledge that has been amassed over the ages.

Areas of knowledge

As you work through the rest of the book, consider the ways in which the practitioners of the various areas of knowledge structure their studies and their recording of their work for posterity specifically to maximize the strengths of memory and the other ways of knowing, as well as to minimize the potential problems. Notice that each of these areas has expectations for a certain level of ethical behaviour – and often they have explicit ethical standards – specifically intended to ensure the truth of the knowledge that gets sent into the future as memories of work done and discoveries made.
The accuracy of the knowledge we send into the future is taken as serious business; people who do not adhere to the expected standards for verifying and recording knowledge find that they are no longer welcome in the profession. This surely says a great deal about how much we value our shared memories and how great are the lengths we are willing to go to, as a community, in order to preserve them accurately.

Where have we been? Where are we going?

Memory is a way of knowing. It is our mechanism for storing and retrieving knowledge for longer than a few seconds. Other ways of knowing are necessary in order for us to be able to create the memories and to understand their significance when we retrieve them. As we have seen, there are many problems with memories, and those problems suggest that we are best served by the conscious construction of knowledge so that we have ways of increasing the accuracy of what we remember. We have also seen that much

of our own personal knowledge is actually knowledge that was developed or discovered by other people – people we never had a chance to meet. Given that fact, how can we feel confident that what we know is true? The more we know about *how* our shared knowledge was amassed and the steps that were taken in order to ensure its accuracy, the more confident we can be. It is, in fact, one of the important goals of this book to help you be able to assess the validity of the knowledge you gain from others. You can do that by understanding that each of the formal systems of knowledge generation – the areas of knowledge – has its own methods for ensuring the highest degree of validity possible.

We will begin with an area of knowledge in whose findings we place a high degree of confidence because it is known for its careful methodology and its rigorous standards for checking its findings: the natural sciences.

Further study

- The May 2010 edition of *Smithsonian* magazine ran an article about how the brain constructs memories and the implications of that process. The article, by Greg Miller, is entitled 'How our brains make memories' and can be found online at the Smithsonian website: http://tinyurl.com/d5cc9um.
- For further information about the USA Memory Championships and the methods that participants use to improve their capacities both to remember and to recall, read Jonah Foer's book *Moonwalking with Einstein: The Art and Science of Remembering Everything*. It was published in 2012 by Penguin Books.
- *All in the Mind*, from Radio National in Australia, has several excellent podcasts about memory and problems of memory. 'The History of Memory' is an interview with a Stanford University history professor, who talks about how the models we have used to explain how our memory works have changed over time, and how, most often, they reflect current technology for storing media. 'Memory: The Thread of Life' talks about how children learn to remember and why cramming for exams is an ineffective approach to studying. *All in the Mind* podcasts are archived at Radio National: http://tinyurl.com/7uja7hc.

- If you want to know more about problems of memory, you can read Daniel Schacter's book detailing the ways in which we forget. It is called *The Seven Sins of Memory: How the Mind Forgets and Remembers*. It was published by Mariner Books in 2002.

- Finally, for a look at how we treat history as memory, take a tour of US Library of Congress online exhibit 'American Memory' at http://tinyurl.com/o7axb.

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3 The natural sciences

The notion of absolute truth is shown to be in poor correspondence with the actual development of science. Scientific truths are better regarded as relationships holding in some limited domain.

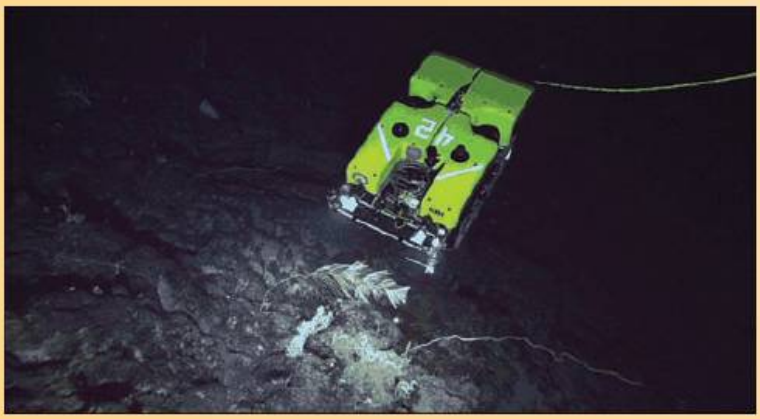
David Bohm

The progress of science is strewn, like an ancient desert trail, with the bleached skeletons of discarded theories which once seemed to possess eternal life.

Arthur Koestler

In questions of science the authority of a thousand is not worth the humble reasoning of a single individual.

Galileo Galilei



Science is built with facts just as a house is built with bricks, but a collection of facts cannot be called a science any more than a pile of bricks can be called a house.

Henri Poincaré

The most incomprehensible thing about the world is that it is comprehensible.

Albert Einstein

When a distinguished but elderly scientist states that something is possible, he is almost always right. When he states that something is impossible, he is very probably wrong.

Arthur C. Clarke

In science the primary duty of ideas is to be useful and interesting; even more than 'true'.

Wilfred Trotter

Science does not give us the taste of the soup.

Albert Einstein

Everything you've learned in school as 'obvious' becomes less and less obvious as you begin to study the Universe. For example, there are no solids in the Universe. There's not even a suggestion of a solid. There are no absolute continuums. There are no surfaces. There are no straight lines.

R. Buckminster Fuller

We found that the theory did not fit the facts; and we were delighted, because this is how science advances.

O.R. Frisch

Far more marvellous is the truth than any artists of the past imagined! What men are poets who can speak of Jupiter as if he were a man, but if he is an immense spinning sphere of methane and ammonia must be silent?

Richard Feynman

A new scientific truth does not win by convincing its opponents and making them see the light, but rather because its opponents eventually die and a new generation grows up that is familiar with it.

Max Planck

Even if by chance he were to utter the final truth, he would himself not know it: for all is but a woven web of guesses.

Xenophanes

All science is either physics or stamp collecting.

Ernest Rutherford

Science is nothing but trained and organized common sense.

T.H. Huxley

Aims

By the end of this chapter you should:

- understand what elements are often said to make up the classical scientific method (with examples, preferably some of your own)
- recognize the limits and problems of the classical scientific method and appreciate that the growth of scientific knowledge is a complex phenomenon that cannot be rigidly defined
- know what makes a claim a scientific claim and the meaning of the term 'pseudoscience'
- appreciate the meaning of 'truth' in a scientific context
- understand the relationship between shared and personal knowledge in terms of making or discovering knowledge in the natural sciences
- understand what the history of science shows us about how and why scientific knowledge changes over time.

Introduction

Since this is the first chapter in the book about an area of knowledge, this is a good time to explain that, in each of the chapters on an area of knowledge, you will find a series of boxes labelled 'knowledge framework'. The knowledge framework consists of several concepts that recur in every area of knowledge and which can, therefore, form a basis for comparing the areas of knowledge to each other. Whenever you see these boxes, you have an opportunity to ponder how this aspect of the area of knowledge under consideration is similar to or different from the same aspect of all the other areas of knowledge.

The natural sciences are one of humankind's great achievements. In popular culture to hear that something is '**scientifically proven**' is almost the same thing as hearing that it is 'definitely true', and science has certainly achieved many wonderful, and terrible, advances in recent history. In a search for **reliable** knowledge, science must rank high on any list. After all, we trust scientific beliefs with our lives every time we get in a car or aeroplane, drive over bridges, use a lift or eat processed foods. So what is it about the natural sciences that make them so special?

There are few people who answer this question as well as Richard Feynman, a visionary physicist who fundamentally changed our understanding of nature. He wrote:

The things with which we concern ourselves in science appear in a myriad of forms, and with a multitude of attributes. For example, if we stand on the shore and look at the sea, we see the water, the waves breaking, the foam, the sloshing motion of the water, the sound, the air, the winds and the clouds, the sun and the blue sky, and light; there is sand and there are rocks of various hardness and permanence, colour and texture. There are animals and seaweed, hunger and disease, and the observer on the beach; there may be even happiness and thought. Any other spot in nature has a similar variety of things and influences. It is always as complicated as that, no matter where it is. Curiosity demands that we ask questions, that we try to put things together and try to understand this multitude of aspects as perhaps resulting from the action of a relatively small number of elemental things and forces acting in an infinite variety of combinations.

For example: Is the sand other than the rocks? That is, is the sand perhaps nothing but a great number of very tiny stones? Is the moon a great rock? If we understood rocks, would we also understand the sand and the moon? Is the wind a sloshing of the air analogous to the sloshing motion of the water in the sea? What common features do

Knowledge framework:
Scope

If we are considering the scope of an area of knowledge, we are considering the nature of its undertaking. Just what is it that natural science is about? What kind of knowledge does it try to create or discover? What sorts of things can be considered to be the purview of the natural sciences and what kinds of things cannot? In the passage quoted here, Richard Feynman is explaining his view of the scope of the natural sciences: it is the study of the physical universe with the object of finding and delineating the rules that govern how the physical universe works.

different movements have? What is common to different kinds of sound? How many different colours are there? And so on. In this way we try gradually to analyse all things, to put together things which at first sight look different, with the hope that we may be able to reduce the number of different things and thereby understand them better.

A few hundred years ago, a method was devised to find partial answers to such questions. Observation, reason, and experiment make up what we call the scientific method.

What do we mean by 'understanding' something? We can imagine that this complicated array of moving things which constitutes 'the world' is something like a great chess game being played by the gods, and we are observers of the game. We do not know what the rules of the game are; all we are allowed to do is to watch the playing. Of course, if we watch long enough, we may eventually catch on to a few of the rules. Knowing the rules of the game is what we mean by 'understanding'. Even if we knew every rule, however, we might not be able to understand why a particular move is made in the game, merely because it is too complicated and our minds are limited. If you play chess you must know that it is easy to learn all the rules, and yet it is often very hard to select the best move or to understand why a player moves as he does. So it is in nature, only much more so; but we may be able at least to find all the rules. Actually, we do not have all the rules now. (Every once in a while something like castling is going on that we still do not understand.) Aside from not knowing all of the rules, what we really can explain in terms of those rules is very limited, because almost all situations are so enormously complicated that we cannot follow the play of the game using the rules, much less tell what is going to happen next. We must, therefore, limit ourselves to the more basic question of the rules of the game. If we know the rules, we consider that we 'understand' the world (2011: 2.1).

You find here, in a nutshell, what many scientists believe science to be. You may be surprised to hear them wax lyrical about curiosity, awe, beauty, rigour, honesty and humility – but contrary to some stereotypes science can inspire lofty emotion! This isn't that surprising – it is, after all, a human endeavour.

Occasionally, you hear science spoken of from an arrogant perspective, with disdain for 'non-scientific' thoughts or processes, but this usually says more about the speaker than about science. Feynman again:

We must, incidentally, make it clear from the beginning that if a thing is not a science, it is not necessarily bad. For example, love is not a science. So, if something is said not to be a science, it does not mean that there is something wrong with it; it just means that it is not a science (2011: 3.1).

1 Explain the game analogy that Feynman uses to explain the aims of science.
2 Do you think the analogy is a good one? Explain your answer.
3 How does this fit in with your science lessons at school?

The 'scientific method'

Let us look now, in some more detail, at what makes science so special. As Feynman says, **observation, reason** and **experiment** make up what we call the **scientific method**. It is also very important that the observations, reasoning and experiments *can be repeated and checked independently* by other observers. If you and your friends are the only ones to have seen or understood something, then it doesn't count as science.

Your personal claim to have seen a UFO would not likely be accepted by scientists. If the UFO had really been there, radar equipment would have picked it up, and it would have been documented in the public forum as shared knowledge. Your report has not received independent experimental confirmation where there

Knowledge framework:
Methodology (1)

The natural sciences function using the well-known **scientific method**, as described in this section. The scientific method in practice, however, is seldom as linear or compartmentalized as textbooks (including this one!) make out. While, in general, hypothesizing comes before experimentation and experimentation comes before data analysis and data analysis comes before the development of a **theory**, the process is not always so neat. Sometimes an experiment breaks down in the middle. Sometimes the data is incomprehensible and the experiment must be re-run or redesigned. Often the findings from one experiment lead to a new **hypothesis**. The process, in other words, is more like a cycle that can be entered at several different points.

Other important features of scientific methodology are the systematic checking of results, the focus on **falsification** rather than proof, and the requirement that all scientific findings be **replicable**. All of these requirements make the pursuit of knowledge in the natural sciences a shared, rather than personal, endeavour.

should have been, so your claim is not scientific. In the natural sciences, shared knowledge, knowledge checked and validated by the community of professional scientists, outweighs the direct personal experience of any individual – even of any individual scientist. That is not to say that all individual experience is definitely false, just that if personal experience cannot be translated into shared knowledge, then scientists will be reluctant to call it science, and are likely to regard it with some **scepticism**. Of course, it's *possible* that UFOs have the ability to hide from radar; we cannot rule this out – when we have so-called Stealth technology it hardly seems impossible to believe that visiting extra-terrestrials also have it. However, the point stands – before we can accept an observation as scientifically sound, we must look to the **evidence** and evaluate it. Most scientists believe that the evidence for UFOs is unconvincing, and that the best explanations for observable phenomena do not involve aliens. It is the nature of scientific endeavour, however, that scientists keep an open mind. If, one day in the future, evidence is discovered that supports the existence of radar-avoiding UFOs, science will accept the evidence and revise the conclusions about the existence of extra-terrestrials.

Validating claims

We can examine these ideas with reference to the following two simple claims:

1 The Earth is flat.
2 The Earth is round.

It is certainly possible to observe that the Earth is flat. We are not talking about the fact that we can see a few mountains here and there, but rather about the fact that, from the perspective of an individual standing on it, the Earth generally seems flat as far as we can see. We can reason from this observation: things on a slope have a tendency to slide down the slope, so if the Earth weren't flat, people would start sliding. But this is not what happens. No one anywhere on the planet slides downward. Based on this evidence, then, it might seem plausible to call the belief that the Earth is flat a scientifically established fact, since that conclusion relies on observation as its basis; however, not only is it possible to reason that the curvature of the Earth might be so slight (and the Earth itself so large) that no one would slide downward, but it is also clear that the view from where we are standing provides only a very limited set of observations upon which to base a claim that we want to offer as one of Feynman's 'rules of the game'. Science requires that all available evidence fits the hypothesis; we cannot simply ignore observations that do not seem to fit our ideas. We can easily gather more evidence about the shape of the Earth; we do not have to rely on individual observation with our naked eyes.

Now let's look at claim 2. What evidence can we gather in order to support this hypothesis? Direct, personal observation of the whole Earth is not available to individuals standing on it, but the fact that the scientific method relies in an essential way on observation doesn't mean that direct personal observation is the *only* way scientists can gather and use **data**. We can – but don't have to – sail around the Earth or send a rocket ship to the moon in order to test experimentally the claim that the Earth is not flat. How do we do it without aeroplanes and satellites? We reason about the **implications** of known facts, and then test those implications; that is, we can apply reason – and this is, of course, a crucial aspect of science. One immediate implication of a round Earth is that there should be a horizon. If boats disappear over the horizon, their mast should disappear last. Also, we should be able to see further the higher up we go – and, in fact, boats always did have somebody high up in the mast, so that they could look further.

■ **A thirteenth-century drawing illustrating how scholars knew that the Earth must not be flat.**

Importantly, for science as a knowledge-producing endeavour, these consequences could not be explained in a straightforward manner with claim 1. For a claim to be considered scientific, it must, as we pointed out earlier, account for all the data.

The distance to the horizon is easy to measure experimentally: all it takes is you, a friend and a small boat. It turns out to be about 5 km if your eyes are 2 m above sea level. Now we can use Pythagoras' theorem and, lo and behold, we find the size of the Earth! The radius should be about 6000 km. So simply by applying reason, we see that claim 2 implies precise limitations on the size of our planet! If it is round, then its radius had better be 6000 km, or, equivalently, its circumference should be about 40 000 km.

Scientific reasoning

This kind of reasoning about the Earth was employed by the earliest known scientists (though, interestingly, the term 'scientist' is a modern term – these thinkers didn't see themselves that way). The fact that the Earth is a sphere had been established among the scientific community by the fifth century BCE. (Perhaps uneducated people, based on their own individual observations, thought that the Earth was flat; they didn't leave any records so we don't know.) The circumference of the Earth was first calculated, in fact, by Eratosthenes, a mathematician and scientist of the third century BCE, though his reasoning has been challenged and then revised many times over the centuries. Famously, in 1492, Christopher Columbus persuaded Ferdinand and Isabella of Spain to fund an attempt to sail around the Earth as a means of getting to India – which was rich with spices – from the west, rather than from the difficult east, which required sailing around Africa. (The King and Queen were hesitant not, as some people believe, because they thought that Columbus' fleet would sail off the edge of the Earth, but rather because their advisors thought that Columbus was wrong about the size of the Earth and that his plan could not succeed with the resources he could carry in his ships. Columbus was, as a matter of fact, wrong: his estimation of the circumference of the Earth was too small by about 25 per cent (Albrecht).)

4 A widespread myth claims that 'people' or 'everyone' or 'scientists' throughout the Middle Ages believed the Earth was flat. Were you ever taught that story? Did you believe it? Why or why not?
5 What does the prevalence of that myth suggest about the sharing of scientific knowledge? (See the Further study section at the end of the chapter for more on this subject.)

Columbus' turning to the King and Queen of Spain illustrates the point that although individuals can reason and draw conclusions to make scientific assertions, often the experiments to verify those assertions must be run

Knowledge framework:
Historical development

The development of ever-more certain and ever-more refined knowledge about the circumference of the Earth is one example of many important historical developments in the natural sciences. As we have noted here, technological advancement is one of the main forces that directs development of knowledge in the natural sciences.

Some historical developments have proven to be crucial turning points that redirected a whole body of scientific endeavour. The shift to the heliocentric **model** of the universe is one such example. In biology, Darwin's theory of evolution changed for ever the way that people think of living creatures and time, while the mapping of the genome has opened up an entirely new vision of the relationships among living things. The section on paradigm shifts helps explain how this process works.

Can you think of other important scientific developments that have shaped the way that we do science today?

by groups. (More recently, the CERN particle accelerator provides a great example of some apparatus that could not be constructed without input from thousands of individuals.) In the case of the claims about the shape of the Earth, no individual – in Columbus' day or now – would be likely to have the kind of funding necessary for the construction of a sea vessel or the funding of a sea voyage needed to test the hypothesis.

Available data

The progress of this knowledge over the past 2500 years illustrates another important point about the natural sciences as an area of knowledge: scientists don't consider that they 'prove' hypotheses to the point of **absolute certainty**. Science allows for the fact that we can never be sure we have all the available data, as well as for the fact that many aspects of the physical universe change over time. Scientific inquiry thus proceeds from the belief that what we can do is try to **falsify** hypotheses. If people had been able to sail 50000km west without returning to the start, claim 2, that the Earth is round, would have been in trouble. But the fact of the matter was that the 40000-km circumference tallied quite well with the earlier suspicions of having reached the same land from two different directions. Experiment, in other words, supported the reasoning that was done based on observations. Of course, this doesn't *prove* that the Earth is a sphere: it could be that it is a pear shape, and that the voyages which seemed to confirm a circumference of 40000km were only good for one particular direction. On the basis of theory and evidence so far discussed, we can't be sure. But we can say that the **experimental data** has failed to falsify the claim.

Replicating data

The fact that we cannot achieve absolute certainty does not mean that our scientific knowledge has to be considered tentative, however. Nearly 500 years after Columbus, the claim that the Earth is a sphere has advanced to as near absolute certainty as is possible to achieve in the natural sciences. In the centuries between Columbus and now, scientists have continued to gather more evidence. In the twentieth century, technological advancements allowed us to send first satellites and then spaceships far enough into the sky around the Earth to verify its spherical nature with photographs and by aerial circumnavigation. The findings that were first discovered by observations from ocean-going ships have been **replicated** by observations from space-going ships.

6 How do you personally know that the Earth is (roughly) round? Have you personally done any experiment to try to falsify the claim? Have you done the mathematical calculation to determine its radius or circumference?
7 What sources from shared knowledge have you relied upon to develop your personal knowledge on this subject? Why do you trust them?
8 To what degree do you think your understanding would change if you did do something yourself to try to verify or falsify that knowledge claim?

By now, scientists have amassed so much evidence to support the theory that the Earth is roughly spherical – or, to put it another way, we have failed so dramatically to falsify the idea – that it is virtually impossible to believe that the idea can ever be overthrown. Scientists, however, do not make unjustified claims, and since it is impossible to assert without any doubt that we have amassed all the evidence there is or ever will be on the subject, scientists do not claim that their theories are proven beyond *all* doubt. We now know, for example, that the Earth is not exactly round, but that it is actually a bit wider at the equator. Does that

mean that claim 2 was wrong, just like claim 1? This is an interesting point. It leads to the questions, 'How much of today's science is wrong? If it is wrong, why does it work so well?' Perhaps 'right' and 'wrong' are not good ways of describing science; perhaps truth – at least in the sense of absolute truth – is not what science gives us at all.

Scientific truth

This is the essence of scientific truth: it can never be proved experimentally that a claim is correct, but many claims can be proved wrong (in which case it is said that the claim has been falsified). This might seem a little strange because it is easy to assume that scientific laws have been proven but, in fact, they have not. No matter how good our theories are, there is always the possibility – however slight – that they will be shown to be incomplete, or even downright wrong. Even if a theory has been tested a million times, there may be an exception lurking around the corner. This possibility arises from the fact that, due to its observational basis, science has an **inductive** component (see Chapter 7 for more on induction). Nevertheless, so long as our scientific laws are functional, we must assume that they will continue to function into the future, even though we cannot absolutely prove this assumption. Until such time as we can falsify scientific claims, we have no choice but to believe them!

We must also be very aware that the scientist's willingness to admit the possibility of a future need for the revision of scientific ideas does *not* mean that we reckon all our theories are wrong – far from it. Scientists have tried very hard to disprove them, in some cases for hundreds of years, and they have failed. The longer a theory has resisted falsification, the more confident we feel about it. That is what Einstein meant when he said: '*Truth is what stands the test of time.*'

What is clear is that a scientific claim is a claim that should lend itself to experiment. We should be able to devise an experiment that could falsify the claim. It is precisely here that we can differentiate between a scientific claim and a non-scientific one.

Knowledge framework:
Concepts and language

We have covered several important concepts with regard to the making of knowledge in the natural sciences: the **scientific method**, **falsifiability** and **replication**, for example. These concepts are important to understand because they define the parameters of what counts as scientific inquiry and what does not.

Other key terms that pertain to science, and with which you might be familiar from your own study of the physical sciences, are: **hypothesis**, **experiment**, **variable** and **theory**. It is worth noting that 'theory' is a technical term in the sciences that does not mean 'guess', as it often does in everyday conversation. A scientific theory is an idea which has been validated over and over again – which scientists have attempted to falsify many times, over a long period of time, without result. A scientific theory can be, after rigorous testing, an idea as close to certain as it is possible to get.

Knowledge framework:
Methodology (2)

Scientific endeavour relies primarily on sense perception (direct observation) and reason for making knowledge, but other ways of knowing are also important. Richard Feynman talks about the importance of imagination in the scientific process:

> *But what is the source of knowledge? Where do the laws that are to be tested come from? Experiment itself helps to produce these laws, in the sense that it gives us hints. But also needed is imagination to create from these hints the great generalizations – to guess at the wonderful, simple, but very strange patterns beneath them all, and then to experiment to check again whether we have made the right guess (2011: 1.1).*

Emotion is, as in all human endeavour, an important asset insofar as it provides the passion necessary to do good work in a sustained manner, but emotion can be a liability in science, if it keeps scientists from admitting evidence that contradicts their hypotheses. The scientific method, with its built-in requirements for replication and independent verification, aims to ensure that emotion does not overrule reason. Feynman again:

> *If it disagrees with experiment, it's wrong. In that simple statement is the key to science. It doesn't make a difference how beautiful your guess is; it doesn't make a difference how smart you are, who made the guess, or what his name is: if it disagrees with experiment, it's wrong. That's all there is to it (2013).*

Emotion must not interfere with the objectivity required for maintaining an open mind towards all possibilities.

Science and pseudoscience

Some people present certain claims as scientific when they are actually not scientific. When such claims have a superficial appearance of being scientific – especially if they seem to deal with the physical nature of the universe – but they cannot be subjected to processes of falsification or replication, we may call these claims '**pseudoscience**'. You may be familiar with some pseudosciences: astrology, fortune telling, paranormal psychology. Practitioners of these fields claim to base their predictions on observable evidence – patterns of the stars, lines in the palm, the pattern of tea leaves in the bottom of a cup, or the Mayan Calendar, for example.

Let's consider some pseudoscientific claims. There's an old Appalachian toy called a Gee-Haw Whimmy Diddle that relies on magic. The Gee-Haw Whimmy Diddle is a notched stick with a propeller on the end. There is also a second stick, without notches. If you rub the second stick over the notches on the main stick, the propeller will turn. What's amazing is that if you yell out 'Gee!' the propeller will spin to the right, but if you yell out 'Haw!' the propeller will stop and change direction, spinning to the left. It doesn't matter how many times you do it, it works. You can observe it with your own eyes – you can even see it working on a YouTube video here: http://tinyurl.com/p6odobt.

■ **A Gee-Haw Whimmy Diddle**

Consider one more example: do you have any scars anywhere – perhaps on your knees or elbows – that you don't remember getting? Believers in UFOs will tell you that you got those scars as a result of having been abducted by aliens who transported you to their ship and did some medical experiments on you. The scar is observable, and is the visible proof of what happened to you.

One problem with all these claims is that we cannot design an experiment to test them. How could we falsify the claim that magic makes the Whimmy Diddle work? There is no way to run a controlled experiment without magic to see if magic is, indeed, the determining factor in changing the direction of the propeller. We certainly can't call up aliens on cue to be observed so that we can test the claim that they are doing medical research.

Reasoned explanations?

Another problem is that the reasoning used to explain the connection between the observed phenomenon and the prediction based upon it is generally either murky or missing. If you ask the UFO believers why you can't remember getting the scar, they will tell you that the aliens wiped your memory. If you ask them why, if your memory was wiped, you don't remember a time when you lost a day

(or two or three, or however many it took for the aliens to do their work), the believers will tell you that the aliens obviously had the ability to control time, and they put you back at the same time you left. Such pseudoscientific arguments are never subject to reason, because a new excuse can always be made up to explain any problem in the logic.

The claim that magic is what makes the propeller change direction is, of course, pseudoscience. 'Magic' is not a reasoned explanation for anything – it is a catch-all word that can be used whenever there is no explanation known. The Gee-Haw Whimmy Diddle does not, of course, work by magic. There is a trick that the user knows, but keeps from the audience, that has to do with how you hold the rubbing stick in your hand. To make the propeller turn one way, you make sure your forefinger touches the notched stick on one side; to make it turn the other way, you lift your forefinger and let your thumb touch the stick on the other side. With a little practice, the user of the stick can do this without calling attention to the sleight of hand, and the audience, of course, will be focusing on the propeller anyway. Now we have a good scientific question: Why should touching the stick on one side or the other affect the vibrations in such a way as to change the direction the propeller spins? This is a wonderful question for physicists, and physicists have, in fact, answered it.

The explanation for your 'mysterious' scar is that memory, as we saw in Chapter 2, is not always reliable.

Remember, however, that not all non-scientific claims are pseudoscience, and to say that a claim is not scientific does not mean that it is not important. Clearly arts, religion and ethics are some of the most important ways of giving meaning to people's lives. None of the claims from those areas of knowledge are scientific, but they are not pseudoscientific, either. These areas are not falsely cloaking themselves in the robes of science in order to appear credible – they have other claims to be valuable, and do not (generally) rely on science. The point is that a claim can only be called scientific if it lends itself to scrutiny and rigorous testing. This is a very difficult requirement, but it is precisely the strict adherence to this principle that accounts for the enormous and rapid progress made by science.

9 Decide whether or not these are scientific claims:
   - a The Earth is flat.
   - b The Earth is not exactly round; it is actually a bit wider at the equator.
   - c UFOs regularly visit Earth to abduct humans for experimentation.
   - d God created the world in seven days approximately 5000 years ago.
   - e God created the universe.
   - f God did not create the universe.
   - g In some remote areas of China, there are people who can jump higher than 10 m.
   - h In some remote areas of China, there are people who can jump higher than 10 m, but their society is so secretive that they will never permit outside observers to witness it.
   - i Love is more important to human beings than anything else.
   - j If you ask people in a multiple-choice question what they find most important, and you include love as a possible answer, then more than 75 per cent will put love at the top of their list.
   - k 'I love you.'
   - l Picasso's painting *Cannes, 4a.m.* is a beautiful piece of art.
   - m People born under the sign of Pisces should not marry people born under the sign of Gemini.

10 Are any of these claims pseudoscientific? Discuss them with others to see if you can agree.

Scientific models

Another important aspect of scientific statements is best illustrated by example. Suppose the time is now one second past 9.00a.m. Consider these statements:

- It is 9.00a.m.
- It is between 3.00a.m. and 3.00p.m.

Both are testable by checking a reliable watch, and so both are scientific claims. The latter statement is, in fact, true, but very unlikely to be useful, whereas the former is false but probably accurate enough for most purposes. This clearly shows that there is more to a scientific statement than the requirement that it can be tested. There is also the issue of how much information a statement contains. These two claims constitute two different models of the concept of what time it is now. As we said in Chapter 1, we establish models to explain what we know – or think we know – and then we test those models and revise them as needed. The test of what constitutes a good model in the natural sciences is functionality. In the example above, the first model is more functional than the second model, so we might reject the second model, even though it is, strictly speaking, true.

Different models

The test of what time it is now is a rather simplistic example of what we do in science, but you can easily see that the principle holds for more complicated questions, and the development and testing of models is central to what natural scientists do. As we saw with the simple example above, there can be more than one model to explain a natural phenomenon. Scientists might develop multiple models either because they are trying to explain different aspects of that phenomenon (there is one model, for instance, to explain the size and shape of the Earth, another to explain the movement and formation of the continents, another to explain the Earth's strata, and so on) or because we don't have sufficient information yet to be confident that any one of the models we have is significantly better than the others. There are a number of models posited for the beginning of the universe, for instance. The Big Bang theory has been popular for a long time, but it has a good bit of competition nowadays. In physics, string theory has been hypothesized as a way of explaining why matter seems to behave differently on the micro level than it does on the macro level, but, in fact, there are numerous different versions of string theories, depending on what explanations one proffers for the available evidence. At this time, physicists don't have enough facts to determine which version is best. We can say that the models are competing and that, through the scientific process, many will be rejected as not matching up to rigorous experimentation. If we get down to one model, and this one survives attempted falsifications for a long time, we may begin to use the word 'correct' or even 'true' – but remember, it is a model, and its relation with truth will always fall short of absolute certainty.

If you reconsider many of the examples we have explored in this chapter, you will see that we have been looking at different models of various aspects of the universe – and that we have seen how those models have changed over time:

- Eratosthenes proposed a model of the size and shape of the Earth that had to be revised as better technology allowed for better measurements. The model of the Earth as roughly spherical (technically, an 'oblate spheroid') is now firmly entrenched, and is unlikely to undergo dramatic change – unless the physical Earth itself undergoes some sort of dramatic change.

- Democritus proposed a model of the atom that has been revised numerous times – from a concept of solid particles shaped differently depending on the type of matter, through the Bohr model of the atom as a little miniature orbital universe, to the idea of a sort of cloud in which particles can be almost anywhere at once. Current physics tells us that the atom is not the only kind of basic building block in the universe; we now believe that other kinds of particles – such as the hypothesized Higgs Boson particle, help create conditions under which atoms can form.
- The earliest known model of the solar system was geocentric, but change did not stop with the sixteenth-century realization that in fact our solar system is heliocentric. Most recently, when astronomers discovered that there are many more objects in the solar system like Pluto, they had to redefine the model of what constitutes a planet; they could thus reduce the number of planets to a usable number, rather than raise it to include perhaps many hundreds, which would have rendered the model unwieldy and impractical. Interestingly, Pluto has ceased to be a planet – even though nothing new about Pluto has been discovered; Pluto's status as a planet depended on a whole web of facts and theories about the solar system. This example highlights the subtle relationship between scientific models and scientific 'truth'.
- Charles Darwin proposed a model for evolution that has gradually been refined over the past 200 years to account for the ever-increasing data that arises from the fossil record and genetic advances. We now know, for instance, that in some cases evolution takes thousands of years, but in others, such as with the fruit fly, we can watch it occurring in the lab.

One other interesting aspect of scientific models, as we saw with the time question at the beginning of this section, is that it sometimes happens that a highly informative but incorrect model is better than a vague but less informative model. It may seem odd that a false statement can be of more use than a true one – and this may lead us to question precisely what we mean by 'true' and 'false' in this context – but the answer to that question will have to wait until after we have looked not just at the scientific statements, but at the scientists themselves.

11 If science never proves anything right, why do we trust it so much?
12 Think about the science you learn at school. How likely do you think it is that it is wrong or incomplete? What about the science you read about in magazines such as *Nature, New Scientist or Scientific American*?
13 What other models of the physical universe are you familiar with? How have those models changed over time?

Science as a human endeavour

The astronomer Carl Sagan argued that the success of science is similar to the success of democracy – both thrive on transparency, and in both science and democracy the most effective road to progress is to give everyone the opportunity to have a look at the data. Everyone has the right to contribute, but only the ideas that deliver the goods carry the day. If your ideas don't stand the test of experiment, they'll be ruthlessly demolished, even if your name is Einstein (the work done by Einstein in the latter half of his life is considered ill-conceived by the majority of physicists). Perhaps this is what distinguishes

science from other disciplines – because scientists rely on experiment, they can reject most of the rubbish! It does not accumulate and get in the way of new, better ideas.

Both the idea of testing theories and the value placed on scepticism are central to science. Attempts to prove Einstein, Newton, Darwin and all the other great (and not so great) scientists wrong are a central part of the scientific endeavour. After all, is there a better way to convince someone that a theory is valid than to try, but fail, to prove it wrong?

Sceptics

There is an important difference here between science and some other systems that claim to explain something about the universe. The institutions of science have built-in sceptics – the scientists themselves! It is the sceptics who refuse to accept the current theory, who come up with their own ideas and persuade others that they are right, who win fame, fortune and success. We might usefully contrast this with other areas where scepticism is sometimes regarded as suspicious, and to be avoided.

Sagan goes on to ask: '*How is it possible that so many people distrust science, but are willing to put their trust in horoscopes and fortune tellers?*'

Science tells you: here's the model we've got. If you don't agree, show us where we're wrong, and we'll not only accept it, but cherish you as the bringer of new insights.

Compare this to the leaders of a religious cult or your local astrologist, who will tell you: '*I cannot explain it to you in ways that you can test and unambiguously confirm, but I have the truth. Trust me and believe me; the truth has been revealed to me.*'

Why is it that so many people prefer to trust one person who makes non-accountability his trademark rather than trust a community that has made self-criticism and scepticism its main virtue? Perhaps the answer to this is that we have so far been talking about science as it should be practised ideally. Of course, science is carried out by humans, and that means that it should also be studied as a human endeavour, with all that entails.

Paradigms and paradigm shifts

Perhaps the most interesting aspect of science as a human endeavour has been explored by Thomas Kuhn, a scientist himself, and also an historian and philosopher of science. Kuhn argued that, contrary to what we have said so far, scientists do not actually work by falsification. Arguing not just on philosophical grounds, but as a matter of historical fact, he suggested that scientists hold some fundamental beliefs (paradigms) so strongly that they are sometimes not prepared to allow them to be falsified; they may ignore or disbelieve findings which seem to disprove them.

Kuhn's classic example is the paradigm of the Earth at the centre of the universe with the planets and the Sun orbiting in circles. This paradigm was technically falsified by Galileo and Kepler. According to a strictly rational scientific process, we might expect their findings to have been greeted enthusiastically, but it took a long time for their findings to be accepted. Another example is the theory of continental drift (which states that the continents 'slide around' on the surface of the Earth), which was laughed at by the geological community for years before finally being accepted.

Knowledge framework:
Links to personal knowledge

Although scientific knowledge is ultimately shared knowledge – knowledge that is both verified through replication and documented for use by future generations – the work of science is done by individuals (sometimes working together in teams). This chapter has mentioned several scientists who are famous for having made truly significant contributions to shared scientific knowledge – Richard Feynman, Carl Sagan, Charles Darwin, even Eratosthenes and Democritus. You can probably name many more.

Who are the individual scientists of the late twentieth and twenty-first centuries who have made the greatest contributions? Is the science you do in school the kind of science that will increase public understanding of the rules of the physical universe? Can you imagine yourself one day contributing to shared knowledge in the way that the scientists named above have done?

Perhaps most importantly: how have the work done by scientists and the scientific knowledge now shared with all mankind affected your personal experience? What difference does science make to your life? We mentioned earlier in the chapter that science has made possible bridges and aeroplanes; it has also made possible mobile phones, safe water and freedom from polio. What other examples can you think of?

Using evidence

The key point here is that it is very difficult to know how to interpret experimental results. When you find a result that seems to indicate that a widely held theory is false, what do you do? Of course, you assume that it is your mistake – and you check the evidence carefully. Even if you can't find the error, which of the possible explanations is more likely:

- that you have failed to spot the error
- that the famous theory is wrong?

Well, the answer depends on many things. Once there is enough evidence, the scientific community will accept that a theory has been falsified, and the paradigm will shift – a new model will become the accepted one.

But what is *enough* evidence? That is a question which cannot be answered by science – it is a value judgement that individuals make according to their own personalities and idiosyncrasies. There are emotional reasons, too (perhaps some scientific advances are felt to be threatening), and the feelings of the scientific community are of paramount importance. Kuhn stresses, for the first time, the social nature of science. Consider an example: in 1926, after 25 years of skilful and patient work by physicist D.C. Miller, in which many thousand repetitions of the Michelson–Morley experiment (to measure the speed of light) produced results clearly inconsistent with Einstein's theory of relativity, Miller addressed the American Physical Society, explaining his results. At face value, Miller falsified relativity, but was the theory abandoned or even brought into serious question by the community? It was not. In fact, his results evoked nothing but expressions of regret that such a fine experimental physicist should waste his professional career generating data in which no one was interested. What seems to have been at stake was the professional skill of the scientist rather than the hypothesis he thought he was testing! So the claim that 'experiment is always the final arbiter of a theory' needs some qualification. The philosopher Michael Polanyi writes: '*It is the normal practice of scientists to ignore evidence which appears incompatible with the accepted system of scientific knowledge, in the hope that it will eventually prove false or irrelevant.*'

Many scientists have echoed this. Erasmus Darwin, brother of Charles, said, '*If the facts won't fit in, why so much the worse for the facts.*' Paul Dirac, Nobel prize-winning physicist, said, '*It is more important to have beauty in one's equations than to have them fit the experiment.*'

Science as a human activity

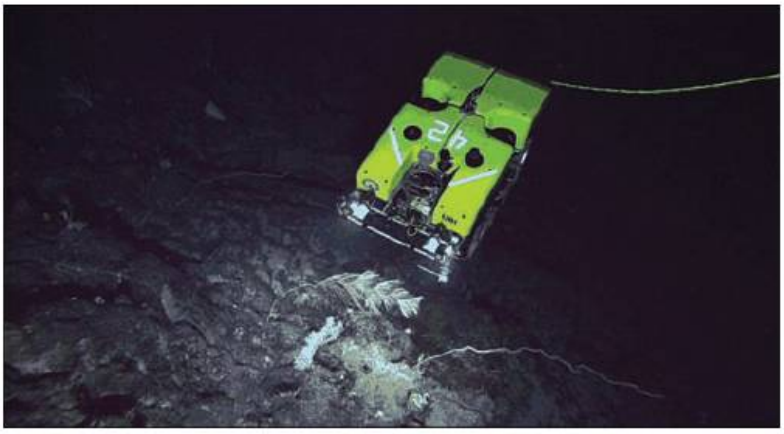
Crucially, this view deposes science from its objective, value-free status. After Kuhn we tend to see science as very much a human activity, flawed and multifaceted. And once you start adding competition, fame, fortune and Nobel prizes to the mix then it's no surprise to find that interpretation of evidence can be guided as much by emotion as by reason. We saw in Chapter 2 how one biologist's human nature got the better of him and undermined the credibility of his own work, so we know it happens. The sheer nastiness of scientific feuds takes many by surprise. Matt Ridley writes:

William Cookson, an Oxford geneticist, has described how his rivals reacted to his discovery of a link between asthma-susceptibility and a marker on chromosome 11. Some were congratulatory. Others rushed into print contradicting him, usually with flawed or small sample sizes. One wrote haughty editorials in medical journals mocking his 'logical disjunctions' and 'Oxfordshire genes'. One or two turned vitriolic in their public criticism and one anonymously accused him of fraud (72).

This is a far cry from the popular stereotype of the objective and disinterested scientists, but perhaps to expect a perfect truth-seeking mechanism from flesh-and-blood people is to expect a bit much.

Let us not, however, get too carried away. Natural scientists have amassed many magnificent and unprecedented achievements, so we need to account for the fact that this can be so, despite the humanity of the individual practitioners, and the key point is the interplay between personal and shared knowledge. It is the rigour of the methodology that ensures progress, and although science is a human activity performed by a human community, it seems to work most of the time. This is truer now than at any time in the past. Today, the greatest dream of many scientists is to prove a theory wrong, since that is how progress is made and fame is won! While conservatism was part and parcel of science a few centuries ago, many modern scientists would say that things have moved on and that today 'difficult' experimental data would not be ignored. Early last century, it took Einstein less than 15 years to win the world over to his radically new ideas. Likewise, when Feynman proved previous theories wrong and proposed new ones, they were accepted within a few years. Conversely, when 'cold fusion' was proposed a few years back, experimenters all over the world immediately took up the challenge (of course, the billions of dollars that were available to the finders of cold fusion may have had something to do with it, too). After a tumultuous few months of conflicting results, the scientific community came to the consensus that the phenomenon of 'cold fusion' was simply an error or a hoax: the crucial results could not be duplicated. 'Cold fusion' did not pass the stringent test of experiment.

It would be quite an exaggeration, furthermore, to suggest that every professional scientist is prone to irrational behaviour, emotional bias or fraud. Many concern themselves consciously with trying to adhere to the ideal of scientific experiment, as described by Richard Feynman. Consider, as just one example, Dr Robert Ballard. The photograph on the next page is of the Hercules, the ROV (remotely operated vehicle) run from Ballard's ship, *Nautilus*. Hercules is fitted with a giant broadcast camera, and its video is broadcast instantaneously to Ballard's website. You can view it at http://tinyurl.com/35t80g7. Although he achieved worldwide fame when he discovered the remains of the *Titanic* in 1985, and might be considered by some as in danger of succumbing to the temptation to cut ethical corners in an effort to garner more fame, Ballard has established an online project to allow anyone who wishes to do so to observe him and his scientific team at work. The project ensures that there is no way for findings from the *Nautilus* to be kept private – the team's observations and interpretations are open to challenge at any moment.



The Hercules

All of these examples demonstrate the crucial fact that we established at the beginning of the chapter: scientific knowledge, though reliant on individual work, ideas and contributions, does not rest on the assertions or claims of individuals. The human impulses of individual scientists are tempered and balanced by the fact that scientific claims are not considered reliable until they are tested and replicated by other, impartial, scientists. Additionally, the transparency of modern scientific findings – the accessibility of scientific discoveries to the public at large through the internet and other media – makes it more difficult for an individual scientist to hold on to a wrongheaded idea for very long.

14 In what ways does human nature pose challenges for the pursuit of knowledge in the natural sciences?
15 How does the formal methodology of the natural sciences help mitigate the potential problems that might arise from human nature?
16 If you did an experiment that seemed to have falsified the law of conservation of energy, what would you do?
17 Do you think that Kuhn's model is an accurate description of science?

Science – a universal tool?

As we have seen, the method of science is widely applicable, but we haven't made clear what distinguishes the **natural** sciences from other sciences. Natural scientists have a far easier job than **social** scientists (such as economists or social psychologists) because claims in the natural sciences can be defined very precisely. For example, compare a physicist with an economist, who has great difficulty in even obtaining precise definitions. (What does 'the economy will react adversely to the imposition of currency controls' really mean, in absolutely accurate terms?) This is not economists' fault. Their subject is plagued by many variables that cannot be independently controlled by experiment, and the environment they are trying to describe is continually changing (for example, a society with widespread internet access may react differently to one without). This is in stark contrast to chemists, who keep working and combining the same 100-odd atoms. If nature had decided to work the way economics works, it would introduce a few new atoms every year! The amazing thing about nature is that, as far as we can tell, its underlying laws are *unchanging*, and it is of course far easier to work in a fixed environment than in an ever-changing one. This is the nature of the natural sciences, and is another reason for the rapid progress we have seen.

The underlying truth

The fact that the natural sciences encompass an area of knowledge that is believed to have fixed laws marks another distinction: it allows researchers in these fields to keep on digging for the underlying foundations and thereby reduce their theories to fewer and more basic terms. To make progress in the natural sciences means to make things simpler – for example, phenomena like wind, sound and heat, what keeps a solid together, and the principles of cooling and pressure are all manifestations of the same underlying truth: that the world is made up of molecules. Going one step deeper, one asks what molecules are made of, and so on. But progress in economics, for example, has led to greater complexity and an increasing list of exceptions to general rules.

The fact that the laws of the natural sciences are undergoing continuous reduction is also the reason why we have so far restricted our discussion of the natural sciences to physics. The basic laws of chemistry, for example, can be understood with physics (with quantum mechanics, to be precise). The laws of biology are essentially chemical in nature, so arguably they also reduce to physics ultimately. Geology is another discipline in which the underlying principles are physical in nature. In short, the deepest underlying rules of all natural sciences ultimately reduce to physics. However, please remember Feynman's words at the beginning of this chapter. We're not saying that by knowing everything about physics we will also know everything about biology. After all, knowing the rules of chess does not mean you know how to play! There is a distinction between reductionism and elimination – when a subject is reduced to physics it does not necessarily mean that we have found out everything about that subject.

18 'People fall in love because of their psychological make-up. Psychology reduces to biology; biology to anatomy; anatomy to chemistry; chemistry to physics. So to be the best psychologist you can be, you should study physics.' On what grounds would you accept or reject this statement?

19 Read the final paragraph above carefully and imagine that at some future date we eventually find all the laws of nature – 'the rules of the game'. What would that mean for our ability to make things and control the world?

20 Some sciences are increasingly taking a **holistic** approach, whereby they try to avoid **reduction**. Does this mean that they are still sciences, or have they become something else?

'Right', 'wrong' and scientific 'truth'

One of the greatest triumphs of the natural sciences is Einstein's theory of general relativity. Combining spectacular creativity, brilliant reasoning, bold conjectures and dramatic experimental confirmation, it seems to be all that science should be. But what if Einstein was wrong? The history of science is full of theories that once seemed 'right', but which we now know are 'wrong'. Famously, the Sun does not revolve around the Earth, atoms are not the smallest particles, and Mars has no canals on it. Some of today's science seems so outrageous (chaos theory tells us that a butterfly flapping its wings can cause a hurricane on the other side of the world!) that surely it is just a matter of time before today's beliefs are superseded and discarded. So why shouldn't Einstein be wrong?

Well, most scientists believe that eventually Einstein will be proven 'not right'. But 'not right' does not mean 'wrong', as we realized when we considered the way that models work in science. This can lead to confusion because we tend to think of science as black and white. We can argue about shades of grey in the arts, or perhaps the social sciences, but we tend to think of 'truth' and 'certainty'

in physics. However, this may be incorrect. Dividing the scientists into the 'bad guys' (who tried hard, but got it wrong) and the 'good guys' (who got it right) is a little too simple.

Of course, Einstein is the archetypal 'good guy'. He managed to solve problems that even the great Newton got wrong. Strange, then, that Newton's 'wrong' ideas are still used by NASA for satellites and space shuttles. Why do all our daily experiences (apples falling and the like) obey his rules? Why does the moon still orbit according to Newton's formulas? Newton's laws work. How can they be wrong?

Building on earlier ideas

The answer to the apparent contradiction between Newton and Einstein is surprisingly simple. Einstein generally *agrees* with Newton; in fact, the only point of disagreement is over issues that Newton never considered (such as speeds extremely close to the speed of light, or near objects with intense gravitational fields). That is, Einstein built on Newton's theories, added to them and took them to new levels of complexity and sophistication. If Newton had been completely wrong, Einstein could not have been right. To say that Einstein 'disproved' Newton is to miss the point of the process – without Newton, there could not have been Einstein.

'Right' and 'wrong' therefore may not be useful ways to describe scientific theories. Physicist David Bohm puts it well: '*The notion of absolute truth is shown to be in poor correspondence with the actual development of science. Scientific truths are better regarded as relationships holding in some limited domain.*'

21 If Newton's ideas were wrong, why are they still used? Can 'wrong' theories make correct predictions?

22 What are the meanings of 'wrong' and 'correct' in Question 21?

New ideas rarely mean abandoning old ideas completely. Rather they stretch, expand and build upon old ideas. Scientists used to argue about whether light was a wave or a particle. It turns out (so we now think) that it is both. The new theory of light does not disprove either old theory, rather it unites and enlarges them. Our model has expanded to explain more data.

This simple point is often lost in the very human desire to categorize ideas as 'right' or 'wrong'. We like clarity and easy answers and we tend to shy away from more complex notions if we can. This means that we sometimes see a 'scientific revolution' when there was really a slow evolution of scientific theory. Physicist Hendrik Casimir writes: '*The gradual evolution of new theories will be regarded as revolutions by those who, believing in the unrestricted validity of a physical theory, make it the backbone of a whole philosophy (33).*'

'Right' ideas are ideas that lead to other ideas and that seem to make deep and unexpected connections to other areas of knowledge. Sometimes they lead to a new explanation of a familiar phenomenon. 'Wrong' ideas, by contrast, do not lead anywhere.

Limited information

By this definition, several 'wrong' ideas are 'right'. We could say that those scientists who once thought that the atom was the smallest particle of matter were 'wrong', but it may be more accurate to say that their theories were limited. Until technologies existed to split the atom and to observe the effects of the smaller particles that make up the atom, there was no way to know that there was

something smaller. It is all just a matter of perspective (you should be reminded of Newton and Einstein again here). 'The atom is the smallest particle of matter' was right when there was no possibility of deducing something else; as technologies developed, scientists had to take a larger, wider perspective. You always need to expand your theory to take more cases into account. That doesn't mean you were wrong before. It just means that you were only right given the available facts.

'What's the opposite of 'Eureka!'?'

In other words, 'wrong' means limited. It means that you haven't got the whole story. It doesn't mean that the theory has no value and is useless. We can say that most scientific ideas are 'wrong' as long as we understand what 'wrong' really means. As ever, a thorough understanding of language is essential.

So, in all likelihood, Einstein was wrong. He was not able to see all the possible problems or consequences of his theories. He was not omniscient! In fact, anyone who claims to have the absolute truth is probably not in the business of science. 'Right' and 'wrong', in that sense, do not really enter into the scientific process. They are only matters of dogma.

23 In your own words, explain the difference between 'right' and 'wrong' suggested here. Do you agree?
24 According to this way of thinking, what is scientific 'truth'? Is this different to the way we use the word 'truth' in everyday speech?
25 Are 'right' and 'wrong' used in the same way in maths, the arts or other disciplines?

Where have we been? Where are we going?

As we noted in the introduction to this chapter, it would be foolish to deny that the natural sciences have made, and are still making, astonishing progress in understanding the way the universe works. They even seem to be telling us something about where we came from and our place in the universe. But can the sciences ever tell it all? Can they ever tell us something about our daily lives and the human experiences which fill them? Many would say not, arguing that even if we knew every single physical detail about the universe that it was possible to know, we would not know, for example, what it would be like to be someone else.

Nor could any science, no matter how advanced, explain what it feels like to be in pain, or in love, or to taste coffee or wine. The argument seems to have a lot of force – maybe the sciences can never do that for us. Can any other discipline?

26 Think back over your science education. What did you learn about the way science works?
27 Are the theories in this chapter realistic about the way sciences work?
28 Are they the way sciences *should* work?
29 Ask any scientists you know what they think makes the natural sciences so special.

To some, the answer is obvious. Where do we regularly seem to 'touch' another human and transcend what has been called our 'egocentric predicament'? The only place, surely, is the arts, and it is to these we now turn.

Further study

★ For more detailed information on the myth of the flat Earth, read Stephen Jay Gould's essay 'The Late Birth of the Flat Earth', from his collection *Dinosaur in a Haystack: Reflections on Natural History*. Gould traces the history of the widespread, but incorrect, belief that many people – scientists included – throughout the Middle Ages believed the Earth was flat. The idea arose in the nineteenth century as part of an effort to discredit religious scholars. Another interesting source on this subject is this website: http://bede.org.uk/flatearth.htm. The author is Dr James Hannam, a writer with a physics degree from the University of Oxford and a PhD in the History and Philosophy of Science from the University of Cambridge.

★ For a fascinating discussion of the historical development of experimental design in the sciences, see *The Lady Tasting Tea: How Statistics Revolutionized Science in the Twentieth Century*. Of particular interest is the first chapter, 'The Lady Tasting Tea'.

★ For more information about pseudoscience and the appeal of conspiracy theories, read Michael Shermer's book *The Believing Brain*. Of particular interest there is Chapter 10, 'Belief in Conspiracies'.

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4 The arts

These are bagpipes. I understand the inventor of the bagpipes was inspired when he saw a man carrying an indignant, asthmatic pig under his arm. Unfortunately, the man-made sound never equalled the purity of the sound achieved by the pig.

Alfred Hitchcock

The fashionable oppish and popish forms of non-art today bear as much resemblance to exuberant creativity … as the noise of a premeditated fart bears to the trumpet voluntary of Purcell.

Lewis Mumford

Without music life would be a mistake.

Friedrich Nietzsche

Imaginative literature in the service of rebellion, or satanism, quickly sinks into exhibitionism or obscurity. Imaginative literature as the expression of a deeply apprehended truth, poetry which interprets to a man the myth of his own age, can in the hands of Dante, of Shakespeare, of Cervantes, of Camões and of Goethe, help to raise the level of a whole civilisation.

J.M. Cohen

Every artist dips his brush in his own soul, and paints his own nature into his pictures.

Henry Ward Beecher

Art is either plagiarism or revolution.

Paul Gauguin

Art
is not a
handicraft, it is
the transmission of
feeling the artist has
experienced.

Leo Tolstoy

Art
is not a
mirror to reflect
the world, but a
hammer with which
to shape it.

Vladimir Mayakovsky

I passionately
hate the idea of
being with it, I think an
artist has always to be
out of step with his
time.

Orson Welles

Acting
is not being
emotional, but
being able to express
emotion.

Kate Reid

Beauty
is excrescence,
superabundance,
random ebullience, and
sheer delightful waste
to be enjoyed in its
own right.

Donald Culross Peattie

Remember
that the most
beautiful things in
the world are the most
useless; peacocks and
lilies, for example.

John Ruskin

I'd
like to hear
your opinion on
this piece of Beethoven.
And remember, it is not
Beethoven who is being
examined here.

Paul Strathern

Life
beats down
and crushes the
soul and art reminds
you that you have
one.

Stella Adler

Poetry
begins in
delight and ends
in wisdom.

Robert Frost

Aims

By the end of this chapter you should:

- appreciate the scope of the arts as an area of knowledge, including possible definitions and descriptions of the central characteristics of the arts
- be able to discuss how artistic judgements differ for individuals and communities, as well as what personal knowledge, as opposed to the shared knowledge, we gain from the arts
- be able to discuss the nature of artistic knowledge, as opposed to other forms of knowledge
- appreciate various theories of the role of truth in the context of the arts
- understand how the arts fit into the human experience.

Introduction

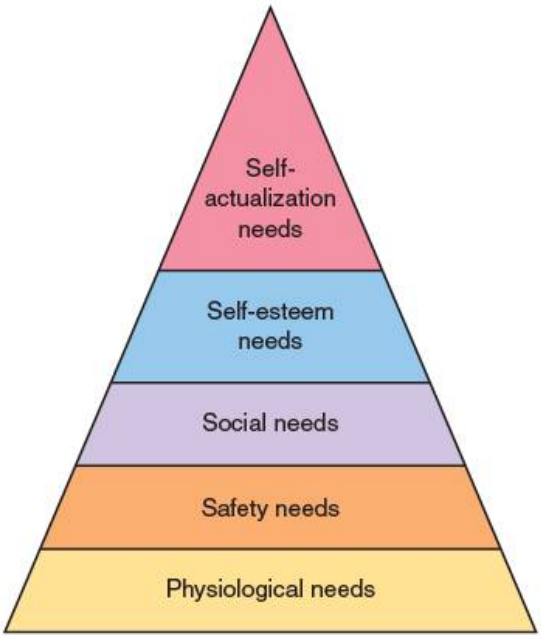
The natural sciences give us knowledge about the physical universe, including the physical nature of *Homo sapiens*. This is knowledge that we use to shape and control our environment and to change the quality of our lives. The arts, on the other hand, have no such obviously practical function, and yet they seem to be very important to us. Tickets to the 2013 Tony award winning musical, *Kinky Boots*, cost up to $150 apiece on New York's Broadway. Concurrently, tickets to *The Phantom of the Opera* in London cost up to £100 each, although that show debuted more than 25 years earlier. In February 2012, Paul Cézanne's painting, *The Card Players*, sold for more than $250 million, the largest amount ever paid for a painting (Lee).

■ ***The Card Players*** **by Paul Cézanne (alternative version to the one sold for over $250 million)**

English singer-songwriter Adele had the highest-selling CD of 2012 (Adele's *21*), with worldwide sales of 18 million copies and a profit of $67 million. Clearly we value the arts to a very significant degree. Why should that be?

As we noted in the Chapter 3, even if we were able one day to assert that we had learnt everything there was to learn about the physical universe (an absurd conjecture!), there would still be much about the universe and its contents that

we did not know, because there is much about the universe which is not physical. A good deal of this consists of experiential knowledge – what it feels like to encounter people and nature and things, what it is like to create things that do not exist naturally, what it is like to do things, such as to play soccer or to write a symphony, what happens when we form relationships with the people, animals, nature and objects around us, and what meaning, if any, we derive from those encounters, experiences and actions. At first consideration, it would seem that we do not need any formal endeavour to help us learn about these things, as we learn about them individually, from direct personal experience; yet, as Abraham Maslow famously proposed in his hierarchy of needs, the drive to share those experiences, to engage in thinking and questioning and interacting about human experience beyond the simple fact of existing and surviving, is deeply engrained in all humans.



■ **Maslow's hierarchy of needs**

Maslow designed the hierarchy as a means of modelling what he suggested are the universal human needs. The most basic needs have to do with our survival. Once those needs are met, the next most urgent need we have, as a species, is for social interaction, followed by the need for a positive sense of ourselves as independent beings. Most interestingly for our purposes here, however, is the fact that Maslow also showed that, at the top of the hierarchy, which depicts the most abstract and psychological need, is our need for self-actualization, which includes the need for cognitive and aesthetic experience, as well as the need to create (McLeod).

These needs may be abstract, in the sense that they do not contribute directly to our physical well-being or endurance, but they are still *needs*, rather than simply wants. This suggests that if these needs go unfulfilled, then we do not entirely experience our essential humanity. The arts serve as a primary vehicle for those experiences. According to this view, we don't just like the arts; we need them, and this begs the question of just what it is that we get from them.

In this chapter, then, we will investigate the nature of the arts, what they are, what kind of knowledge they convey, and how they convey it.

1 Are the arts – or any particular kind of art – important in your life? Which one(s)? Why?
2 Do you accept the notion that Maslow proffered that we need to develop our cognitive and aesthetic abilities? Do you think that these are universal human traits? Why or why not?
3 If you accept Maslow's hierarchy, which is more important – the lowest level of the pyramid or the top level? Construct arguments to support both views.

What is art?

Before we consider how to define or evaluate the importance of art, we need to decide what may or may not be legitimately called 'works of art'. We should not restrict our attention purely to painting, poetry, or any other particular form, and when we refer to 'the arts' or 'art' it will not be with reference to any particular medium. However, in expanding our vision of the arts we are immediately faced with the problem of where to stop. It is sometimes tempting to say that there are no boundaries – that everything is art because anyone can say something is art if it seems like art to that person. Consider, for example, the character in the film *American Beauty* who spent his time filming a plastic bag blowing down the street. Very few people would consider a piece of trash blowing in the wind to be art, but some might. And what about the video of that piece of trash? Is that art? And what about a movie featuring a video featuring a piece of trash blowing in the wind? The problem is that if we call anything or everything art, then 'art' ceases to be a useful term; why would we even bother to use it if it could not distinguish between any two things or events? If art is indeed an interesting and valuable idea, then some things must be excluded from its scope; if everything is art, then it isn't even a category, subject or area we can legitimately distinguish to study. So for our purposes, we must determine some way to define the category, even though it may seem hard to define.

What do we mean when we ask the question 'What is art?' If we mean 'What sort of things are *called* art?', then we have an empirical issue – the question is about how and in what contexts people use the word 'art'. In this sense, the answer will be descriptive of how the world is, and open to (scientific) investigation. On the other hand, and perhaps far more interestingly, if we mean 'What sort of things *should* we call art?', then we have entered a different area, for this question cannot be answered purely by reference to a description of the world. In order to answer the question in this sense, we are required to make a *judgement*, and the answer will indicate how we think the world *should* be (by using the word 'should' you can see why some have argued that art and ethics are tightly linked).

This split between **descriptive** and **prescriptive** modes of analysis is often found when we consider human activity (in the human sciences, the terms **positive** and **normative** are used) and it raises the problem of criteria, or standards, by which to judge. If we have a theory in, say, chemistry, then we can, in principle, perform experiments to test the theory. The standard of judgement is clear and unambiguously stated; theory must conform to experiment. Now the natural sciences are not without their difficulties, as we have seen, but there are universally accepted standards because we know what the natural sciences are about. Broadly speaking, they are about finding out how the physical world works, and so they appeal to the physical world (that is, experiment) as the arbiter of success. The contrast with the arts could not be more clear. The basic

Knowledge framework:
Scope

The scope of the arts seems to be almost unlimited. Art treats such diverse subjects as:

- religion: as in da Vinci's famous painting *The Last Supper*
- politics: as in Henrik Ibsen's play *A Dolls' House*
- nature: as in Vincent van Gogh's *Starry Night*
- technology and travel: as in Monet's paintings of the trains at the *Gare St Lazare*
- love: as in Verdi's opera *Aïda*
- living things: as in Ruth Sharman's poem 'Birth of the Owl Butterflies'
- art itself: as in Elizabeth Bishop's poem 'Poem'.

Unlike the natural sciences, the content of which is limited to physical properties of the natural universe, the arts can encompass all of those plus all human experience, historical and contemporary, real and imagined.

descriptive approach of seeing what happens in the world gets us nowhere – I would argue that my grandmother's teakettle in my kitchen cupboard is not art, and yet the Metropolitan Museum of Art has on display a teakettle (Kierstede) only slightly older than the one my great-grandmother left to me. Thus, we cannot point to 'experimental data' to determine what is or is not art.

Kierstede's *Teakettle*

Kierstede, Cornelius: Teakettle, *1710–20. New York, Museum of Modern Art (MoMA).*

Taking the prescriptive approach, however, gets us no further. We disagree about what art is because we disagree about what art *should be*. When I disagree with the Metropolitan Museum of Art about the kettle, the difference may not be about the object, but about art itself. I cannot settle the matter with the museum (let alone the matter of whether or not the kettle is any good) without asserting and defending views on the nature, purpose and subject matter of the arts. And on these there are many, many views.

So before we can even begin to address the question of good or bad art, we need to think about precisely what it is that art attempts to do. Only then might we be in a position to see whether or not any particular piece has achieved its intended goals.

What is the purpose of art?

Several suggestions have been made about the purpose of the arts. It is often suggested that the arts are *a way of expressing emotion*. This idea seems to fit well with the stereotypical art/science divide – the (often implicit) argument being that if science is objective and emotion free, then art must be subjective and emotion laden. Certainly, much art is either directly about emotions or evokes strong emotions within us – consider the deeply emotional quality an opera such as *Carmen* contains, or the power that a movie such as *Gone With the Wind* has to move us deeply as we watch it. But what about that silver teakettle? That does not seem to evoke much emotion – and it would be hard to argue that when the silversmith made it, his primary intention was to evoke emotion: he was making a teakettle so that someone could use it for the very prosaic purpose of making and serving tea.

4 Find several pieces of art in different media (for example, architecture, music, painting, poetry, plays, sculpture), good and bad, which evoke emotion.
5 If the purpose of art is to evoke emotion, then what are the best forms of art?
6 Would this definition of the purpose of art include things which we would not wish to include, or exclude things we would not wish to exclude?
7 In light of this, to what extent is communication of emotion a useful characterization of art?

This emotional theory cannot offer a complete explanation of the purpose of the arts. Another theory suggests that the arts *imitate nature or the world* (this theory is also called the **mimetic theory of art**). Indeed, much art fascinates us for this very reason. Consider the painting and the photograph below.

■ ***Flowers in a glass vase on a draped table, with a silver tazza, fruit, insects and birds***
by Jan Davidz de Heem

■ ***Big Sky – Rocky Mountain National Park 2012***
by Carolyn Henly

Both of these reproduce elements of nature in unambiguous, clearly detailed ways, and most people would recognize them as works of art (though we might argue about whether they are equally great or about the likelihood of their continuing to be admired in future generations). In both cases, we recognize the fidelity to the original subject that the artist reproduced, so it is easy to see how these artworks fit the definition of mimetic art.

8 Find several pieces of art which imitate nature.
9 Would this definition of the purpose of art include things which we would not wish to include, or exclude things we would not wish to exclude?
10 What do you think might be the aims of a typical photographer? Are they different from the aims of the painter or sculptor?
11 To what extent is mimesis a useful characterization of art?

■ ***Woman's Head***
by Pablo Picasso

This definition of art solves the problem of the Kierstede teakettle, as its realism is unquestionable. But what about modern art, such as the sculpture by Picasso, entitled *Woman's Head (Fernande)* shown above? Most people agree that this is a work of art, but it certainly isn't realistic. Indeed, since the dawn of Impressionism in the nineteenth century, art has rapidly grown to include genres that transcend the real – Impressionism was followed by Cubism, Surrealism, Abstract Expressionism and Postmodernism, to name a few schools of art that stray from the realistic depiction of the external world.

Another ancient tradition is that of art *teaching us what is right*. If art does not tell us how the world is, then perhaps it tells us how it should be. Much of literature seems to serve this purpose: consider, for example, Athol Fugard's play, *'Master Harold' … and the Boys*; it is an immediate and powerful way of saying that something was terribly wrong in South Africa under apartheid, and that the world should be different. In fact, the moral values espoused by the play seem important and relevant to us today, even though apartheid has ended and even if we never lived in South Africa, because the wrong that the play condemns is a kind of wrong that we encounter today. The play calls upon our powers of admiration and empathy, and it resonates with our sense of fairness. And it is not only literature that has the power to evoke a moral or ethical response: Canadian artist Rick Gibson once made a sculpture by hanging aborted and freeze dried foetuses as earrings from a mannequin (Gibson). There was an outcry that this was a deeply immoral thing to do, that it showed no respect for human dignity or the sanctity of life; however, it could also be argued that the artist was attempting to make a profoundly moral point: that in our materialistic society children are sometimes treated as fashion accessories, available if we want them and disposable if we do not. The art conveys the message in a powerful and striking way that words cannot. Certainly, as a medium, art is often able to say some things in a more powerful way than the limited statements 'Abortion is immoral' or 'We should value children more' can. Art can heighten moral awareness in a subtle and perhaps more profound way. But what about the teakettle, again? Or even the photograph or the still life that we considered earlier? None of these would seem to have any moral implication; nor do many thousands of other artworks, so clearly we cannot say that art is defined by its function in conveying a moral message.

12 Describe some art which has affected your moral outlook. Why did it do so?
13 Does this view of the purpose of art capture what we think should and should not be categorized as art?
14 What are the links between emotional and moral feelings that are engendered by the arts?

A final commonly offered purpose of art is that it *appeals to our sense of the aesthetic*; that is, that the function of art is to appeal to our sensory experience based on what we consider to be beautiful. This is an idea that seems to appeal to many people – one prevalent justification for the refusal to define boundaries of what constitutes art is the assertion that 'beauty is in the eye of the beholder', so that only each individual can determine what is beautiful. This definition would seem to account for most of the artworks we have considered so far in this chapter – except for Rick Gibson's *Foetus Earrings*, which are unlikely to be considered beautiful by anyone (but presumably might be)! In fact, they were considered so repellent that they were on display for less than one day before police arrived at the gallery to shut the exhibit down. Gibson was eventually tried and convicted, along with the gallery owner, of public indecency. The trial raised many questions about legal definitions and inequities in the law pertaining to different types of art (Lewis 56), but nowhere – neither in the court nor in the press – did anyone suggest that the work was not actually art.

15 Describe some art which appeals to your aesthetic sensibility. What is it that you find to be aesthetically pleasing?
16 Can you think of other examples of works that you would consider to be art, but which are not aesthetically pleasing?
17 To what extent is the idea that art should appeal to our sense of the beautiful a useful definition of the arts?

So we are left with a predicament: if some, but not all, art is beautiful; if some, but not all, art conveys a moral message; if some, but not all, mimics life, and if some, but not all, expresses emotions, then what quality is common to *all* this art?

Notice that all of the functions listed above pertain to human experience that is internal, rather than external. Sensory and emotional experience is of the immaterial mind, rather than of the material, scientific universe, and our sense of what is or is not moral is purely a human intellectual and emotional pursuit; it is not something that exists outside of us. It would appear, then, that the only *function* of art is to express a range of ideas, sensibilities, experiences and feelings in order to develop a deeper understanding of them and share them with each other. Perhaps that's all art does – it simply has no 'useful' purpose. We can't use a dance or a symphony to accomplish anything specific; we hang paintings on the wall solely as decoration; we don't use them as table tops or book shelves or for any other practical function. Thomas Hoving, the former director of the Metropolitan Museum in New York, said that '*A work of art should be looked at as a humanistic experience, an object on its own*' (McPhee 117).

This definition of art solves most, if not all, of the problems we have noted above. An object, such as the silver teakettle in the Metropolitan Museum is art because we (in the collective sense) have decided that it is no longer to be used for serving tea. Its function now is to be admired for its beauty and craftsmanship,

as well as for its power to make us realize in a visceral sort of way our similarities to those who preceded us by 300 years. It is now easy to understand why the famous sculpture by Marcel Duchamp entitled *Fountain* is considered to be art; it became art when he removed the urinal from its functional environment and set it up to be considered for its emotional, aesthetic, moral or other intellectual purposes. We can even understand now how the plastic bag blowing in the wind in *American Beauty* could be seen as art by the young man who filmed it, and his film can easily be seen as art as well, as in that context, both have artistic purposes.

■ Duchamp's *Fountain*

Such a definition does not, however, solve all of our problems. This definition would seem to support the notion that anything can be art, because anyone can decide that anything is art. We are also left with the problem of the quality of art: if all it takes for something to be art is that its function is solely intellectual or emotional or aesthetic, is the plastic bag blowing in the wind as good a piece of art as da Vinci's *Mona Lisa*?

18 Which of the following 20 items are works of art? Justify your choice.
- *Sunflowers* by Vincent van Gogh
- A mass-produced urinal entitled *Fountain*, chosen and displayed, but not designed or created, by Marcel Duchamp
- An untitled white piece of canvas
- A superb rock concert
- The song *Happy Birthday*
- A superb sportsman running 100m
- A perfect copy of *Sunflowers* sold for $3 in a market
- A beautiful mountain
- A poem generated by a computer
- Einstein's general theory of relativity
- A white piece of canvas entitled *A Foggy Day*
- An extremely funny cartoon
- Mozart's *Clarinet Concerto*
- A perfect copy of *Sunflowers* hung in a gallery and called *The Perfect Copy*
- *King Lear* by William Shakespeare
- The Taj Mahal in Agra, India
- A sheep cut in two and preserved in a glass container
- Some old bricks and timber randomly arranged and entitled *Building Site*
- The ballet *Swan Lake*
- A white piece of canvas entitled *Hiroshima; Ground Zero*

19 Do your answers change if you think about the work from the perspective of shared knowledge rather than from the perspective of personal knowledge?

Knowledge framework: Application

Notice that the definition of art as that which exists for no other purpose than the artistic leads to an array of interesting questions:

- What if I buy a van Gogh painting to stow away in a vault while it appreciates in value so that I can sell it for a profit later? In such a case, I would not be treating the painting as art, but as a means to a pragmatic end: a secure retirement.
- Could my great-grandmother's teapot one day be considered a work of art? Certainly – consider the pottery and furnishings that have been uncovered in archaeological digs. Many of them were made to be functional objects, but we treat them now as art.

It's also interesting to explore 'art' as the development of any skill, such as 'the art of cooking' or 'the art of judo' or 'the art of woodworking'. This use of the word 'art' refers to experiences and products that have practical real-world functions, and so these 'arts' are not our concern when we think of 'the arts' as an area of knowledge.

20 Did you find any of the following concepts helpful in your discussions? Were they all equally important in each case?

Value	**Creativity**	**Truth**	**Intention**	**Enlightenment**
Splendour	**Reality**	**Perspective**	**Accuracy**	**Elegance**
Form	**Realism**	**Novelty**	**Empathy**	**Beauty**
Emotion	**Passion**	**Wisdom**	**Interpretation**	**Education**
Wonder	**Awe**	**Emotion**	**Balance**	**Structure**

What is good art?

The notion that art (and good art) is solely in the eye of the beholder would seem, at face value, to be absurd. No matter how tempting it is to think that everyone gets to decide what is art and what is good art, it is easy to think of examples which preclude such a conclusion. Imagine you went to the ballet, and the dancers in the corps de ballet were out of sync with each other, shuffling around mostly flat-footed, and landing with great thuds after leaps. Imagine further that in the solo dances or in the *pas de deux* the prima ballerina didn't bother lifting her arms very high or extending the line all the way through her fingers, or that her partner dropped her prematurely in an awkward heap after a lift. Clearly this would be bad ballet dancing, and no one would be inclined to argue that these dancers were as good as Mikhail Baryshnikov or Polina Semionova. No one would argue that elevator music is of the same quality as Beethoven's *Moonlight Sonata*, or Jeff Buckley's 'Hallelujiah,' or John Legend's 'Ordinary People', or that *Friday the Thirteenth Part VIII* is as good a film as *The King's Speech*. Famous artists such as Rachmaninoff, the Beatles, Vincent van Gogh and Jorge Luis Borges have become part of our cultural memory because they are memorable – they stand out from other artists whose work has not been deemed to have reached the same level of accomplishment.

How then, do we know what constitutes good art?

21 If the arts are about personal opinions then why do we, as a society, rate some art as much better than others? Why are some pieces that were created centuries ago still well known today? Could the sound of my pet cat vomiting really be great art?

22 If there are objective standards by which to measure the arts, then what are they? Do you think your standards are universally applicable? And what is the basis for your choice of those particular standards?

23 It has been suggested that personal opinions and objective standards are only two options on the question of artistic standards. Is this true? Are there any other alternatives or distinctions which might be helpful?

The fact that there are art critics seems to suggest that there are some opinions that are worth listening to. The fact that more often than not the critics are in broad agreement might suggest that there are recognizable standards of judgement. Anyone who has ever sat an art, music or drama course or examination knows that some standards do exist. Art critics and artists can (and do) discuss concepts of balance and tone in paintings, or of harmony and structure in music, or the effectiveness of choreography and quality of movement in dance. Film critics talk about special effects, lighting, characterization, costuming, style and so on. The terminology and the consideration of how much each factor contributes to the quality of the artwork may vary, but there is general agreement that these qualities constitute important factors in determining the quality of any given work of art.

Knowledge framework:
Links to personal knowledge (1)

The arts are an area of knowledge in which personal knowledge and shared knowledge can be strikingly different. A mother is likely to be quite reasonably moved by her 5-year-old daughter's drawing, and even many years later may love it for the emotional response it generates in her – the way it helps her remember her daughter at that age and the evocation of her love for that child. The mother's personal knowledge of and relationship with her daughter make that drawing invaluable to her; others do not share the experience and so judge the art by different standards of quality, by which the drawing will be found lacking; hence, the same drawing is unlikely to garner any public favour and will never be displayed in a museum. No one will remember this particular artwork in 200 years.

It is highly unlikely, however, that you base your personal judgements of any given work of art on the opinions of critics. You don't just automatically like some painting, or think that it's a work of art, because a critic says it is a masterpiece; nor do you reflexively dislike a movie because some other critic says it's a disaster. You may learn something about a work of art that you did not know or did not notice from hearing or reading a critique, but you probably are accustomed to judging art for yourself, and deciding what you like based on your personal, internal, visceral response to any given work, and you are probably more than happy to disagree with any critic who does not see it your way.

In this relationship between the judgements made by experts, such as critics and artists and academics, and those made by individuals, we can now perhaps see how it can be that we can believe that some art is better than other art and yet be reluctant to prescribe universal standards of judgement. Because we experience art personally, we want to assert our personal right to judge it for ourselves; yet we also want to acknowledge the greatness of great artists. The way to reconcile these two positions is to acknowledge that, unlike with the natural sciences or other areas of knowledge, the standards for judgement in the arts are different for personal knowledge than they are for shared knowledge.

24 Think about your own experiences in art or music lessons. Are there standards which you attempt to meet?
25 Are your judgements about art as good as those of an expert?
26 Is there universal agreement about the standards of judgement? If not, why not?

The process of judging the quality of any work of art is not as simplistic as it might seem based on what we have considered so far. For one thing, personal judgements are likely to vary rather dramatically from person to person. You might think, for example, that rap music is deeply emotional and important, while I might think it sounds like random noise, and I might find classical music, which you find quite tiresome, to be the height of musical achievement. As personal judgements, these are both functional and, therefore, satisfactory. Neither one of us can be considered wrong. Our personal artistic judgements are also likely to develop over the course of our lifetime. The more you know about any particular genre of art, the more you are likely to appreciate it, and the more your judgements will be the result of ways of knowing other than emotion and intuition. And that may be the primary difference between personal judgements and what ultimately come to be shared judgements: the reason that it is possible to claim that anything can be considered not only art but also good art by some person somewhere is that we acknowledge the importance of the personal emotional response which outweighs reason or language for that individual. Experts, on the other hand, subvert personal emotional responses to informed judgements and trained intuitions, both of which are based on reasoning against established criteria (established communally). This is not to say that experts eliminate or ignore the importance of the visceral emotional reaction to art. When Oscar Wilde quipped, '*There are two ways of disliking art; one is to dislike it; the other, to like it rationally*,' he may have hit the nail on the head. Malcolm Gladwell, in *Blink*, recounts the story of George Despinis, the head of the Acropolis Museum in Athens, saying that he knew a statue was a fake '*Because when he first laid eyes on it, he said, he felt a wave of "intuitive repulsion"*'

(Gladwell 6). This is clearly an emotional reaction; it is just different from the emotional reaction of the amateurs, who respond based solely on themselves, their loves, hates, sorrows or other personal feelings. The difference between the experts and the individual non-expert is that the former have developed their intuitive and emotional understanding to encompass a much broader context than their own personal lives.

We can, now, see how it is possible to have two completely different kinds of artistic judgements for two completely different kinds of purposes. Your personal judgements define good or great or valuable art for you, individually; however, those very personal judgements have no direct or immediate influence on the public and shared determination of which art will be put into museums or which artists will be remembered down the ages.

There are two primary paths by which art and artists come to be widely seen as iconic; that is, there are two paths by which art comes to be recognized as great by the community:

- One is that the cumulative judgement of individual consumers – people who purchase CDs, paintings or sculptures, or movie, concert, opera or theatre tickets – results in the kind of mass commendation that sets one artist apart from another.
- The other is that the experts, the people who incarnate artists and artworks in journal articles, books and museums, make a selection based on a more formal set of academic standards and that selection is preserved and displayed for current and future generations.

The two methods interact: individual persons are frequently influenced by shared knowledge. We go to museums to see artwork with which we are unfamiliar, for example, and suddenly we find that as we learn about some artist or artwork we did not understand before, we like it better. This results in our going out of our way to see more work by that same artist and sharing it with our friends and family, thus promoting that art and that artist through our behaviour. Those artists who eventually appeal to the most people are those who are considered to be the best. Sometimes, the greatness of a particular artist is not recognized in his or her lifetime. *The Great Gatsby*, by F. Scott Fitzgerald, for instance, is now widely considered to be one of the greatest American novels ever written, but it achieved this status only long after Fitzgerald died. By contrast, Japanese author Haruki Murakami has achieved worldwide fame for such novels as *The Wind-Up Bird Chronicle* and *1Q84* in his lifetime. The process is uneven and sometimes slow, but eventually we develop a cultural consensus as to which art and which artists are great.

Great art, in short, is not 'great' because it speaks to one individual person; great art is great because it speaks to something transcendently human.

27 Think of a work of art that you love personally and which has already been judged to be a great work of art through surviving the test of time. Do you think that the reasons you love it are the same reasons that it is beloved by so many other people? Why or why not?

28 Think of a work of art that you love personally but which has not yet had the opportunity to survive the test of time and become widely acknowledged as a great work of art. Do you think that it will? Why or why not?

29 What is meant by 'transcendently human'? Think of a work of art that you think has achieved that standard. What universal human experience does it convey or portray?

Knowledge framework: Historical development

We have seen how artists have tended to push the boundaries of their artistic media both to develop new styles and to alter the notion of what content is appropriate for art. The development has tended to move from the more realistic to the more abstract – even in artistic fields such as dance.

This development has not, however, tended to negate past artworks; instead, the scope of what is considered to be art expands to keep the old and incorporate the new.

Art which is too radical and thus evokes too much negative reaction may very well be rejected in its day, only to find recognition in some future decade or generation.

How do artistic judgements change over time?

Personal artistic judgements change over time because we change, as individuals and as societies, over time. A novel that meant very little to you when you were required to read it for your tenth grade English class may resonate with you much more deeply when you are 35. A painting that you loved as a child may now seem insipid to you.

The same process has taken place across the history of the arts. The purpose of art has expanded, and so too has what has been considered acceptable in terms of shared knowledge. If we consider various artistic movements over time, we can see that art has developed along with social change and technological development. The kind of digital manipulation of photos, for example, that we can do now was not possible even 30 years ago (which is, by the way, a killer argument against the moon-landing conspiracy theorists). Photographic technology has progressed from a system that imprinted images on a piece of glass coated with a light-sensitive material through film to digital recordings. Similar technological developments have expanded the range of pigments available for paint, tools for carving sculptures and special effects available on the stage and in the movies.

The content and style of art have also changed over time. The earliest known art was cave paintings, which consist of images of the things the painters saw around them. Early paintings and sculptures were dedicated to depicting religious topics and aristocrats; from there the scope of art expanded to include normal everyday people. Accepted styles have shifted from the grandiose to the realistic to the impressionistic to the Cubist, Deconstructivist, Surreal and Abstract. Often these changes have caused tremendous controversy: when the first Impressionist painting was displayed in Paris in 1874, the work was denounced by critic Louis Leroy, who wrote, in a blast of sarcasm:

The rash man had come there without suspecting anything; he thought that he would see the kind of painting that one sees everywhere, good and bad, rather bad than good, but not hostile to good artistic manners, devotion to form, and respect for the masters. Oh, form! Oh, the masters! We don't want them any more, my poor fellow! We've changed all that (Nochlin 10–11).

Nowadays, of course, Impressionism has become among the most beloved of all artistic styles.

This phenomenon is not confined to the visual arts: on the hundredth anniversary of the first performance of Igor Stravinsky's ballet score, *The Rite of Spring* in 1913, National Public Radio reported that when it was first performed:

… the curtain rose and the dancing began, there appeared a musical theme without a melody, only a loud, pulsating, dissonant chord with jarring, irregular accents. The audience responded to the ballet with such a din of hisses and catcalls that the performers could barely hear each other. Backstage at the premiere, Nijinsky shouted at the dancers while Diaghilev tried to suppress a possible riot by flashing the house lights ('Milestones of the Millennium').

Nowadays, the work is considered a classic, and we often hear the music performed even without the accompanying ballet. Time has allowed the cultural judgement to evolve, and what was once widely rejected has now become widely admired – rather like rock music, in fact.

30 Is there any art that you find to be meaningful and important but which your parents think is pointless or badly made? What, in your experience, accounts for the difference in attitude towards that art?

31 Has there been any significant controversy over a piece of art in your local, regional or national community? What was the cause of the controversy? Do you think that in time that work of art will come to be widely accepted? Why or why not?

We have seen, now, that the scope of the arts changes over time, and that what constitutes art or good art differs, depending on whether we are asking the question from the perspective of personal knowledge or from the perspective of shared knowledge. We haven't yet established, however, exactly what that knowledge comprises.

What knowledge is there in art?

As we saw in Chapter 3, the natural sciences seek to give us knowledge about reality. They try, in other words, to convey to us some 'truth' (even if incomplete or subject to later revision) about the world outside of ourselves. If the goal of the arts is to convey some similar understandings, then realistic art ought to be one of the highest forms of art there is, and photography would seem to be a highly reliable and easily accessible medium, as it can arguably capture more truth about the real world than any painting can. But is the old cliché 'the camera never lies' really true? A photographer selects his picture from an almost infinite range of possibilities; to take a particular photograph is to miss the other possibilities – and to leave out all context, the lack of which may obscure reality quite a bit! Consider the photograph of the mountains on page 58: the shutter speed for that picture was approximately 1/500th of a second, so the reality that was captured was a tiny moment, imperceptible as an independent unit to the human eye, and accessible only by a camera. By the next 1/500th of a second, reality would have changed – the clouds would have moved, the light might have altered slightly, thereby altering the colours just a tiny bit, the shadows on the ground would have changed, and so on. In a sense, the photograph did capture one tiny fragment of reality, and so is realistic, but in another sense it is entirely unrealistic, because it shows something that we cannot consciously experience – and that is if we presume that the photograph has not been manipulated. In the twenty-first century, digital technology has advanced so far that now anyone with a computer and a little time and imagination can alter any photograph in myriad ways, so that no photograph can be presumed to mimic even the tiniest sliver of reality perfectly unless you were present from the moment it was taken through the printing process.

Consider further the still life by de Heem. Paintings are not digital and cannot be digitally altered (although it is worth noting that the reproduction in this book *is* digital and therefore *could have been* altered!). One reason that de Heem's painting is so stunning is that it is, in fact, a spectacularly accurate representation: every detail of every flower, insect and piece of fruit is so lifelike that one almost expects to see the butterflies take flight. It's hard to imagine that anyone could get paint to look more realistic than this; yet, the painting is in some ways profoundly unrealistic: the flowers and fruits and insects depicted do not coexist in real life. Tulips bloom much earlier in spring than lilies; the fruit would be ripe much later than the early spring flowers, and the grains would not be ripe until later in the summer. However realistic each individual object in the

painting is, the whole could only be created by a man in a hothouse; the still life is not a depiction of reality as it is left to nature's devices.

32 Do you think that a photograph conveys more of reality than a highly realistic painting? Why or why not?
33 Do you think that a painting which offers the viewer an extraordinarily detailed view of a real-life object conveys more of reality than an Impressionist painting? Why or why not?
34 How much reality is conveyed by a television drama? A realistic play? A realistic novel?

The fact that even works of high realism are not completely realistic underlines an important point about the arts, one that we approached before: a work of art is not the thing it depicts; it is not anything except a work of art. Henri Matisse insisted upon this point once, when a visitor to his studio asked, about a painting Matisse was working on, 'Surely the arm of that woman is too long?' Matisse replied, 'Madam, you are mistaken. That is not a woman; that is a picture' (Langer 8). A very famous painting entitled *The Treachery of Images* by René Magritte makes this same point. (The caption, for those readers who cannot translate the French, says 'This is not a pipe.')

■ ***The Treachery of Images***
by René Magritte

If art is not anything but itself – and even the word 'art', which relates to 'artifice' and 'artificial' would suggest that that is correct – then what kind of knowledge could it possibly convey? We suggested that what differentiates art from other things is that a work of art exists solely for an aesthetic, emotional, moral or other intellectual purpose. This would seem to suggest that the knowledge inherent in art is aesthetic, emotional, moral or otherwise intellectual.

If this is the case, then can we see some knowledge of that kind in the two realistic artworks we've been studying? What might those images be 'about'? To some degree, that is left to the audience to determine. Maybe the experience is predominantly emotional – maybe, you, as a viewer, are mostly struck by the sheer beauty of the images, and the beauty makes you feel an indescribable kind of emotion about nature and the world in which we exist. Maybe the experience is more intellectual: perhaps both the photo and the painting are about getting a glimpse of reality that is not actually accessible to us, given the limitations of our sensory apparatus. Perhaps the photograph makes us think about the tiny moments of beauty that underlie our much broader experience of it, or about the strange tension between time passing and our desire to remember moments as if

they were frozen, or the fact that we take for granted that what we experience is 'real', even though we actually experience only a tiny fragment of reality. Maybe the painting causes us to ponder the relationship between the beauty of nature and man's creative powers. The knowledge contained in these two works can, then, potentially be aesthetic, emotional and intellectual. Whether it is any one or all of these, however, seems to depend on how the individual audience member engages with the work.

We saw earlier that one potential function of the arts is moral. Certainly many, if not most, books, plays and films involve some moral perspective. The writer and philosopher Iris Murdoch argued, in her book *The Sovereignty of Good*, that appreciation of the arts, and beauty in particular, allow us to transcend some of the empirical and rational problems of the human condition; they allow us to rise above our petty and individual selves, and that this must be the first step towards a meaningful morality:

By opening our eyes we do not necessarily see what confronts us. We are anxiety-ridden animals. Our minds are continually active, fabricating an anxious, usually self-preoccupied, often falsifying veil, which partially conceals the world. Our states of consciousness differ in quality, our fantasies and reveries are not trivial and unimportant, they are profoundly connected with our energies and our abilities to choose and act. And if quality of consciousness matters, then anything which alters consciousness in the direction of unselfishness, objectivity and realism is to be connected with virtue (84).

This is a difficult idea. Murdoch suggests that by altering our states of consciousness, as the arts surely do, they are of necessity linked with our moral perspectives. Being startled or unsettled by Marcel Duchamp's *Fountain*, for example, might push us to new, richer consciousness of an everyday object. Maybe we're pushed to consider why we are shocked to see a urinal proclaimed as art, why there should be a cultural taboo on looking at a urinal in a public place, or why we should have any taboo associated with a necessary, healthy, human biological process. One can easily see that something which pushes us to notice and think about beliefs and values we don't normally acknowledge has a role in shaping morality.

On a more directly practical level, philosopher Martha Nussbaum has argued that literature enhances our moral understanding not only by encouraging us to look outside ourselves, but also by engendering a sympathetic and emotional identification with characters (perhaps suggesting that the emotional and moral approaches are not as distinct as they might, at first, seem):

We have never lived enough. Our experience is, without fiction, too confined and too parochial. Literature extends it, making us reflect and feel about what might otherwise be too distant for feeling. The importance of this for both morals and politics cannot be underestimated (47).

It is this identification with characters, as we saw with Fugard's *'Master Harold'... and the Boys*, which can then contribute to the growth of the reader.

As with the interpreting of paintings and photography, though, the determination of the moral perspective in any given work of art depends in part on the audience for that work. In the preface to *The Picture of Dorian Gray*, Oscar Wilde disagreed with the idea that the morality is in the work. He wrote: *'There is no such thing as a moral or an immoral book. Books are well written or badly written. That is all'* (3). Wilde suggested that a work of literature does not

contain and deliver moral rules; just as we do not use the arts as a primer for understanding nature or other external aspects of reality, we do not use the arts as a primer for how to behave in accordance with clear, set moral norms. Instead, the arts push us to confront and think about norms, behaviour, attitudes and actions so that we can form individual perspectives. Under this view, it is only out of the *interaction* between the reader and the particular work of art that a moral idea can arise.

There seems, then, to be a rather strange relationship between the arts and truth; a work of art seems to be able to help us understand some truths even though the work itself does not directly tell the truth.

35 Describe in your own words the ideas of the section above. Do you agree?
36 Consider the great pieces of art you know. Does this model explain why they are considered great?
37 According to this model, what are the highest and lowest forms of art?

Knowledge framework:
Language and concepts

Paradoxically, the knowledge that we gain from the arts cannot be easily expressed in language – at least not in simple, direct propositional claims. Instead, even where the medium of the artwork is language (such as in plays or novels or poems), the meaning, if any, is not conveyed in the literal words and sentences. Instead, every work of art requires us to construct a system of meaning that derives from the lexicon of the text – be it literature or painting or dance.

This is equally true in artworks that rely on words for conveying their substance as it is for artworks that rely on other media – sounds or images, for instance. Blue in one painting might be a source of peace and quiet, while in another it might convey sorrow or despair.

The various elements of non-verbal artistic works perform in some ways as a language, but cannot be called a language, because, as you will see in Chapter 17 on language as a way of knowing, some key features are missing. For one thing, there is no consistent grammar universal to all art works, nor is the 'lexicon' (the use of that word is a metaphor to describe the elements of any work of art which convey meaning) productive. It is not capable of generating infinite meaningful utterances. Instead, the system of meaning has to be determined individually for each work of art, though it is true that some artists develop consistent techniques so that their elements of meaning can be interpreted in several (or many) of their works.

The arts, experience and the nature of artistic truth

The once influential philosopher A.J. Ayer is quoted as saying: '*a work of art is not necessarily the worse for the fact that … [it is] … literally false … If the author writes nonsense, it is because he considers it most suitable for bringing about the effects for which his writing is designed*' (Ammerman 120).

This is an interesting position – Ayer suggests that in the arts 'nonsense' and statements which are 'literally false' may be the best way to achieve certain effects. So if we take these effects to be truth and knowledge of some sort, this means that we are using falsehoods as the best way to find truth! Perhaps this is what Picasso meant when he said: '*We all know that Art is not truth. Art is a lie that makes us realize truth, at least the truth that is given us to understand. The artist must know the manner whereby to convince others of the truthfulness of his lies*' (Borofsky).

Knowledge framework:
Methodology (1)

The example from *Macbeth* shows us that one of the primary methods of constructing and conveying meaning in literature is the use of figurative language. Truth is conveyed through language which is not literal: metaphors, hyperbole, symbols, sarcasm, unreliable narrators and many other literary techniques are employed by the writer. The reader must understand the fundamental fact that literature does not consist of a series of truth statements in order to have any chance of getting at the truth that underlies the fiction.

This methodology is not limited to works of art that are conveyed in words. Painters use colours to convey meaning, sculptors rely on exaggerated features and forms, the ballet is a highly stylized form of dance far removed from the kind of dancing that most of us engage in in our everyday lives. Costumes, lights and features of the sets convey symbolic or metaphorical meaning in plays and movies. The audience of any artwork must be able to interpret all of the non-literal components of that work for it to be of any artistic value.

This seemingly ridiculous assertion is worth pursuing. Consider this famous piece from Shakespeare's *Macbeth*. Having just been told that his wife is dead, Macbeth says:

> *Life's but a walking shadow, a poor player*
> *That struts and frets his hour upon the stage,*
> *And then is heard no more; it is a tale*
> *Told by an idiot, full of sound and fury*
> *Signifying nothing. (Act V, scene 5)*

Let us examine this extract for meaning, truth and knowledge.

Life's but a walking shadow … No, it is not. This is false.

… *a poor player that struts and frets his hour upon the stage, and then is heard no more* … 'Life' is not a sentient being who can act, and even if we take 'life' to be a figurative stand-in for people, the vast majority of us do not act, and we do not go on stage. Those of us who do so probably spend significantly more than an hour there.

… *it is a tale told by an idiot* … No, life is not a story, so there can be no narrator, idiot or otherwise.

… *full of sound and fury* … There is sound in life, and some fury, but clearly life cannot be literally full of anything, any more than life can have a colour.

… *signifying nothing* … Well, my life is certainly significant to me, even if to nobody else. Again, this is false!

On this reading, the passage contains no truth. Is it therefore meaningless and without merit? Most would agree that to say so would be to misunderstand profoundly the point of the arts, and that it is this literal analysis, not the passage, which is without real meaning. The flaw lies in the conception of knowledge and truth that is at the root of the analysis. We have tacitly assumed that by 'truth' we mean literal truth (this is also sometimes referred to as scientific truth, although this may be based on a misunderstanding of scientific truths) or truth that is verifiable in some sense. But if we try to reduce art to a series of truth statements, are we not diminishing it? To anyone who has ever felt undercurrents of insignificance or absurdity in their life, Macbeth's words speak a deep and vitally human truth. The artistic truth is different from the literal truth, but it is not without value for that.

That is not to suggest that literal truth has no place in the arts – Dickens describes certain aspects of Victorian London in great detail and Homer is an important historical source for the Trojan War, but this is only incidental to their works' value as art. Our artistic appreciation of Dickens and Homer is not based on the accuracy of their factual accounts (more detailed and accurate accounts may not be art at all). Broadening our experience of situations where we were not personally present is no bad thing, but it does not require art to do that. If we prefer an account of Homer's to that of the historian, it is precisely because it goes beyond what actually happened in the Trojan War and in some way informs us about something in the present – our own experience. The condition of humans is a very different thing to the human condition, and it is knowledge of the latter with which the arts are concerned.

Let us look again at the passage from *Macbeth*. The speech, of course, is a metaphor. The tenor of the metaphor is Macbeth's conception of the hard realities of life – he's making a generalization based on his own experience – and the vehicle of the metaphor is an actor upon a stage.

Life's but a walking shadow … Just as an actor is not the person he portrays (and, indeed, the person he portrays is most often fictional!), so at times our lives seem shallow and fragile, and feel, perhaps, like mere copies of something real. Haven't we all felt that at times?

… a poor player that struts and frets his hour upon the stage, and then is heard no more … In the same way that a play lives and dies in an evening, we sometimes have the sensation that our lives are only tiny, temporary scenes in which we play a role for the short time that we are on Earth. The metaphor suggests that each of us has a rather small and worthless part. This is a pessimistic view, but many, if not all, of us have been there at one time or other in our lives.

… it is a tale told by an idiot … Here Macbeth is making a judgement about the meaning of life. He suggests that the play in which he is living is so nonsensical, so meaningless, that it can only have been written by someone who lacks the ability to reason.

… full of sound and fury signifying nothing … Macbeth ends by suggesting that, just as a bad play written by a bad playwright would seem to the audience to be nothing but a lot of meaningless noise, so do our lives lack value: no matter what we do, how we struggle or how much we try to fight it, we will all die and be forgotten. Even if we are remembered, what will that signify? Nothing.

It would, of course, be possible to write out what the passage means in a sense which contained literal truths. It might start, 'There are times when, to some people, life seems shallow and unreal …'. The passage would then conform to a strict notion of truth, but it would also be a rather dull statement not worth re-reading. When Shakespeare has Macbeth say the literally false passage in the context of the play, however, when his wife is dead and his life is falling to pieces, it is a profound and moving sentiment that has provided insight and, yes, truth of sorts, to people for hundreds of years. Even more provocative for those who listen to Macbeth's despairing judgement is the question of whether Shakespeare himself believed Macbeth's vision. Shakespeare put the words in Macbeth's mouth, but surely one of the powerful points of that play is that, although he never seems to come to understand or accept it, it was Macbeth who brought most of his tragedy down upon himself. Shakespeare, we might argue convincingly, didn't intend for his audiences to walk away thinking that the truth is that life is meaningless; rather, he seemed to want us to understand something even more powerful: that whether our lives are meaningless or not depends largely upon our own actions. In this metaphorical soliloquy, then, we get two different truths: the truth of what life feels like to someone who has aimed high and fallen far, and the truth of what a more objective onlooker understands from considering that person's outlook.

This interpretation is debatable, of course. And since it is debatable, how do we come to any conclusion about what any particular work of art means?

38 What are the different possible senses of the word 'truth' that have been described here? Are these mutually exclusive? Are there any other forms of truth?
39 Identify a piece of art which has communicated some truth to you, in the non-literal sense that we have discussed. What precisely is that truth? Define/explain it as precisely as you can. Is it possible to do so?
40 How is it that the medium of art manages to convey these truths if they cannot be expressed in a literal way?

Knowledge framework:
Methodology (2)

Constructing or discovering meaning in a work of art requires many ways of knowing. Emotion and intuition help us connect to the emotional content or implications of the work; imagination helps us to consider a wide range of possibilities; memory helps us to bring our existing knowledge to bear when trying to understand what is going on in a work of art; and reason is much more important than some people imagine it to be, because despite the popular conception that art is all about emotion, we rely heavily on reason to justify our interpretations.

Language is important in several ways: language is, of course, the medium for several genres of art, and even for those, such as painting, which do not rely on words as the material of the work, language can be important. What would we think of Picasso's *Guernica* if it were untitled? We also rely heavily on language in the arts as the means of testing our ideas with others and for sharing our interpretations.

Perhaps the most important way of knowing that audiences employ is sense perception, because all interpretation depends on the accurate recognition of the real features of the work of art, be they physical, auditory or linguistic.

How do we make knowledge in the arts?

Every interpretation is just that: an *interpretation*. Each reader must decide what he or she believes that the work conveys. We have seen several examples of this already in this chapter: De Heem's still life might seem to one person to be nothing more than an expression of nature's wealth, an image that makes that viewer experience feelings of joy and gratitude, even wonder. To another, it might convey a more intellectual idea about our power to alter reality, not only with a hothouse, but also with the stroke of a brush, and prompt questions and ideas about how we ought to wield that power. We saw how Macbeth's speech might convey multiple meanings, and we saw how there could be two dramatically different interpretations of Rick Gibson's *Foetus Earrings*, neither one 'right' or 'wrong.'

At this point, it might be tempting to run back to the position we considered at the beginning of the chapter and simply conclude that art can mean whatever anyone wants it to mean. Such a position, however, is no more useful now than it was then. Think about it: it would be foolish to interpret Kierstede's teakettle as a vitriolic socio-economic condemnation of slavery. There is clearly no connection between the teakettle and slavery or social commentary. For such an idea, you don't need the teakettle at all, because you are not interpreting. You can just go off in a corner and think about the evils of slavery.

The verb 'interpret' has the denotation of explaining the meaning of *something*. Interpretation, then, is fundamentally tied to the nature of the thing being interpreted; thus, scholars and artists do not think of art as an area of

knowledge which allows for completely freewheeling 'interpretations' unrelated to the factual reality of the individual work of art. There are standards and expectations for the interpretation of a work of art, and you have no doubt experienced this in your classes on literature or the other arts: in practice, the way we construct meaning from a work of art is that each receiver of a work must develop an understanding that he or she can justify with evidence. Evidence consists of the factual, real features of the artwork itself. This is perhaps most easily understood with literature, for which the 'facts' are the words of the text. It is the reader's job to consider the words of any literary text and imagine the potential implications of those words – metaphorically, symbolically, practically, or otherwise. Each of the arts employs common practices that the experienced audience member comes to recognize and upon which a confident interpretation can be based. Skilled readers, for example, know to at least consider whether the inclusion of snow in a text is meant to suggest death and whether the author's choice to set a story in springtime reflects the idea that something is being reborn. This use of familiar symbols or strategies is not limited to the verbal arts, however. Skilled viewers of Picasso's work know to consider whether the strange faces they see are actually depictions of the face from several different angles, all superimposed on each other; and skilled listeners of symphonies know to expect the second movement to employ a slow tempo. Skilled audiences also know that none of the 'standard' strategies constitutes hard and fast rules, and they delight in discovering that an artist has taken the expected and done something unexpected with it.

The knowledge in a work of art, then, is dependent upon the *interaction* of the audience with the artwork. It is varied and variable; often the knowledge we get from a work of art arises from discussion with others who see it somewhat differently than we do. Rather than looking for certainty, we ask whether any given interpretation is reasonable, or valid. The standard for determining whether an interpretation is valid or not is the rigour with which the interpretation has been constructed. If an interpretation accounts for all the facts of the artwork, if it does not assume things which are irrational, and if it does not interpolate actions, words, or sounds or images that are not part of the artwork – and which cannot be reasonably shown to follow logically from the facts of the artwork – then the interpretation stands. The value of the interpretation is then up for discussion and debate.

Recognizing the important elements of any work of art and fitting them together to make meaning requires close and careful attention to the details of the work of art under consideration. From those details, a coherent interpretation can be recognized and developed. This is the essential method for discovering or developing meaning in any artwork: the audience for that work must engage with it, observe it closely, and imagine all the possible ways in which the disparate elements might be seen to form a coherent whole. An effective and convincing interpretation is what results from an audience member's having brought to bear all of his or her tools for making knowledge. Perhaps it is the fact that we can bring so many aspects of ourselves and our experiences together that makes our engagement with art such a rewarding experience.

Art and the human condition

"Well, for that matter, what is the meaning of you?"

Our investigation into the arts so far seems to have left out one important aspect of our experience with art, and that is the deep emotional response we have to a work of art that transcends any meaning that can be put into words. If I ask you to name a book, or a song, or a movie you love, you no doubt can do it. If I ask you to tell me why you love it, you will probably have considerably more trouble. If you love *Pride and Prejudice*, you might try to account for it by talking about how perfect Elizabeth Bennet and Fitzwilliam Darcy are for each other, or how funny the narrator is, or how brilliantly Jane Austen paints portraits of people we recognize from real life – especially weak, selfish, clueless, non-reflective people. Ultimately, though, whatever you can say will probably not satisfactorily express your feelings about the novel.

Nussbaum again:

Novels do not function … as pieces of 'raw' life: they are a close and careful interpretative description. … The point is that in the activity of literary imagining we are led to imagine and describe with greater precision, focusing our attention on each word, feeling each event more keenly – whereas much of actual life goes by without that heightened awareness, and is thus, in a certain sense, not fully or thoroughly lived … So literature is an extension of life not only horizontally, bringing the reader into contact with events or locations or persons or problems he or she has not otherwise met, but also, so to speak, vertically, giving the reader experience that is deeper, sharper and more precise than much of what takes place in life (47–48).

One reason that it is so difficult to describe the kind of knowledge we get from the Arts is that it is very often a kind of knowledge that cannot be put into words – or at least which can be better expressed in a medium that does not involve words. One way to describe that dynamic is to say that art *offers insights into the human condition*, and it does so by engaging us in cognitive and aesthetic experience. This characterization of the arts seems to encompass the others so far suggested, and suffuses them with a meaning and purpose which resonates more warmly with our experience of great works of art. Douglas Morgan puts it beautifully in his article 'Must art tell the truth?':

Remember, if you can, that breathless final moment when you have moved intensively with heart and mind through a quartet of Brahms or Bartók. You have hoped, expected, feared, been lifted, lowered, fulfilled and disappointed, and now, inevitably, the voices together sing one rich climactic chord. You as a person vibrate, suspended, with the vibrating sound. Now imagine your neighbour leaning towards you anxiously and expectantly, to ask, 'Quickly now, tell me what you learned from that music. What information did it communicate to you?' Such a neighbour deserves only an icy glare of disdain (21).

41 Look at the list of items in Question 18 and suggest what the pieces might tell us about the human condition.
42 Describe some art which has moved you profoundly in some way.
43 According to this model, what are the highest and lowest forms of art?

Perhaps this conception allows us to suggest that profound art is art which provides us with meaningful experience, either in its own right, or as a way to reinterpret or re-experience our own experiences. In this sense we can see why the arts are subjective – they speak to us about our own experiences – but also see why there is so much agreement; as so many of our experiences and inner worlds are common. Arthur Danto has related this to the original Greek concept of mimesis:

Hamlet and Socrates, though in praise and deprecation respectively, spoke of art as a mirror held up to nature. As with many disagreements in attitude, this one has a factual basis. Socrates saw mirrors as but reflecting what we can already see … and [therefore] of no cognitive benefit whatever. Hamlet, more acutely, recognised a remarkable feature of reflecting surfaces, namely that they show us what we could not otherwise perceive – our own face and form … and so art, in so far as it is mirrorlike, reveals us to ourselves (571).

Of course, there are other views. We might argue that experience is indeed 'raw' and cannot be acquired through an interpretation. To exist 'in the moment' is the true experience – all else is secondary. To think that we can have experience *through* art, or indeed *through* anything, may be mistaken – perhaps the whole point of experience is that it is unmediated and immediate. Film critic Michael Norman mentions Samuel Fuller, a Second World War veteran and war film director, who said that the only way to recapture the experience of war on film is to put a machine gun behind the screen and gun down the audience! His point is clear and powerful – the experience of war through a film can never be the same as the real thing. Norman writes of the seductive nature of the war film, and arguably this point is applicable in the widest sense:

The truth about war movies is that they are not really about war; they are about our fantasies of war, our notions of what happens when we arm our children and send them off to fight. They are the images we can't summon on our own or are too afraid to imagine. They are the stories we need to hear, the explanations we require to deal with mysteries of living. Without war movies we would be left only with the truth and the truth of war is simply too terrible to tell.

War movies give us a fiction, and, despite Norman's apparent misgivings, that fiction helps us connect in an important way – a way which is not solely intellectual – to people who have experienced war first hand, and it has the power to make us care about war in a way that we couldn't care without the film.

Despite, or perhaps because of, the fact that art allows us vicarious entrée to experiences we have not personally had, art has been valued by humans in every known society for thousands of years. We do not expect to get literal reality from art, but we do seem to get valuable insights that help us understand and cope with the reality we do encounter outside of art. We also gain knowledge of the world inside us, the world of emotions, values and judgements. We don't get the kind of knowledge from the arts that we get from the sciences or mathematics or history, a kind of knowledge which is easily expressed in a single proposition or a set of them, and a kind of knowledge which can be expressed in words or formulae. What we get from a work of art is direct personal experience created by our engagement with another human mind. We get knowledge not only of what it means to be human, but also knowledge of how similar or different our experience is from that of others, also human. We get knowledge of how what we see and feel and believe is amazingly, shockingly, joyfully similar to someone who may have lived in another time and another place; we get knowledge of how amazingly, shockingly, joyfully different the view is from our place in the universe to the view from someone else's. The greatest art informs and enriches our interactions with the world. The writer Robert Dessaix has gone so far as to suggest that, '*Once you've read Tolstoy and Turgenev, for example, you will simply love differently*' (198).

44 Are the arts important? If so, is this despite or because of the problem of finding the standards by which to judge them?
45 What place does rationality have in the arts?
46 What are the standards of artistic judgement?
47 Which people are best qualified to judge the arts? What qualities should they possess?

Knowledge framework:

Links to personal knowledge (2)

Just as art is judged on the basis of both personal and shared standards, it is created by individuals and, to some degree, in groups. Those works of art created by individuals will be highly individual, depending upon the interests, skills and aims of the artist, while those which are the result of collaboration will reflect the highly personal input of each collaborator, then shaped by the collaboration. Sometimes one person's vision (the director's in a theatrical production, for example) will contribute more to determining the essential nature of the work, but even then, the input of the other collaborators (actors, in the case of a play) will naturally colour the outcome.

Each artist relies to differing degrees on the same ways of knowing that the audience will eventually use to interpret the art – emotion, intuition, imagination, memory, sense perception and reason. Some artists claim to work very intuitively (though remember that this is a trained intuition!), while others profess themselves to think long and hard about how to put together a work. Many, if not most, do drafts of their work as they try to figure out what final product will best embody what they want to convey.

Despite the importance of individual vision, artists influence each other. Movements such as the Impressionist, Cubist and Abstract-Impressionist schools arose from artists working together, discussing their work, and identifying values that underlay their final products.

Where have we been? Where are we going?

We have seen that, unlike the natural sciences, the arts deal in a kind of knowledge that is variable and often intangible. Where the natural sciences deal explicitly with the nature of the physical universe, the arts deal with a much broader range of subjects, which may include objects from the physical universe, but the kind of knowledge we get from the arts is not about the physical features or processes of objects. They seem to connect with us, and to allow us to connect to each other in a very human way. This benefit has, however, come with a cost – we have lost much of any objective claim to certainty that we may once have had, and part of the reason for this is that where the natural sciences rely heavily on sense perception and observation, the arts rely heavily on imagination. Imagination is a way of knowing that gives us access to things which do not exist, and it seems a curious fact that this could help us know that which does exist. We will turn our attention to imagination in the next chapter, to see if we can better understand how it works.

Further study

- An extremely powerful introduction to the social and political relevance of the arts is John Berger's very readable and short *Ways of Seeing* (Penguin, 1972), based on the BBC television series.
- The best general philosophical introduction we know of is Chapter 10 of Donald Palmer's wonderful *Does the Centre Hold?* (Mayfield, 1991).
- Chapter 4 of Martin Gardner's *The Whys of a Philosophical Scrivener* (Oxford University Press, 1983) directly addresses the issue of aesthetic relativism.
- The links between the arts and the natural sciences are controversially explored in Edward Wilson's *Consilience* (Vintage, 1999).
- A tremendous consideration of the relationship between the arts and truth is in Douglas Morgan's 'Must art tell the truth?' (*Journal of Aesthetics and Art Criticism*, vol. 26, 1967).
- In fiction, we have been charmed and enlightened by Alain de Botton's *How Proust Can Change Your Life* (Vintage, 1998).
- For the thoughts of the critics, a great overview is Carolyn Korsmeyer (ed.) *Aesthetics: The Big Questions* (Blackwell, 1998).
- Many of the original expressions of aesthetic theory from down the ages and across the cultures can be found in David Cooper, Peter Lamarque and Crispin Sartwell (eds) *Aesthetics: The Classic Readings* (Blackwell, 1997).
- You can listen to the National Public Radio story about Igor Stranvinsky's *Rite of Spring* at http://tinyurl.com/okjfrl2.
- Finally, Malcolm Gladwell's *Blink* provides excellent insight into how informed intuition relates to artistic judgement, particularly in the introduction, entitled 'The statue that didn't look right,' and in the final chapter, entitled 'Listening with your eyes'.

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5 Imagination

Everything you can imagine is real.
— Pablo Picasso

I am enough of an artist to draw freely upon my imagination. Imagination is more important than knowledge. Knowledge is limited. Imagination encircles the world.
— Albert Einstein

Reality leaves a lot to the imagination.
— John Lennon

Imagination, of course, can open any door – turn the key and let terror walk right in.
— Truman Capote, *In Cold Blood*

I am certain of nothing but the holiness of the Heart's affections and the truth of the Imagination.
— John Keats

Imagination is the golden-eyed monster that never sleeps. It must be fed; it cannot be ignored.
— Patricia A. McKillip

Nature, to be commanded, must be obeyed. The imagination must be given not wings but weights.
— Henry Adams, *The Education of Henry Adams*

Some might think that the creativity, imagination, and flights of fancy that give my life meaning are insanity.
— Vladimir Nabokov

Imagination will often carry us to worlds that never were, but without it we go nowhere.
— Carl Sagan

Imagination means nothing without doing.

Charles Chaplin

Because when you are imagining, you might as well imagine something worthwhile.

L.M. Montgomery

Fairy tales had been her first experience of the magical universe, and more than once she had wondered why people ended up distancing themselves from that world, knowing the immense joy that childhood had brought to their lives.

Paulo Coelho

Hate is a lack of imagination.

Graham Greene

And people who don't dream, who don't have any kind of imaginative life, they must … they must go nuts. I can't imagine that.

Stephen King

Lovers and madmen have such seething brains
Such shaping fantasies, that apprehend
More than cool reason ever comprehends

William Shakespeare

Imagination does not become great until human beings, given the courage and the strength, use it to create.

Maria Montessori

Imagination is not only the uniquely human capacity to envision that which is not, and, therefore, the foundation of all invention and innovation. In its arguably most transformative and revelatory capacity, it is the power that enables us to empathize with humans whose experiences we have never shared.

J.K. Rowling

The man who cannot visualize a horse galloping on a tomato is an idiot.

André Breton

Imagination, like reality, has its limits.

Tim O'Brien

Aims

By the end of this chapter you should:

- be able to define imagination and identify different types
- be able to explain what personal knowledge we get from imagination
- be able to explain what shared knowledge we get from imagination in the formal areas of knowledge
- be able to identify problems of imagination
- understand the ways in which we counteract potential problems with imagination
- understand the way imagination works with other ways of knowing.

Introduction

If we ask you to imagine a cat, you probably have no trouble conjuring up the image of a cat in your mind. If we ask you next to make it a long-haired cat with blue fur and green eyes, you can do that, too. If we ask you now to put the cat in roller skates and give him a top hat, and have him skate gracefully around the Eiffel Tower in Paris, you can do that, too. So long as you have seen a cat, a hat, roller skates, and the colours green and blue, and so long as you know what the Eiffel Tower looks like, you can imagine this scene – which does not and, in fact, cannot, exist – pretty much effortlessly. So far as we know, humans are the only species capable of this act of mental creation – of breaking an object (a cat) down into its component parts (fur, eyes, colour) and manipulating the parts – along with other objects not normally belonging together – to create something new, perhaps never seen before, and perhaps impossible to see.

That's not to say, though, that imagination is just about flights of fancy. You can use it for very practical purposes: to anticipate how your date will go on Friday night, or what will be in the history test tomorrow, or what it will feel like to be away at college. So we use our imaginations for a wide variety of purposes, from calling up images of past experience to inventing objects, to making up stories, to trying to determine the potential consequences of our choices and actions. But just what is imagination? How does it work? And how reliable is it as a way of knowing? We will investigate all of these questions in this chapter.

1. How much of your time do you spend imagining things? And when do you use your imagination – at home, school, alone, with friends?
2. What, if anything, do your answers to Question 1 tell you about imagination?
3. Is your imagination important to you? Why or why not?
4. When you read about the imaginary cat in the paragraph above, did you find yourself visualizing it? What might this suggest to you about how your imagination works?

What is imagination?

The *Stanford Encyclopedia of Philosophy* tells us that 'imagination' is a term for a broad range of mental functions:

Kendall Walton (1990), for instance, distinguishes between spontaneous *and* deliberate imagining *(acts of imagination that occur with or without the subject's conscious direction), between* occurrent *and* nonoccurrent *imaginings (acts of imagination that do or do not occupy the subject's explicit attention), and between* social *and* solitary imaginings *(episodes of imagining that occur with or without the joint participation of several subjects). … Gregory Currie and Ian Ravenscroft (2002) begin their book-length work on imagination by distinguishing among* creative imagination *(combining ideas in unexpected and unconventional ways);* sensory imagination *(perception-like experiences in the absence of appropriate stimuli); and what they call* recreative imagination *(an ability to experience or think about the world from a perspective different from the one that experience presents) (Gendler).*

■ **Recreative imagination**

The article goes on to list several more categories that have been proposed as a means of identifying and classifying imaginative functions; clearly, the jury is still out in terms of being able to precisely categorize this particular human faculty.

5 Come up with two examples for each of the categories given in the section above. Do any categorizations seem especially convincing or unconvincing?
6 Think of the different ways you use your imagination.
   a Which of these do you use the most?
   b What sorts of knowledge (if any) do those different types of imagination help you to know?

Despite the fact that it is possible to identify a whole array of similar processes, all of them have something in common: in every case we are using our minds to envision or create something which is not currently present. When we imagine, we use our minds to create a mental representation or model. There are, however, other kinds of mental processes that do that (arguably, *most* mental process do that – an interesting point in itself), and so we want to be able to see if we can distinguish 'imagination' from those other kinds of mental processes.

Some mental activities are quite easy to differentiate: perception, for example, is not the same thing as imagination, as when we use the word 'perceive', we mean that we are transforming actual data of something present into a mental model of that thing (there is some overlap with the earlier example of the cat roller skating around the Eiffel Tower, but also some difference). When we talk about 'anticipating', we are talking about our mental representation of something that we have good reason to expect is actually going to happen (Gendler). You would, for example, anticipate, rather than imagine, that you will have spaghetti for dinner if your mother has told you that she is making spaghetti for dinner (even though you might imagine the taste if you were hungry).

Some other mental processes are harder to differentiate from imagination. Belief obviously requires us to create a mental model of something which is not physically present; belief, however, implies that there is a close relation between our belief and reality. If you say that you believe that God or a god created the world, or if you say that you believe that Lionel Messi was the greatest football player ever, you are making a claim about what you understand to be a factual reality. If you said that you 'imagined' that Lionel Messi was the greatest football player ever, that statement would imply that he actually wasn't, and that you were only making it so in your mind.

Memory and imagination might be even more closely related. When we say we remember, we mean that we can recreate in our minds an actual event as it happened or an actual object or person as it existed. As we saw in Chapter 2, however, modern science tells us that memory is more a process of recreating a whole event from discrete bits of information than it is a playback of a continuous data stream, like a movie. In that case, memory would seem to be quite similar to uncontrolled and unconscious imagining. The fact that our memories are of actual past events in which we participated ourselves, however, can be seen as the dividing line between memory and imagination. You remember the cat you had as a pet when you were a kid; you must imagine what it was like to land on the moon as a member of Apollo 11.

7 Visualize something that happened to you yesterday, something that happened last month, something that happened last year, and something that happened when you were younger than 10 years old.
   a About which memories are you the most certain?
   b Which can you visualize the most clearly?
   c Do any seem to you to require more imagination than the others?
   d Can you distinguish between those cases where you are using imagination and those where you are not? If so, how?
8 Now visualize an event for which you were not present, but about which you know a great deal. How does your imagination help you to know and understand that event?

The *Stanford Encyclopedia of Philosophy* differentiates this kind of imagination, **sensory imagination**, the forming of mental images, from a second type, called **cognitive imagination**, which is the use of imagination to entertain possibilities – possible consequences, outcomes, actions, answers and so on. When you try to decide, for example, which movie you should go and see with your friends this weekend, you don't call up actual sensory images of the movies; rather, you imagine in cognitive terms which movie you will enjoy the most, or will give the most satisfaction to the whole group. This is, surely, an important difference.

The human sciences have begun to add the work of philosophers who have investigated imagination, though the work is in its infancy. Current theory, as proposed by Rutgers psychologist Alan Leslie, is that imagining involves a three-stage process (Baron-Cohen). First, we have to acquire some mental representation of something – the image of a cat, say (or, more likely, of many different cats). Leslie calls that the *primary representation*. From that, when we imagine, we copy that image; and then, finally, we can manipulate the *second-order representation* into something new, by giving it blue fur, roller skates and a top hat, for example. This theory seems reasonable as we know we can easily distinguish between the original 'inputs' to our imagination and the imaginative models that result. We can (unless delusional through illness, for example) distinguish between models of objects that have some claim to be truthful ('I see a fish'), from those models that have no claim to being true ('I imagine a mermaid'). So imagination allows us to retain, untouched, our images of the world around us and at the same time to imagine other possibilities. Whatever specific mechanism allows us to manipulate our existing stored mental models to make new, modified models, our capacity to imagine is a fundamentally human capacity.

In *The Believing Brain*, Michael Shermer describes the process by which evolution shaped our ability to make mental patterns. He describes two types of perceptual errors: we can perceive something that is not really there (Shermer calls this a Type 1 error), or we can fail to perceive something that really is there (a Type 2 error). Type 1 errors are most often harmless. If you hear a rustle in the darkness and assume it must be a mugger waiting to rob you, and in fact the rustle was only a paper bag blowing in the wind, nothing happens. Type 2 errors, however, are dangerous. If you ignore the rustle, because you fail to imagine that it might be something dangerous, and it turns out to be a mugger, then you may suffer serious consequences for that failure (Shermer 59). Our ancestors with the ability to imagine dangers survived in greater numbers than those who could not, and so that ability was selected over time, leading us today to the ability to imagine a wide range of possibilities as to what any piece of perceptual data could mean. Interestingly, this built-in desire to avoid the Type 2 'missing the signal' errors in our perceptual data leads to increased Type 1 'seeing the ghosts' errors, as we shall see in Chapter 14, and underscores how imagination and perception are tightly linked.

9 Consider the following list of patterns in nature. Do any of them exist independently of our ability to organize our sensory data into patterns?
- Animal shapes in the clouds
- The Big Dipper and other constellations
- A group of trees that form a triangle
- The spiral sequence of seeds in a sunflower (You can find more on this example at the online Museum of Mathematics at http://tinyurl.com/ncu85mw.)
- The even numbers, the prime numbers or the sequence of digits of pi.

10 Which type of perceptual error, Type 1 or Type 2, does each of the following represent?
- Hearing a noise in the dark and thinking that someone is hiding in the shadows
- The stereotype that all women are emotional
- Letting out a scream when someone taps you on the shoulder because you didn't process the footsteps coming up behind you
- The failure to recognize the different person in the Simons and Levin door experiment at http://tinyurl.com/osfnvqh.

11 What does the Type 1 and Type 2 distinction tell us about what we can know from our imagination?

The fact that our ability to imagine is innate can be seen in the way that children develop.

We can identify creative processes in children at the very earliest ages, especially in their play. A child who sits astride a stick and pretends to be riding a horse; a little girl who plays with a doll and imagines she is its mother; a boy who in his games becomes a pirate, a soldier or a sailor, all these children at play represent examples of the most authentic, truest creativity. … A child's play is not simply a reproduction of what he has experienced, but a creative reworking of the impressions he has acquired. He combines them and uses them to construct a new reality, one that conforms to his own needs and desires (Vygotsky 11–12).

It remains important, nevertheless, for the child – and later the adult – to be able to tell the difference between the imagined and the real; in normally developing humans, that ability grows as we mature.

So the ability to imagine is innate, and we develop it over time as we grow and mature. In the modern era, though, we use our imaginations for much more than keeping ourselves alive.

What do we know from imagination?

Imagination and personal knowledge

Individually, we use imagination frequently and for a wide variety of purposes. Although we don't usually have a need to construct fantasies like roller skating cats, we do use sensory imagination for play, for daydreams and for artistic endeavours. Perhaps you have classes at school in which you engage in drawing, dance choreography or composing music. Maybe you help design sets for theatrical productions or posters to advertise school dances or T-shirts to commemorate a basketball championship. In situations such as these, you use your imagination to know what possibilities there are for how things can be.

Athletes use sensory imagination for training:

Visualization has been popular since the Soviets started using it back in the 1970s to compete in sports. Now, many athletes employ this technique, including Tiger Woods who has been using it since his pre-teen years. Seasoned athletes use vivid, highly detailed internal images and run-throughs of the entire performance, engaging all their

senses in their mental rehearsal, and they combine their knowledge of the sports venue with mental rehearsal. World Champion Golfer, Jack Nicklaus, has said: 'I never hit a shot, not even in practice, without having a very sharp in-focus picture of it in my head' (LeVan).

This kind of visualization can be quite powerful; studies show that athletes who combine visualization with physical training show greater gains than athletes who engage only in the physical training. Imagination in this case helps people know not only what they can do, but also how to do it better.

We can use cognitive imagination to generate possibilities in many other kinds of situations too. If you're designing a science lab, trying to figure out the best way to solve a maths problem, interpreting the central metaphor in a poem, or trying to decide what songs to re-mix for a special someone, you're using your cognitive imagination (though the last may involve the sensory imagination, too, if you are playing the songs you are considering in your head). Another important use of this kind of imagination is to resolve ethical dilemmas. If you have to decide, for example, whether to stand by while a friend does something wrong or to join him, or to take action to try to stop him, one of the main ways you determine the best course of action is by imagining and weighing the consequences of each choice.

12 Which type of imagination do you think you personally use more often, sensory or cognitive? Why do you think that is?
13 For the next two days, keep track of the situations in which you use both types of imagination – sensory and cognitive. Which one do you actually rely on more? Which one are you better at?
14 Humans have the gift of being able to plan for the future; how closely is this linked to the imagination? Is this a necessary link?

All of these functions of imagination are conscious. Other functions, though, are unconscious. Sometimes the best way to use your imagination is to turn it loose to work on its own. Possibly you've had the experience of struggling with a problem and going to sleep without a solution, only to wake up with a clear idea in mind about what needs to be done. There are many famous stories of 'Eureka' moments in which problems were solved by sudden imaginative realizations that seemed to come out of nowhere. Even the phrase 'Eureka moment' comes from one such example – the story of Archimedes who, stepping into his bath, suddenly understood the relationship between mass and water displacement. A similar, possibly apocryphal, tale describes Newton having a sudden epiphany about gravity when an apple fell on his head. One of the most famous stories of intuitive imagination of all is the story of August Kekulé, who, in 1865, had a dream which revealed to him the completely unexpected shape of the benzene molecule:

Suddenly, in the dream, the serpents caught each other's tail and formed a circle. Kekulé saw the answer. The carbon atoms formed an hexagonal ring with alternating single and double bonds. Each one held its own hydrogen atom – 'like charms on a bracelet,' says von Baeyer. It was a structure utterly alien to anything else in chemistry (Leinhard).

As he slept, Kekulé's imagination called up the memory of a ring in the shape of two intertwined snakes – a symbol for alchemy – and offered it to his conscious mind as the solution to the problem of the shape of the troublesome molecule.

Ouroboros, the symbol of alchemy

Finally, one of the most important functions of our individual imaginations might be one that we rarely acknowledge; the ability to know/imagine what other people are thinking and feeling without having to be told. Philosophers have long debated whether or not we can ever know if people other than ourselves even have minds ('the problem of other minds') but happily we not only take it for granted on a daily basis, we actually have automatic insight into the content of these other minds. The accidental discovery of 'mirror neurons' in a lab in Palermo, Italy in 1992 has begun to put this (miraculous, when you stop to think about it) ability on a firm scientific footing, and to allow us to see how imagination and intuition (see Chapter 10) may be tightly linked. The claim is that through the operation of these mirror neurons, we actually experience, in diluted form, the emotions involved in events we perceive, even if we are not directly participating in them. That's why it is so exciting to watch a tense sports match, so scary to see a horror movie or, for that matter, arousing to watch pornography. It also explains why we feel happy when someone smiles at us and why we feel sad when we see someone else cry ('Mirror neurons'). This is a fascinating finding, as it shows how a vital aspect of the arts – the way they can convey (even slightly) new experiences – is underpinned by imagination and is possibly founded in neurology. Ultimately, these mirror neurons may be used to better understand the emergence of cooperation and empathy, two skills vital in society and in personal relationships, and so mirror neurons may even have profound links to our ethical beliefs and leanings.

Imagination, then, can play diverse and profound roles. Far from the stereotype of simple fantasy, imagination may play a central role in many areas of our thinking, and that is why it is so important that we scrutinize it for problems and (even more) complexities.

15 What is the difference between conscious and unconscious imagination?
16 Imagine what the world would be like if we did not have mirror neurons and could not understand what other people were feeling. What problems would arise?
17 What does this kind of imagination help us to know?

Potential problems of imagination for personal knowledge

Imagination is an important skill, but sometimes it can get us into trouble – you have probably heard someone being described as having an 'overly active imagination', for example. This criticism can be used to describe several different kinds of problems. It might mean that the person spends too much time fantasizing and too little time attending to the real world around her – problematic because anyone who is not sufficiently attuned to reality can get into trouble at any time by missing important information from the surrounding environment. While, in a young child, an imaginary friend is expected and acceptable, past a certain age, it is cause for concern. 'An overactive imagination' might also describe someone whose imaginings are too fantastical. People who are overly paranoid, for instance, spend their lives in fear that some danger lurks around every corner. Another form of this kind of imaginative problem is the belief in conspiracies, or in the paranormal; people who expend a lot of their energy pursuing evidence of UFOs or trying to prove that the moon landing was a government conspiracy have also lost touch with some important features of reality. Michael Shermer traces these kinds of overly imaginative beliefs to the evolutionary preference for Type 1 errors. Paranoia and conspiracy theories, he

argues, are, at their hearts, simply rather extreme variations of seeing patterns where there are none (Shermer 62).

It is also possible for our imagination simply to be wrong, rather than overactive. We may misinterpret someone's facial expression or make a bad estimate about the consequences of an action. We may choose the wrong method for approaching that maths problem, mis-imagining which technique will work, or we may misinterpret the poem. These failures of our conscious efforts to imagine can happen for a variety of reasons: perhaps our reasoning is poor, or we lack the necessary experience to accurately predict outcomes, or we lack the emotional experience needed to understand the situation as well as we thought we did. Experience helps us hone those abilities; the link between imagination and truth is an important one, which we will return to later in the chapter. But it's also worth noting that some problems with imagination are biological and more serious. People whose imaginings are extreme, prolonged, and wildly in conflict with reality, exhibit behaviours which we call hallucinatory, or schizophrenic, or psychopathic. Psychopaths, in particular, lack the physiological hardware that allows for empathy (Harms), and hallucinations occur from various causes: they can be drug-induced, for instance, and they can arise from illness, especially with high fever.

Cartoon from www.cartoonstock.com

One particularly terrible form of hallucination is called Capgras Syndrome; like other neurological disorders, it is fascinating for what it can tell us about the way our minds work. Identified by French Psychologist Joseph Capgras in 1923, its primary symptom is that the person suffering from Capgras delusion believes that his loved ones – mother, father, husband, wife, children – have been replaced by imposters ('Capgras Syndrome'). Neurologist V.S. Ramachandran suggests that the source of the problem, which can occur as a result of disease or injury, is a failure of the brain to send proper messages:

… In patients experiencing Capgras … the connection between visual recognition and emotional recognition is severed. Thus the patient is left with a convincing face – 'That looks like mom!' – but none of the accompanying feelings about his mother (Abumrad and Krulwich).

So what looks like a mistaken case of imagination (these are not imposters, after all) in fact turns out to be a problem in the interface between perception and emotion; and the tragic conclusion is that those people can no longer tell the difference between imagination and reality. They do not think that they are imagining; they think that they are perceiving, and they make decisions and act on the 'reality' that they experience, a 'reality' dramatically at odds with the reality that the rest of us experience.

18 Consider the kinds of problems we have identified here – uncontrolled hallucinations or disorders such as Capgras Syndrome. What problems of knowledge are caused by this kind of failure of the brain's imaginative systems?

19 It appears that here imagination (or at least a problem of imagination) actually arises from perception and emotion. Would this make imagination a secondary mental process, one that can be reduced to these other, more basic processes?

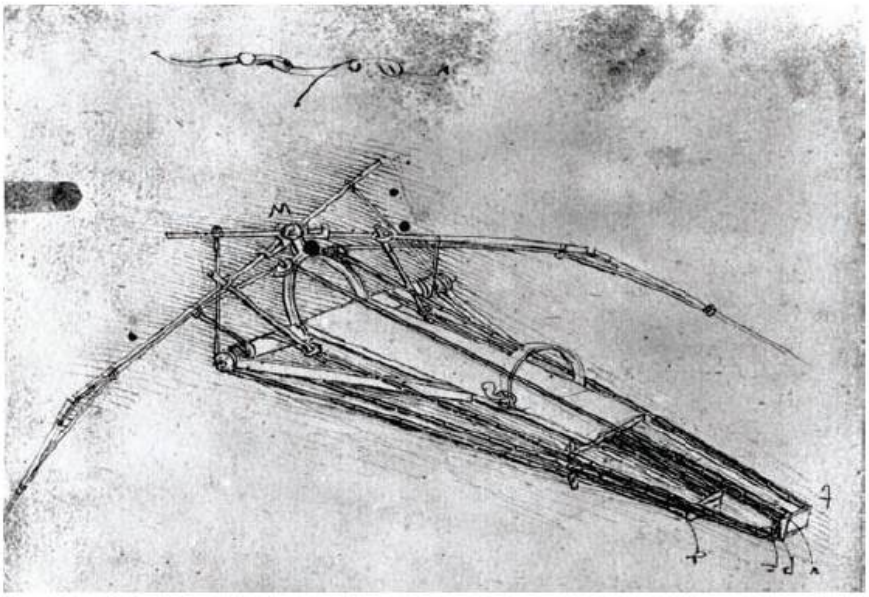
A different type of imaginative problem is the lack of sufficient ability to imagine appropriately. One particular group of people with a range of conditions are those on the autism spectrum, who cannot 'read' others in the same way that most people can. With '*no interest at all either in mind-reading, pretending, or fiction … they may … not even spare a thought for how someone else might be feeling or what they might be thinking, or understand why a mermaid or a unicorn is a fun idea*' (Baron-Cohen). Preliminary studies indicate that mirror neurons do not fire the same way for autistic people as for others, resulting in a lack of the type of imagination needed to conduct successful social relationships ('Mirror neurons'). Fascinatingly, people on the autism spectrum may be very imaginative when painting, or doing mathematics, thus confirming the multifaceted nature of imagination (Ahronovitz).

Constraining imagination

When it comes to imagination, we are like Goldilocks; we don't want too much, and we don't want too little; we want just enough. We want to imagine many possibilities, because the ability to do so benefits us individually and as a species. We also need, however, to be able to determine the difference between the imaginary and the real, and to test our imagined futures against reality. It might seem odd to inject 'reality' into imagination, as these are sometimes considered as opposites, but perhaps judiciously limiting imagination is also to enrich it. Timothy Williamson, Professor of Logic at Oxford University, explains the importance of reason and reality:

Constraining imagination by knowledge does not make it redundant. We rarely know an explicit formula that tells us what to do in a complex situation. We have to work out what to do by thinking through the possibilities in ways that are simultaneously imaginative and realistic, and not less imaginative when more realistic. Knowledge, far from limiting imagination, enables it to serve its central function.

In a sense this is obvious – if our imaginings wander too far from reality, they become worthless. You might imagine that you can jump out of a tree and fly to the moon, but such an imagining gets you nothing. Others before you, however, did imagine that it might be possible for humans to fly to the moon if they used a machine that complied with the laws of physics and provided for all the survival needs of human passengers, and because their imagining – which must once have seemed to be wildly improbable (consider Leonardo da Vinci's designs for flying machines in the fifteenth century) – was realistic enough, it was eventually realized, and humans left the planet of their birth for another world.



Da Vinci's drawing of a flying machine

The development of flight and of rocket ships capable of carrying man to the moon did not happen as the result of a single individual's imagination; such projects require that we work together and develop shared knowledge, and it is this shared imagination to which we now turn.

20 What is the relationship between imagination and reality in terms of our personal ability to make knowledge?
21 Have you ever imagined something that you thought was reasonable but which later turned out not to be true?
22 Think of some times in which you indulged in playful imagination – imagining things or people or situations which could not actually be true – now or in the future. How do you know whether what you imagine is reasonable or unreasonable?

Imagination and shared knowledge

Imagination might seem intensely personal – but in fact, like **reason** or **emotion**, we use it in contexts where it is the *shared* nature of the knowledge that makes it a powerful tool. Here we consider the role of imagination in the various areas of knowledge.

We are accustomed to thinking of the arts as being an area of knowledge that relies heavily on imagination. For the Harry Potter series of books, J.K. Rowling imagined a world in which owls serve as messengers, goblins manage the bank, and a professor can turn into a cat at will. All fiction, not just the fantasy or science fiction genres, relies on the writer's imagination: the essence of fiction is that it tells of people who did not exist, engaged in events that never happened. Other art forms, too, depend on the imagination of the artist. In his famous painting, *Persistence of Memory*, Salvador Dali imagined a scene of melting watches. As we saw in Chapter 4, even highly realistic paintings are in some ways imaginative; for the still life we examined in that chapter, the artist de Heem imagined a collection of objects from nature that do not exist simultaneously in the real world and could not, therefore, be collected in fact. Leonardo da Vinci's *Last Supper* depicts a scene from biblical history, and the artist, having not been present, had to imagine all the details: the room, the table, the dishes; the colours of the clothing; the actions of the disciples, and, of course, what Jesus might have looked like.

■ *The Last Supper*, by Leonardo da Vinci

Even a portrait, for which the subject sits in front of the painter while she paints, requires the painter to imagine: which colour on the palette will effectively recreate the skin tone or the light? What expression in the eyes will create the effect that will best serve the purpose? Shall I reveal to the subject what everyone else sees, or shall I present a more comfortable fiction? Put like this, it's hard to imagine (!) even a very realistic artistic work that did not rely in an integral way on the artist's imagination.

The composition of music requires the musician's imaginative powers, too. While it is true that the composer of a piano sonata probably plays the piano himself and can, therefore, work on the composition by trying out his ideas to actually hear what they sound like, the idea seems to come first. Beethoven began to lose his hearing as a relatively young man, and yet he composed many works, including the magnificent Symphony no. 9 in D minor, featuring the choral work 'The Ode to Joy' in the final movement, when he was completely deaf. The music existed, for him, solely in imagination.

In all of these cases and indeed, it seems safe to assert, in the creation of any work of art, imagination clearly plays a critical role.

23 Compare this 'artistic imagination' with the categories of creative imagination, sensory imagination and recreative imagination, which were mentioned in an earlier section.

- **a** Does the 'artistic' imagination map directly onto any single one of these categories with no overlap with any of the others?
- **b** Does the (successful or unsuccessful) attempt to map 'artistic' imagination to these categories tell you anything about imagination itself?

Imagination plays an equally critical role for the audience of any artwork as well. Probably you have had the experience of seeing the movie version of a well-loved book and finding yourself irritated, or downright angry, because the filmmaker's vision of your favourite scenes or characters did not match yours. If you close your eyes and listen to the theme from Tchaikovsky's *Swan Lake*, or to Rimsky-Korsokov's *Flight of the Bumblebee*, you probably experience images forming in your mind, conjured up by the music.

The interpretation of literature requires you to use your imagination to determine the implications of the text. Consider Kenneth Brannagh's 1993 film of Shakespeare's *Much Ado About Nothing*. For the film, Brannagh, who

both adapted the play for the screen and directed it, imagined a world full of light and singing and dancing. The film gives us white flowing costumes made of diaphanous material and lots of sunlight. By contrast, Joss Whedon's 2012 film of the same play (Whedon also wrote the screenplay and directed his version) gives us a much darker world. The film is in black and white, and this world is a world of heavy drinking, in which the mean-spiritedness of some characters is emphasized. You can view the trailer for Brannagh's version here: http://tinyurl.com/plc9mya, and the trailer for Whedon's version here: http://tinyurl.com/nfu5fsg. From those short clips, you will see how strikingly different the two film versions are.

Both films accord closely with the original text; however, the earlier version conveys a fairytale atmosphere in which the happy ending creates enough joy to wipe out the evil deeds that temporarily disrupted the general good will, while the latter gives us a grittier contemporary version, that suggests that the evil deeds and intentions are engrained in the world and can perhaps be only temporarily overcome. Which version is 'right'? Since both can be justified by the text, both are right. This sort of imagining is called **interpretation**, and it is surely just this that helps us connect to a work of art to understand and to love it.

24 We do not often associate *interpretation* with *imagination*, but perhaps there is a link here. Can you define
- **a** imagination using the term *interpretation* in your definition
- **b** interpretation using the term *imagination* in your definition?

In light of these definitions, what is the relationship between imagination and interpretation?

25 You can listen to the theme from Swan Lake here: http://tinyurl.com/p7sezv9. Close your eyes and listen. What images come into your mind?

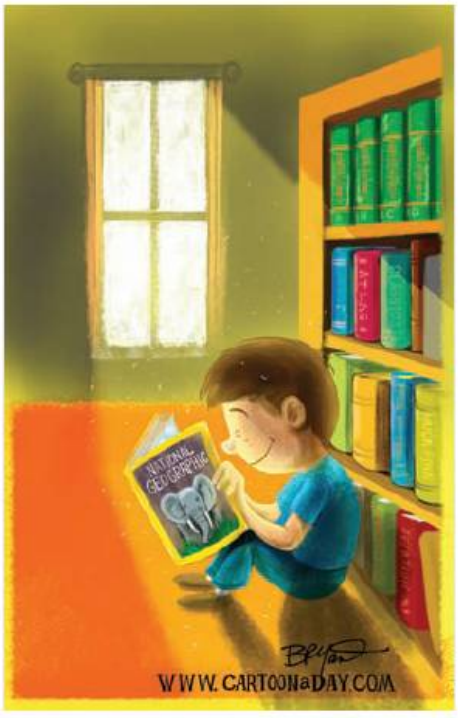
26 Look at the painting below by Vermeer. It's called *Girl with a Pearl Earring*. Do you see the large, shiny pearl? Now look at it very closely (you can use this link: http://tinyurl.com/ozeceku). What is really there? Vermeer did not paint a pearl; what did he paint? (That 'pearl' is really just two sweeps of white paint. Squint a little, if you're having trouble seeing.) What did your imagination do to help you interpret this painting?

■ **Vermeer's *Girl with a Pearl Earring***

The very sort of imagining which gives us access to a work of art, however, seems unthinkable in other areas of knowledge, such as mathematics. Most of us are not accustomed to thinking of mathematics or history or science as subjects requiring imagination and, indeed, it is easy to make a case for the claim that imagination is a problem in these subjects. An historian who made up facts, or imagined that Henry VII actually looked like Winston Churchill, would be scorned. A mathematician who tried to claim that he imagined that quadrilaterals were really mystical creatures capable of altering matter would be hustled off for a medical check-up.

And yet, these subjects do require imagination.

Consider the job of the historian: he undertakes to reconstruct people and events from the past – often from a past distant enough in time and space that there are no eyewitnesses to the events left to give him direct testimony. He relies, therefore, on written and photographic records, physical artefacts and other historians' work. Like a detective, he has to treat his facts as pieces of a puzzle, and one of his primary means of making knowledge will be his (highly constrained) imagination. He has to imagine how the pieces of evidence fit together as he tests his ideas as rigorously as he can – against all the known facts – to see if they make sense when considered together. For the reader of history, as well as the writer, imagination is also an important tool.



Why do we read Robert Hughes' great history of Australia, *The Fatal Shore*, or Doris Kearns Goodwin's biography of Abraham Lincoln, *Team of Rivals*, if not to immerse ourselves in the stories and imagine what those people and places were like? Our imaginations allow us to take the facts and weave them into experiences that we could not have any other way.

This may sound like the arts – but the difference between our use of imagination in the arts and our use of imagination in history is the degree to which what we imagine must be bounded by reality. In history we aim to discover and understand the literal truth of what happened and why; in the arts, as we saw in Chapter 4, we aim to use fictional events and objects to reveal emotional and aesthetic truths. This is a crucial difference.

Read the excerpt from *Team of Rivals*, available here: http://tinyurl.com/ykg3qm.

27 How did the author's imagination contribute to this description?

28 How does your imagination help you understand what Lincoln's life was like? How can you know how your imagination is constrained by reality?

But what about mathematics? Most people associate mathematics primarily with reason, and, since its goal is absolute certainty, imagination would seem to be problematic. Nevertheless, Richard and Ellen Kaplan, founders of The Math Circle at Harvard University, point out how deeply imaginative mathematics is:

The lunatic, the lover, and the poet, said Shakespeare, are of imagination all compact. He forgot the mathematician, whose daily concerns are shapes in 27 dimensions, series that converge after more terms than there are particles in the universe, numbers larger than infinity, and others infinitesimally small as well as surreal and hyperreal and imaginary (16).

Cartoon from www.cartoonstock.com

"True, we have encouraged you to use your imagination, but not in math."

You have no doubt encountered some of these imaginative elements of maths yourself, but perhaps took their imaginary nature for granted. Maths relies not only on imaginary elements, but also on the mathematician's ability to imagine (even the counting numbers 1, 2, 3 are arguably imaginary objects, in their own way, derived from and constrained by sensory experience; certainly not 'real' in any obvious way; similarly the humble circle, line or point). The essence of pure mathematics is the rigorous proof, and the creation of a proof requires intensive attention on the part of the mathematician to possibilities. Like the historian, the mathematician must consider the pieces of the puzzle before her – in the case of maths, the pieces consist of existing mathematics, rather than primary source documents and physical artefacts – and imagine how they might fit together. She must determine which of the known mathematical theorems are relevant, the structure of the problem, the gaps in the puzzle, and she must subject every logical connection to the searchlight of her attention, seeking ruthlessly for any possible flaw.

Any subject that requires its practitioners to hypothesize and test their hypotheses requires its practitioners to imagine as part of the process. The natural and human sciences are no exception. Theoretical physicist, Michio Kaku, had this to say about the importance of imagination in science: '*What is the rocket fuel that makes science work? That makes this engine propel itself? And I think that rocket fuel is curiosity. It's imagination. It's the innovative spirit. That's what keeps science alive.*'

The many products of science, then, from iPod to jetliner, are the result of the imaginations of scientists – working alone or together – to conceive an invention that could be made, if not now, then sometime in the future, and then to develop that invention, working gradually, step by step, towards the goal. As with maths, however, imagination is not just an outcome of science; it is part of the process. Professor Williamson describes the role of imagination

in the scientific method this way: '*We must develop the consequences of competing hypotheses with disciplined imagination in order to compare them with the available evidence.*'

So imagination seems to be a key part of science and maths. As these are disciplines often seen as consisting largely of pure reason, perhaps we should re-examine the link between imagination and reason itself – and perhaps even call into question the distinction between the two processes. We shall consider in Chapter 7 classic cases of reasoning such as:

- (A1) All men are mortal. ➜ (A2) I am a man. ➜ (A3) I am mortal.
- (B1) All carrots are vegetables. ➜ (B2) No carrots are blue. ➜ (B3) No vegetables are blue.

To most traditional ways of thinking, we reach the conclusions (A3 and B3) here by **reason**; that is, by the simple application of coherent thought – no imagination required. This means that any valid conclusion is in each case somehow 'contained' in the first two statements (the premises). Now we can ask *how* we then go from the premises to the conclusion – which is not entirely easy to say.

29 Re-examine the cases above. If the premises are true (as they are), is the truth of the conclusion guaranteed?

30 How are you sure of your answer to Question 29?

In fact, in case A the logic is what we call **valid** and in case B it is **invalid**. That is, the conclusion 'follows' in case A, but not in B (where it may be true, but that's a happy accident). We can explore this more fully in Chapter 7, but for now let's just ask how we got from the premises to the conclusions. We can say 'reason' in each case, but perhaps 'imagination' is as good an answer; in each case we take statements 1 and 2 and 'do something' to come up with a third statement. The 'doing something' is the tricky bit – but as it seems to involve recombining the meaning of 1 and 2 in some way (in Chapter 7 we suggest perhaps by imagining a diagram), it would seem to fit the category of 'creative imagination' as described earlier.

If this is right, then it does give us a new angle on the difference between cases A and B above. If we call the process 'reason' then conclusion B is simply an error; but when we call the process 'imagination' then perhaps things look slightly different. Perhaps both are imaginative conclusions; but only case A corresponds to 'reality' in a direct way. If this is right, then this is another way of looking at a point we have already seen – that is, that imagination is perhaps most powerful when it is in some way *constrained*.

31 Is it possible that reason and imagination are really just different ways of looking at the same thought processes?

32 What are the strengths and weaknesses of the view that reason is just imagination constrained by reality?

- a Is this a substantive point or perhaps just playing with words?
- b Would this view fit **deductive** or **inductive** reasoning most closely (see Chapter 7 for definitions of these terms)?

So, as with personal knowledge, shared knowledge requires that the imagination of its makers and discoverers be rational enough to generate ideas and solutions that correspond to reality in ways particular to each area of knowledge (we do not expect artistic imagination to be directly tested by experiment, for example). In the formal areas of knowledge, however, as you will see in other chapters in this book, there are numerous mechanisms built into the knowledge-making process in order to ensure that any faulty thinking – or imagining – is caught and corrected. The goals of the various areas of knowledge include the revelation or depiction of some true aspect of the world (note the intentional ambiguity of this phrase), so the formal practices of each are consciously designed to maximize that possibility.

33 Is imagination more important in some areas of knowledge?
34 Do the different areas of knowledge use imagination in different ways? Or even different types of imagination?
35 What is the relationship between imagination and reality in terms of making shared knowledge in the different areas of knowledge?
36 Is that relationship the same as the relationship between imagination and reality for personal knowledge?
37 What are the potential pitfalls of imagination in the formal areas of knowledge?

Where have we been? Where are we going?

We have seen that although the purpose of imagination is to create in our minds a mental model of something which is not really before us, our imagination is only effective when it is in some way bounded by reality. To imagine something is to hypothesize it and to simultaneously acknowledge that it is not (yet) real. To realize our imagined objects, situations, outcomes and solutions, we must take action, and effective action relies on our ability to begin with real parameters. To be able to use our imagination in a healthy way, then, gives us the power not only to generate ideas for solutions to problems, effective actions or inventions, but also to assess the viability of those ideas and to plan ways in which to work to make them into reality should we wish to. The relationship between imagination and truth, then, is a powerful one: we know that what we are imagining in that moment is not true, but we can determine that it either *must already* be true, despite our present inability to verify that through sensory data, or that it *will become* true as the result of events or processes that are already happening, or that it *should become* true as a matter of our own will and determination (and so alter our lives by altering reality). Imagination thus plays key roles in areas as diverse as science and ethics.

Imagination feeds our memories, our intuitions and our beliefs. It is a crucial part of reason and it allows us to alter our reality in ways that can improve our lives and the lives of others in our societies to a significant degree. What imagination cannot do, however, is give us certainty. We can imagine possible solutions, outcomes and futures, but we won't know for sure what will happen until we decide on a course of action and take it. In order to consider the nature of certainty, we will need to visit an area of knowledge in which we can obtain certainty: mathematics.

Further study


- For more information on mirror neurons, you can watch the 14-minute video from PBS, available at http://tinyurl.com/47m3a99. There is also an excellent article from the Association for Psychological Science available at http://tinyurl.com/oto7gwx. That article discusses the developing science of mirror neurons in some detail and connects that study to the study of autism.
- For an in-depth look at the relationship between autism and creativity, see *Autism and Creativity: Is There a Link Between Autism in Men and Exceptional Ability* by Michael Fitzgerald.
- Michael Shermer's book, *The Believing Brain*, gives a detailed look into how our brains form patterns and the many implications of that innate ability.

- For a more thorough discussion of how and why our imaginations can sometimes provide us with effective intuitions while we sleep, you can listen to the *RadioLab* podcast called 'Sleep,' available at www.radiolab.org/2007/may/24/.

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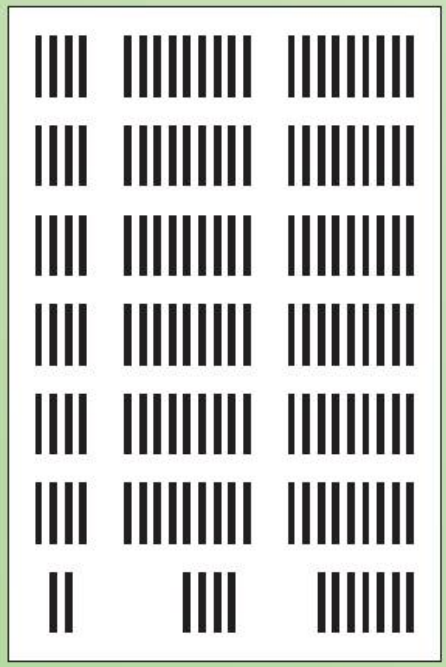
6 Mathematics



Mathematics is the subject where we never know what we are talking about, nor whether what we are saying is true.

Bertrand Russell

When you have satisfied yourself that the theorem is true, you start proving it.

Arthur Koestler

As far as the laws of mathematics refer to reality, they are not certain; and as far as they are certain, they do not refer to reality.

Albert Einstein

...
it is certain that the real function of art is to increase our self-consciousness; to make us more aware of what we are, and therefore of what the Universe in which we live really is. And since mathematics, in its own way, also performs this function, it is not only aesthetically charming but profoundly significant. It is an art, and a great art.

John W.N. Sullivan

You can not apply mathematics as long as words still becloud reality.

Hermann Weyl

If mathematics describes an objective world just like physics, there is no reason why inductive methods should not be applied in mathematics just the same as in physics.

Kurt Gödel

Mathematicians may have trouble talking to non-specialists about what they do – but they also have trouble talking to each other. The idea that maths is some kind of universal language is a myth – mathematicians from different areas simply cannot understand one another.

Anon

There is nothing that can be said by mathematical symbols and relations which cannot also be said by words. The converse, however, is false. Much that can be and is said by words cannot successfully be put into equations, because it is nonsense.

C. Truesdell

Math is like love – a simple idea, but it can get complicated.

R. Drabeck

Nobody untrained in geometry may enter my house.

Plato

Mathematics is created in the self-alienation of the human spirit. The spirit cannot discover itself in mathematics; the human spirit lives in human institutions.

Giovanni Vico

On each decision, the mathematical analysis only got me to the point where my intuition had to take over.

Robert Jensen

Aims

By the end of this chapter you should:

- understand the axiom-theorem structure of mathematics
- understand the implications of this structure for mathematical truth
- understand the role of logic in mathematics and the link to rationalism
- be able to discuss possible links between mathematics, science, art and language
- understand why mathematics may be regarded as an extremely creative discipline
- have some insight into the process of attempting to establish a theorem to describe a situation
- understand that the initial promise of the axiomatic approach has been undermined by Gödel, and be able to mention possible implications of his ideas.

Introduction

Knowledge framework:
Personal and shared knowledge

The important thing to remember for the purposes of this course is that when we talk about mathematics as an area of knowledge, we are talking primarily about pure mathematics, and, to a lesser degree, about applied mathematics.

The kind of mathematical work that students do is important for students, as it gives them the basic mathematical knowledge that they will need to pursue maths at higher levels later on, and, one might argue, it helps them develop the kind of logical thinking skills that are necessary for success in a wide range of other activities, including literary analysis, historical analysis and scientific experimentation. But students of maths are not developing new mathematics, so, although we will touch on personal mathematical knowledge from time to time, we will focus our attention largely on shared mathematical knowledge as it is derived by professional mathematicians.

It may not be obvious immediately why a book with a philosophical leaning contains a chapter on mathematics. What could be less ambiguous, more clearly defined and less open to interpretation than a mathematical problem? A maths problem may not be resolved easily, but there is a right answer, and little room for debate – we are probably all too familiar with the rather tedious and long-winded maths exercises which are marked right or wrong. So why would we include such a dry topic in a course such as this?

The answer is twofold. First, the relative certainty of mathematics is exactly the reason we need to include it – if it presents us with indubitable knowledge then we need to learn precisely how it does that and see if we can apply the technique elsewhere. The techniques of mathematics may provide us with a tool that will be central to our search for reliable knowledge. Secondly, we will argue that the stereotypical image presented above is just that – a stereotype. There is far more to mathematics than the rigid application of formal rules to complicated symbols, even if that's what it may look like to students – especially in the early years of studying mathematics. To others, the pure mathematicians who spend their working lives breaking new ground in mathematical knowledge, and the applied mathematicians whose work it is to use mathematics to solve real-world problems and to develop all kinds of new technologies, mathematics is creative, imaginative, deeply satisfying and in some ways similar to those disciplines sometimes considered diametrically opposed to mathematics – the arts.

Mathematics is a subject which everyone finds difficult at some stage. There are often negative attitudes to the subject, and these arguably stem from the requirement to learn a large body of knowledge that seems to have few relevant applications. Consider, for example, the fact that most high school students are likely to get no further in mathematics than the calculus, a body of mathematical knowledge that was developed over 300 years ago. Even IB higher level mathematics, which includes discrete maths and group theory options, involves skills that few adults use (for that matter, few adults even use equations or logarithms, or calculate volumes!) – and so the school work is in danger of seeming pointless. However, maths is also an immensely powerful tool in its application to science (at least) as witnessed by buildings, bridges, cars, computers, moon landings, aeroplanes, atomic bombs, cell phones, video games and myriad other technological wonders that rely intrinsically on mathematics,

whether we realize it or not! It plays a central role in any technology, and is increasingly finding its way into apparently unrelated fields such as history, medicine, psychology, art and music.

To some people, then, maths is pointless and irrelevant and they would not bother with it if they could avoid it. To others it is a fascinating source of never-ending delight. That a topic can appear in such diverse contexts, and in such different ways to different people – this alone makes it well worth studying.

What is mathematics?

We mentioned in the introduction the kind of mathematics that students do, which consists largely of following in the footsteps of mathematicians who have, over the past two or more millennia, developed the systems and formulas that we are familiar with today. This entails understanding and learning formulas and procedures that have already long been standard practice in mathematics. The knowledge that students attain in their mathematical pursuits is new to them, and so constitutes new personal knowledge, but those efforts do not break new mathematical ground.

With regard to shared mathematical knowledge – that is, the knowledge attained by professionals and contributed to the body of mathematical knowledge held by all of us together – there are two significant types: applied mathematics and pure mathematics. The former consists of the modelling of real-world processes and objects using the language of mathematics. This modelling goes on all the time and at various levels of sophistication. You or your family may use mathematics this way if, for example, you need to build a fence on your property and you use geometry, percentages, and other basic math tools in order to calculate the amounts of materials you will need and what the fence will cost to build. Engineers use more complex mathematics to design and build high-rise buildings, roads, bridges and aeroplanes. Scientists use mathematics to model the behaviour of systems they observe in the natural world, and so on.

Pure mathematics, on the other hand, is done by professional mathematicians – often working for universities or governments – in order to extend the mathematical knowledge that we have available to us. The endeavour is called 'pure maths' because it is undertaken purely for the sake of learning mathematics, and might not have any immediate practical applications (if the product of the effort can be applied by others, then that's all to the good, but that is not the purpose of the work). Pure mathematicians simply use existing maths as their starting place, and then build on that in an effort to determine what else, given these mathematical facts, must also be true, mathematically speaking. We will look in depth at how they go about this in a later section in this chapter.

Mathematics: invention or discovery?

If the content of mathematics has to do with modelling the real world and with extending the scope of mathematics itself, then there seems to be some kind of intrinsic relationship between mathematics and reality. So one of the natural questions we encounter when we are trying to understand the nature of mathematics as an area of knowledge is whether we *discover* mathematics – like the natural sciences, which seem to be largely a process of discovering processes of nature – or *invent* it, a process we do so much of in the arts? When you solve a mathematical problem, you probably feel like you are *finding* the solution.

You may feel that mathematical truths are always true: $2 + 2 = 4$; no argument there. And 242 324 is an even number, whether we like it or not. We would be foolish to look for a triangle with seven sides. Consider 345×53. You probably can't do it in your head, but you could work it out given a pencil and paper and a little time. Certainly with a calculator the answer could be found quickly. The correct answer doesn't depend on who does it, when they do it, how they do it or what culture they are from. They may get it wrong, of course, but the answer itself is always 18 285. We have no choice as to what the answer is. We have to find it.

But is that answer true because it represents a sort of universal reality? Imagine we contact alien life forms and try to communicate. Will we find that they believe in different mathematical results? Will they have calculated different mathematical answers to us? If they have calculated, for example, will they have found the same value as us? Will they believe that $2 + 2 = 4$?

The view that 'maths is out there waiting to be discovered' is called the Platonic view of maths, after the Greek philosopher Plato, who thought that mathematical truths are eternal and unchanging. At first sight, this seems very appealing, as we have seen from the examples just given. However, there are some difficult questions for Plato to answer:

- Where does mathematics exist?
- How do we 'discover' maths?
- Why does the 'real world' seem to obey mathematical laws?

■ Looking for $\sqrt{2}$

These are quite profound problems, because many find that the only reasonable answers tend to suggest that, contrary to what we initially suggested, mathematics is purely in the mind. Now Plato would not have minded this (he argued that we are just 'remembering' things we already knew but had forgotten) but this sort of answer doesn't carry much weight today. If we find that mathematics is really in the mind then isn't it an invention? This may answer the problems mentioned above (how?), but it raises its own difficulties.

- Surely we can't have invented the fact that $2 + 2 = 4$? That goes against all common sense! If maths is invented, why don't different mathematicians invent different mathematics?
- If maths is invented, in the same way that artists invent art, how can answers to mathematical questions be right or wrong?

It has been suggested that mathematicians would *like* maths to be discovered – that is how they feel emotionally towards their work. They talk about 'discovering' theorems and this attitude pervades their working life from Monday

to Friday. However, if pressed hard on the matter, when philosophizing at the weekend, most will retreat away from 'discovery' to 'invention' as they cannot logically justify 'discovery' to their satisfaction. One mathematician who refused to retreat in this manner was G.H. Hardy, one of the great number theorists of the twentieth century. In *A Mathematician's Apology* he wrote:

I began by saying that there is probably less difference between the positions of a mathematician and of a physicist than is generally supposed, and that the most important seems to me to be this, that the mathematician is in much more direct contact with reality. This may seem a paradox, since it is the physicist who deals with the subject matter usually described as 'real'; but a little reflection is enough to show that the physicist's reality, whatever it may be, has few or none of the attributes which common sense ascribes instinctively to reality. A chair may be a collection of whirling electrons, or an idea in the mind of God: each of these accounts of it may have its merits, but neither conforms at all closely to the suggestions of common sense.

I went on to say that neither physicists nor philosophers have ever given any convincing account of what 'physical reality' is, or of how the physicist passes, from the confused mass of fact or sensation with which he starts, to the construction of the objects which he calls 'real'. Thus we cannot be said to know what the subject matter of physics is; but this need not prevent us from understanding roughly what a physicist is trying to do. It is plain that he is trying to correlate the incoherent body of crude fact confronting him with some definite and orderly scheme of abstract relations, the kind of scheme which he can borrow only from mathematics (128–29).

Although this is eloquently put, many other mathematicians have disagreed. To begin to derive some insight into this difficult question, we should examine the nature of mathematics itself more carefully. If we can see exactly why maths differs from the sciences and other disciplines, then we might be able to make some progress.

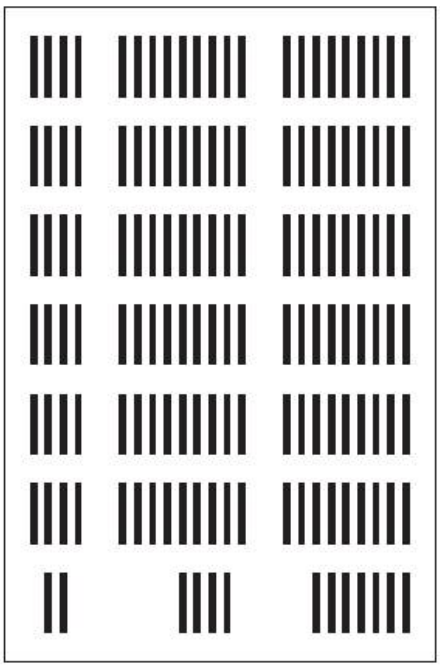
The history of mathematics

■ Ishango bones

A good entry point into the nature of mathematics is to examine its origins. The earliest known mathematical object is the Lembobo bone, found in the 1970s in the Border Cave, between South Africa and Swaziland and believed to be about 37 000 years old (Williams). Second oldest are the Ishango bones, which were found in 1960 and which date back, it is believed, approximately 25 000 years (Williams). Though nearly 10 000 years of history separates the two, the function of both bones appears to be the same: marks were made on the bones in order to count and keep track of something. What that something was is debated (prime

numbers? lunar dates?), but there is agreement about the general function being mathematical. As far as we know, then, the history of mathematics began with applied maths. The Ishango people needed something that would allow them to model the real world so that they could keep track of quantities without having to have the actual objects in front of them to be compared physically over and over.

Consider the problem that arises quite soon, however. It's pretty easy to keep track of quantities by using a one-to-one correspondence of a mark on a bone and a physical object; this means that the mathematical system used maps directly to the real world; but what happens when the number of real-world objects gets to be really large? Even if we decide to let one hash mark stand for ten or 100 objects in the real world, a tally stick runs out of room at a certain point, and if we switch to some other format, something much larger, a really large number of hash marks gets to be unwieldy to work with. Consider this box: If the first column has hash marks worth 100 objects, and in the second column hash marks are each worth ten, with the final column containing marks each worth one, how many objects does this stone or papyrus or piece of bark represent?



No doubt you can work it out, if you take a few minutes, but how much easier is it just to read this number: 3241? The Hindu-Arabic number system, which dates back to about the seventh century, and which is now nearly universally used, solved the problem of dealing with vast quantities of hash marks. So see what has happened here; we had a mathematical system which worked (i.e. counting for small numbers), but then developments showed that it ceased to be useful in other circumstances – so we developed a new system that worked better. This simple process is as central to maths now as it was in the past. Now, with only ten digits – the zero was a later addition, and made its way to the Western world in 1202 (Rowlett) – and some extra symbols, such as commas and periods, we can indicate any quantity we want in a relatively short form. Of course, the problem remains if the number gets *too* large. Can you imagine, for instance, what this number actually signifies, if it signifies an actual quantity of real objects?

652 232 111 239 000 786 564 887 345 212 949 003 123 999 432 905 121 344 977.984

Such an enormous number is very difficult for us to process as a number, and it is equally difficult for us to process as a quantity that we can really understand. So how does mathematics cope with quantities that are almost unimaginably large?

You should by now have a pretty good idea that the big-picture answer to this question is 'by adapting, by creating a new system'; and this leads us into a way to understand the nature of mathematics.

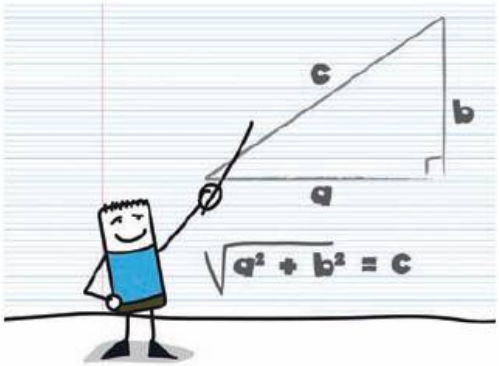
The nature of mathematics

The problem of the very large number can be solved in a variety of ways – scientific notation, for example, allows us to express very large numbers in a more simplified format. An example is Avogadro's Number, which is roughly 6.023×10^{23}, the number of molecules in a mole ('Some notes'). But there is an intriguing idea here: how large can numbers get? The answer, of course, is that there is an infinite number of numbers, so numbers can get infinitely large. We know this because however large our number is, we can always add one more, and there is nothing in our system that allows for a cut-off point. Someone invented the Arabic numbering system, though, right? So why can't we just arbitrarily choose an end point – let's say, 10^{1000}? The number of atoms in the universe is estimated at 10^{80} (Ghose), so 10^{1000} ought to be a sufficiently large number to allow us to number all the objects in the universe – even if we consider all the smallest particles that make up all the atoms in the universe. That is a finite number, isn't it? Surely we don't need a number larger than the number of everything that exists.

But trying to tie the number of numbers to real objects misses the mathematical point altogether. The truth is that whether the number of subatomic particles in the universe is finite or not, and whether we could ever manage to find a way to count them all or not, this does not influence the nature of our system of counting numbers. An arbitrary cut-off – no matter how big – would simply constitute a blind refusal to accept the nature of the system we invented. We invented the system, but we did not invent all the implications of the system. We must now live with those implications – in this case, the fact that we can continue to add 1 indefinitely. The essence of pure mathematics is the study of the implications of the features of our existing mathematical systems. One way to think of it is that we invented some basic mathematical systems – the counting numbers, basic geometrical shapes, and so on – and the rest of the history of mathematics has consisted of discovering the implications of those systems, and the implications of the implications, and so on.

As a simple example of the mathematical process, imagine a child learning about odd and even numbers. She starts by being given a list of odd numbers 1, 3, 5, 7, 9, 11, 13 … and even numbers 2, 4, 6, 8, 10, 12, 14 … Her first job is to tell whether other numbers, say 34, 77 and 66, are odd or even. Once competent in this, she may notice a few patterns. It seems that adding 1 to an odd number gives an even number, and adding 1 to an even number always gives an odd number. It also seems that it's only the last digit that makes a number odd or even; the other digits don't make any difference. She may also spot that adding two odd numbers always gives an even number, or that multiplying two even numbers always gives another even number.

Well, we need to be careful here. We are using the word 'always' a little hastily. After all, there is an infinity of numbers, and our young mathematician has only experimented with a few dozen. With several examples, she may have a pretty good idea that the pattern always holds, but for mathematicians this isn't enough. A scientist or historian may have to rest content with 'sufficient evidence' (whatever that may mean), but the mathematician can go one step further: she must prove, absolutely, that her **conjecture** is true.



Why must a mathematician go to so much trouble? In the natural sciences, as we saw in Chapter 3, we consider that we can trust our knowledge once we can establish a formal theory, which we do by amassing evidence over time. When we have a great deal of evidence that corresponds with reality, and when the theory coheres with all other known science, then we are confident in our findings. Shouldn't the same standard apply to mathematics?

Knowledge framework:
Concepts and language

We are introducing several key mathematical concepts here, terms which are critical to understanding the nature of mathematics as an area of knowledge.

- A **conjecture** is the mathematical equivalent of a scientific hypothesis. A conjecture in mathematics is always called a conjecture until it has been proven absolutely via a 'rigorous proof.'
- A **rigorous proof** is a formal argument which uses known mathematical facts, such as 'axioms' and proven theorems, as premises. The mathematician provides the deductive logic connecting those facts, each one to the next, to derive a conclusion. The conclusion must account for all possible cases, so that there is no longer any doubt whatsoever that one day we might stumble across an exception to the proof.
- Once a conjecture has been proven, it is called a **theorem**, and a theorem, unlike a scientific theory, is absolutely certain. (Remember from Chapter 3, however, that the degree of uncertainty in an established theory is quite small. Its uncertain nature does not mean that a formal scientific theory is merely hypothetical or whimsical.)
- An **axiom** is a feature of a mathematical system or object. Axioms do not need to be proven because they exist inevitably due to the nature of the system. Once we establish the concept of equality, for example, it follows inevitably that if A=B, then B=A. There is nothing to prove.

It is the infinite nature of mathematics that makes the difference. Because there are infinite numbers (and infinite triangles, circles, spheres, parabolic curves, and so on), there is no such thing as a preponderance of evidence in maths. Even if we have, say, 10 million right triangles (or right-angled triangles), for which the simple conjecture that $a^2 + b^2 = c^2$ holds, there are infinitely more possible right triangles which could undermine that conjecture, and there might be very many more than 10 million – even infinitely more than 10 million – for which the conjecture did not work. Only a **rigorous proof** can settle the matter in such a way as to give us confidence that our conjecture is correct. With regard to this particular conjecture, Pythagoras supplied a proof in the sixth century BCE, and the theorem is now named after him.

In the case of the conjecture about even and odd numbers, we can easily prove that the patterns are true for all integers. A proof for each is given below. They may seem a little pedantic, but the techniques can be generalized to more difficult cases, and by working through these proofs, we can understand why it is that all mathematical proofs allow us to arrive at certain knowledge. Given the axioms, it is impossible to doubt the conclusion of these steps.

Axioms

- An odd number is a number which can be written as $2n + 1$, where n is a whole number.
- An even number is a number which can be written as $2n$, where n is a whole number.
- The usual laws of arithmetic apply.

Check that the definitions of odd and even numbers make sense to you. Experiment with them until you are happy that they are correct definitions. Let n be 5, 7, 50, 100 or anything else you like and see what you get in the two definitions. This 'playing' is a vital part of maths, and it is the part of the process of mathematical thinking that relies on inductive reasoning versus deductive reasoning. (Chapter 7 will go into induction and deduction in considerably more depth, but, for now, consider that **induction** is done by using a sample of observations and generalizing patterns from those, while **deduction** works from premises and develops a conclusion by using logic. There is no need for direct observation in the deductive process, though the premises may have been established via observation.)

Theorem 1

An odd number and an even number add together to give an odd number.

Proof: Let o be be an odd number and let e be an even number.	This is just a definition step in which we introduce symbols to stand for concepts.
Then $o = 2n + 1$ and $e = 2m$ for some whole numbers n and m, by definition.	Here, we simply plug the symbols that we just defined into the definitions we agreed upon above.
So $o + e = 2n + 1 + 2m$	In this step, we show that the two different ways of stating 'odd plus even' symbolically are equivalent.
$= 2m + 2n + 1$	In this step, we simply rearrange the terms which we know we can do from basic algebra. In other words: $2n + 1 + 2m = 2m + 2n + 1$ Since they are equal, we can choose whichever version we wish. We choose the second.
$= 2(m + n) + 1$	In this step, we used the fact that multiplication distributes over addition to factor out the 2 and rephrase the statement. Notice that so far all we've done is rearrange the original statement to show that the same idea can be expressed in several different ways.
$= 2p + 1$ where p is a whole number	In this step, we've replaced the $(m + n)$ with a new symbol: p. We can do this because we began with the definition of m and n as whole numbers, and if we add any two whole numbers we're going to get another whole number.
but this is of the form $2n + 1$ and hence odd.	Finally, we notice that $2p + 1$ is exactly the same as $2n + 1$, our original definition of an odd number, and so we have proven that adding any even number to any odd number results in an odd number.
QED	QED is the abbreviation for the Latin phrase *quod erat demonstrandum*. This means, roughly, 'that which was to be demonstrated'. It is used at the end of proofs to indicate that that which was intended to be demonstrated has, indeed, been proven.

We detailed all the logic for you for this proof so that you can see how the deductive process works. Notice that we did not discover any new facts, nor did we create any new information. We took what was already known – our premises or axioms – and we used that to investigate the implications of those facts. The process relied on reason, not on observation, but it also relies on a certain amount of imagination, since, if you are the first person working out the proof, you have to use your cognitive imagination to generate the possibilities for working the proof. You have to ask yourself such questions as: 'What are the implications of these mathematical facts?' 'Which of these facts are useful?' 'What are the different ways I can express this same idea?' and so on.

Here is a second proof. We've given you the steps; you work out how deductive reasoning was used in order to develop the proof step by step.

Theorem 2

Two odd numbers add together to give an even number.

Proof

Let a and b be odd numbers.
Then $a=2n+1$ and $b=2m+1$ for some whole numbers n and m.
So $a+b=2n+1+2m+1$
$=2m+2n+2$
$=2(m+n+1)$
$=2p$ where p is a whole number
but this is of the form $2n$ and hence even.
QED

These are hopefully straightforward examples, and the results hardly need formal proof – we 'knew' they were true beforehand. However, more complex problems are only really understood once the proofs have been developed, or counter-examples found, and formal proof is what pure mathematics is all about. New mathematics happens in precisely this way – there is a result which may be believed to be true, but it will not be fully accepted until the proof has been found. This process can take a very long time; historically, some conjectures have lasted for many years before a proof was developed. The Tanayama–Shimura conjecture (involving an advanced mathematical concept called a modular form) remained a conjecture for 40 years (*The Proof*). It was first offered in 1955, and, working on the assumption that it was true, mathematicians developed vast quantities of new mathematical concepts and ideas. All of these maths were tentative only, however, pending the proof for Tanayama–Shimura. If Tanayama–Shimura were to be proven false, then all the maths that had been built upon the assumption that it was true would also collapse, and mathematicians would have had to start over. Fortunately, in 1995, Andrew Wiles proved that Tanayama–Shimura was true (and in so doing also proved that Fermat's Last Theorem was true), and so 40 years of mathematical work was also proven all at once.

The proof is everything, and this is the defining characteristic of mathematics.

1 Prove the following theorems:
- Theorem 3: Trebling an even number results in another even number.
- Theorem 4: Two even numbers multiplied together give an even number.
- Theorem 5: Trebling an odd number gives another odd number.
- Theorem 6: An odd number and an even number multiplied together give an even number.
- Theorem 7: Two odd numbers multiplied together give an odd number.

You have probably noticed that we made a claim for 'certainty' but not for 'truth'. This is an important distinction and we can see that the 'truth' of mathematics will depend on the axioms. We may apply all the logic we want, but if the axioms we start with aren't any good then we won't get anywhere (this is the 'garbage-in, garbage-out' principle). In the example above, we took as axiomatic, 'An odd number is a number which can be written as $2n + 1$, where n is a whole number.' But is this true? In a way, it is hard to see how it could be true or false – there are numbers of the form $2n + 1$, and we can call them odd if we want to. All we are doing is giving certain things certain names. Does a pentagon really have five sides? Well, yes, but only because we define pentagons to be five-sided shapes!

Here is the crux of the matter for understanding the nature of axioms and their role in mathematical proof. Although axioms are typically called 'assumptions', they are not assumptions in the same way that we mean it when we say that we assume that there will be homework tomorrow, or that we assume that Claudia will be going to the Prom with Ahmad or that we assume that our parents will allow us to go to the movies on Saturday evening. In these non-mathematical cases we make these assumptions based on our past observations – that is, they are inductive conclusions – but we are using the past to predict the future, and so there is always the chance that we could be wrong. A mathematical assumption, an axiom, is not of the same sort – it's more like a definition – and from the perspective of the mathematician, the reason that it is safe to make this sort of mathematical assumption is that as a definition, it cannot be wrong. Now if axioms 'cannot be wrong', this sounds like a promising possibility – it might even suggest we have a pathway to truth. Before we make such a claim, however, we'll need to explore exactly what an axiom is, and is not.

The nature of axioms

To better understand the relationship between axioms and truth, let's consider a metaphor. Axioms are something like the rules of a game. Let's take the game of curling as an example. Curling involves sliding stones down a sheet of ice to try to hit the centre of a target (called 'the house') at the other end of the ice. One of the important rules, or axioms, requires that the teams alternate throws, so, let's say, the team with the red stones goes first. The first player will throw his first stone, then the first player on the other team will throw the first yellow stone. Then red, then yellow, and so on until all 16 stones have been thrown. This is called an 'end'. (This is an oversimplification, of course, as all curling fans will know, but it will serve our purposes!)

Curling

Another important rule, or axiom, is that at the end of each end, *only* the team with the stone closest to the centre of the house (called the button) scores. This rule has a natural consequence, which is that the team who throws the last stone has a distinct advantage, because the person who throws the last stone has the last chance to knock a stone from the opposing team out of the way and to get closest to the button. That is the inevitable outcome of the alternating system of making shots. You can watch this YouTube video to see a spectacular example of someone winning on the final stone: http://tinyurl.com/ycr5bg5.

This is like a theorem in maths: given the axioms of the system, there are inevitable theorems. Here, if we alternate stones, then the last stone has the advantage. There is no way to change that theorem without changing the system. The axioms that lead to this theorem, furthermore, are not really a matter of truth or falsity: they are simply features of the system. We can make statements about the axioms which are true or false, but the axioms themselves are simply features of the game, in the same way that a tree is a feature of a forest or a wall is a feature of a house.

Let's say that we do decide to change the system. We invented it; we can change it. So now let's say that under the new rules of curling, whichever team has yellow stones will always throw all their stones first, and the team with red stones will throw all their stones when yellow is finished. You can immediately see that this new axiom changes everything. We have a new theorem-like outcome, which is that red will always have a terrific advantage, because red will get eight straight chances to get a stone closest to the button and yellow will have no chance to defend against them. It's hard to imagine, even, what motivation yellow would have for playing, as the possibility that they could win is reduced almost to zero. This change of rule doesn't just *alter the game*, it *changes the system* so much that it doesn't really seem reasonable to call it curling any more – we'll have to call it Bizarro curling.

The metaphor of the game as a system and the rules as axioms is not perfect, but it should help us now to notice a few important things about axioms:

- We don't need to prove them; they are simply the defining features of the system as we have created it. They cannot be 'wrong'.
- The theorems are the inevitable implications of the axioms that define the system. The system of curling includes the implication that last stone is an advantage. The system of the triangle includes the axiomatic features of being a closed figure of three straight sides that intersect only at three distinct points called vertices. We don't need to prove these; these are the defining features of the system. We can, however, prove that, given those features and some additional axioms from geometry, the angles of any triangle must inevitably add up to 180°.
- 'True' and 'false' are not relevant concepts to apply to axioms; axioms are simply a matter of reality. Just as we don't consider the 'truth' or 'falsity' of a tree or a wall, we don't consider the truth or falsity of axioms. They are objects, facts, realities, not concepts that can be true or false.
- We can't really change axioms, as axioms are the features that we use to define a given mathematical system. If we 'change' those axioms, we actually leave the system and begin in a new one; we don't change the original system in any way at all. How could we? It doesn't exist in the physical world, but in some abstract sense, and so it remains exactly as it was, even if we have decided to think about another system. What 'changing' an axiom amounts to is choosing

another axiom to take its place, and thereby starting up a new system; and that does happen (an example with far reaching consequences would be the choice of mathematicians to allow/define square roots of negative numbers. Originally part of pure maths, these are now indispensable in much modern technology). We can change the triangle into something else and decide to call that object a triangle, but that really won't fool anyone – we will still be working within a different system from the one whose nature resulted in 180° of total angles.

- While single axioms might appear in more than one mathematical system, it is a group of axioms that collectively and uniquely defines a particular system. We can only prove that the number of degrees in the angles of a triangle, for example, is 180 if our triangle is on a flat plane. If our triangle is on a sphere, we are working in a completely different system (one with curved lines instead of straight ones) and, therefore, new theorems result. The geometry of the flat plane was first developed by Euclid; the geometries of other surfaces are generally called non-Euclidean geometries.
  The axioms for non-Euclidean geometries are different from the axioms of Euclidean geometry, but they are not 'changed' from 'original' axioms, and it makes no sense to say that the axioms of the flat-plane triangle are wrong now that we are working with a curved surface. Those axioms simply don't exist in the new system. Saying that one set of axioms is wrong because they don't work in a new system would be like saying that the rules of rugby are wrong because they don't work for American football.

Given these facts, when we use axioms as the basis of our proofs, therefore, we do not have to worry about the truth of the conclusion. If we have done our maths right then the certainty of the conclusion is guaranteed. In this sense, all maths is implicit in the axioms. H.A. Simon writes:

All mathematics exhibits in its conclusions only what is already implicit in its premises. Hence all mathematical derivation can be viewed simply as a change in representation, making evident what was previously true, but obscure. This view can be extended to all of problem solving – solving a problem simply means representing it so as to make the solution transparent (132).

2 What is the relationship between truth and mathematics? Why has it been said that maths is a **formal game** or a **closed system**?
3 If all mathematics is just a change in representation, that is, if the theorems are somehow already 'present' in the premises, why is mathematics so hard?
4 Is this similar to any other areas of knowledge?

So the relationship between truth and mathematics is an interesting one. Maths may be certain, but 'truth' is a murkier concept – particularly in the usual sense of the word, which we generally use to mean that an idea corresponds with some reality. This takes us back to the initial question of whether mathematics is invented or discovered. But even if 'truth' may be difficult to ascertain when it comes to maths and the 'real' physical world, the 'truth' of mathematics is unquestionable when it comes to the nature of the mathematical systems themselves. Hence G.H. Hardy's claim about the reality of mathematics:

A mathematician … is working with his own mathematical reality.
Of this reality, I take a 'realistic' and not an 'idealistic' view … This realistic view is much more plausible of mathematical than of physical reality, because mathematical

objects are so much more what they seem. A chair or a star is not in the least like what it seems to be; the more we think of it, the fuzzier its outlines become in the haze of sensation which surrounds it; but '2' or '317' has nothing to do with sensation, and its properties stand out more clearly the more closely we scrutinise it. It may be that modern physics fits best into some framework of idealistic philosophy – I do not believe it, but there are eminent physicists who say so. Pure mathematics, on the other hand, seems to me a rock on which all idealism flounders: 317 is a prime, not because we think so, or because our minds are shaped in one way rather than another, but because it is so, because mathematical reality is built that way. (96–97)

Knowledge framework: Methodology

The rigorous proof is the hallmark knowledge-making method in pure mathematics. Obviously, then, deductive reasoning (see Chapter 7 for more detail) plays a significant role in the making of knowledge in mathematics; however, this is not the only important way of knowing mathematicians rely on.

Language is important to mathematicians, as well – indeed, many people will argue that maths *is* a language in and of itself. We think that there is more to maths than just the language, so we prefer to argue that maths *has* a very specific language that must be known and used by mathematicians in order for knowledge to be made. Mathematical language is quite interesting – it requires the same degree of rigour that any proof requires and mathematical definitions must be constructed very precisely to be of use.

Even within reasoning, it is not just about deduction; *inductive* reasoning is also important in the generation of conjectures. Additionally, as we see here, because maths requires creative thinking, imagination and intuition play key roles for professionals. A mathematician does not

Maths as a creative art

So far we have concentrated on the logical side of maths. Certainly, logic plays a very central role, but there is more to maths than that and, in particular, there is a great deal of creativity and imagination. You may not have seen much evidence of that in the proofs of theorems 1 and 2 (pages 109 and 110), where each step followed logically and there seemed to be little room for originality or inspiration. But we can easily find problems where a 'logical' approach (what does that mean anyway?) doesn't get us very far.

Recall that we say that a positive whole number is a *prime* number if it has exactly two factors. That is,

2 is prime because $2 = 1 \times 2$ so 1 and 2 are the only factors of 2

and

17 is prime because $17 = 1 \times 17$ so 1 and 17 are the only factors of 17

but

21 is not prime because although $21 = 1 \times 21$ (so 1 and 21 are factors of 21) we also have $21 = 7 \times 3$ (so 1 and 21 are not the *only* factors).

With this in mind, we can see that the first few primes are 2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43, 47, 53, 59, 61, 67, 71, 73, 79, 83, 89, 97 …

Now these numbers prove to be very interesting to mathematicians, because they are to arithmetic what the elements are to chemistry. In chemistry, you study the elements so that you understand how compounds (which are made up of elements) behave. So, too, in maths we can study prime numbers with a view towards generating insights which work for 'more complex' (mathematicians call them 'composite') numbers. So, let us ask ourselves a few questions about primes:

- Are there any more even prime numbers after 2?
- How many prime numbers are there?
- Do the gaps between the primes keep getting bigger?

Can you answer these questions? Can you prove them? After the first one (to which the answer should be clear after a little thought), things are getting a little more complex. There is no immediately obvious way to start trying to prove these – you may have a pretty good idea about the answer (your intuition may be quite well developed) but the formal, logical proof is far from straightforward. And, of course, until the proof is there, mathematicians are going to look at intuition with a fairly sceptical eye. And what about these questions:

- Is there a prime between n and $2n$ for any value of n?
- Is there a prime number between successive square numbers?

know in advance how the proof will be constructed; she must generate possible solutions. We will also see, a little later in the chapter, that given the limits of our ability to define and control mathematical systems, and given the vast complexity of modern proofs, faith is required to allow us to continue to trust the proofs that we have.

- How many prime numbers are exactly 1 less than a square number?
- How many prime numbers are exactly 1 more than a square number?
- How many pairs of prime numbers are there which differ by 2 (for example, 11 and 13 or 10006427 and 10006429)?
- Is every even number greater than 2 the sum of two prime numbers?

How to start these proofs? It is not at all obvious; the definitions of 'prime', 'square' and 'even' do not really seem to help; and there is no clear way to begin (but one of these questions is within your grasp – can you see which one?) In fact, if you can answer, and prove your answer, to either of the last two questions then you will be a very, very famous mathematician. (The last question was set by Christian Goldbach, 1690–1764, who notoriously conjectured that there is an infinite number of such pairs. It remains one of the outstanding problems of number theory.)

Of course, for our purposes we are less interested in the actual problems themselves than in what they tell us about the nature of the discipline, but you must not imagine that your experience of some of these problems is all that different to that of the professional. You may both look at a problem, understand what it is that you want to do, but be unable to see a way of doing it. The difference is that in school maths you can ask your teacher or look up a text, but for the professional there may be no one to ask and no books to consult. He is on his own, and he has to come up with something new, something that nobody else has ever thought of.

5 Have you ever solved a maths problem when no one had told you a method or a way of doing it? Have you ever found a solution all by yourself?
6 How is this process similar to or different from the scientist, the historian, the novelist or the musician at work?
7 So how do mathematicians do it? How do they come up with new ideas?

Of course, Question 7 is impossible to answer. If we could answer it, then we would be back to the stage of reducing maths to a recipe, and mathematicians would merely be following the instructions. We can point to factors that may help creativity – relevant experience, love of subject or whatever – but these are not, in themselves, enough. Plenty of people may be trying to create (discover?) something new, and they may all have 'the right background', but only one actually manages it, and the key to his insight might be as obscure to the mathematician as it is to anyone else. Andrew Wiles describes a moment of inspiration as 'an incredible revelation' (*The Proof*) – vocabulary usually used for religious ecstasy! So creativity in maths, as elsewhere, is elusive and mysterious. Recognizing this is perhaps the key to understanding why some see mathematicians as artists, and certainly key to understanding why some maths is considered 'great' and other maths not. Great maths, like any great art, does not follow well-trodden paths, nor does it apply tried and tested techniques. Instead it does something genuinely new, deep or profound. Like any great art, great maths is beautiful. G.H. Hardy writes:

A mathematician, like a painter or a poet, is a maker of patterns. If his patterns are more permanent than theirs, it is because they are made with ideas. A painter makes patterns with shapes and colours, a poet with words … A mathematician, on the other hand, has no material to work with but ideas, and so his patterns are likely to last longer, since ideas wear less than words.

The mathematician's patterns, like the painter's or the poet's, must be beautiful; the ideas, like the colours or the words, must fit together in a harmonious way. Beauty is the first test: there is no permanent place for ugly mathematics (115).

He goes on to say:

I have never done anything 'useful'. No discovery of mine has made, or is likely to make, directly or indirectly, for good or for ill, the least difference to the amenity of the world. Judged by all practical standards, the value of my mathematical life is nil. I have just one chance of escaping a verdict of complete triviality, that I may be judged to have created something worth creating. And that I have created something is undeniable: the question is about its value. The case for my life … is that I have added something to knowledge … and that this has a value which differs in degree only, and not in kind, from the creations of the great mathematicians, or any of the other artists, great or small, who have left some kind of memorial behind them (151).

8 Is mathematical creativity the same as other types of creativity? If not, what are the differences?

9 Although Pythagoras' theorem is named after Pythagoras, anyone could have 'found' the theorem. Contrast this to literature. Could anyone else have written Shakespeare's or Dostoevsky's works? How about music, poetry or architecture? What does this distinction tell us about the differences between maths and the arts?

10 It is unfortunate that so much mathematics remains inaccessible to so many. However, we can see where aesthetic appeal comes in from a few simple examples. Consider the following mathematical statements:

$\sqrt{16} = \pm 4$

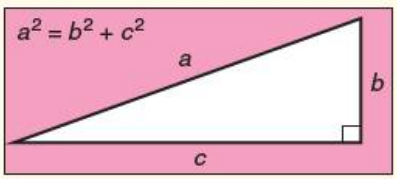
$$\frac{\pi^2}{6} = \frac{1}{1^2} + \frac{1}{2^2} + \frac{1}{3^2} + \frac{1}{4^2} + \ldots$$

$1 + 3 = 4$

$$\frac{\pi}{2} = \frac{2 \times 2 \times 4 \times 4 \times 6 \times 6 \times 8 \times 8 \times \ldots}{1 \times 1 \times 3 \times 3 \times 5 \times 5 \times 7 \times 7 \times \ldots}$$

$2674/23 \approx 116.26$

$5 + 9 = 2$



$e^{i\pi} + 1 = 0$

$$\frac{1}{2} = \frac{2}{4} = \frac{3}{6} = \ldots = \frac{n}{2n}$$

$$\begin{aligned} 35^2 - 25^2 &= (35 + 25)(35 - 25) \\ &= 60 \times 10 \\ &= 600 \end{aligned}$$

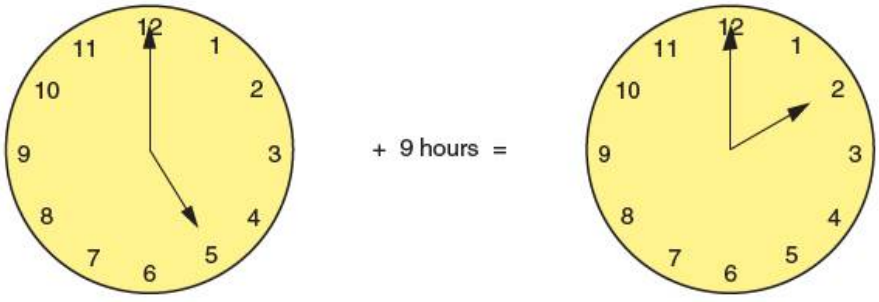
Could any of these statements be considered beautiful in any way? You may find it helpful to consider notions of brevity, simplicity, truth, utility, elegance and surprise.

11 As a matter of fact, Hardy's claim that he never did anything useful is wrong; he made contributions to genetics and quantum mechanics. But suppose he were right. Would that matter?

The nature of mathematical systems

You have seen that the role of axioms is central to mathematics. You have seen that the set of axioms available for your use is dependent upon the mathematical system in which you are working. When we talk about the ability of maths

to generate absolute certainty, then, we are only ever talking about absolute certainty *within a given system*. This is not immediately obvious; it might be tempting to think that something as simple as addition, for instance, is absolutely certain, in all systems, and that if we add two numbers together, we will always get the same answer no matter what. $5 + 9 = 14$, right? Actually, even that statement, and others like it, are dependent upon the system. We can easily change the system so that $5 + 9 = 2$; all you have to do is think about clock arithmetic. Starting at 5:00 and moving the hands nine hours ahead gets us to 2:00. We then generate a whole lot of other 'truths', such as $11 + 1 = 0$, $7 \times 2 = 2$ and so on. These are mathematically correct *in the axiomatic system described*. We can choose that system and then it follows that $5 + 9 = 14$ will no longer be true!



12 In clock arithmetic, calculate the following:

- $5 + 8$
- 3×2
- $2 - 4$
- 5×10
- $8 - 12$
- $11 + 12$

13 What are the right axioms for arithmetic? Is everyday arithmetic 'true'?

So why do we use the number system that we do? The answer is simply that we use it when it is convenient to do so. In the physical world, when we add five things to nine things, we end up with 14 things, so we say $5 + 9 = 14$. But on a clock face, that doesn't work, so we use another system. Similarly, you may see chapters in a book numbered 1.1, 1.2, 1.3 ... all the way up to 1.9 and then 1.10, 1.11, 1.12. This is incorrect in our normal decimal system, but it is convenient to use in the context of mapping out a book. In quantum mechanics, physicists use a system whereby it is possible for one particle and another particle to add up to no particles, simply because it works. So this is the first way we choose our mathematical system – we see what is useful.

Of course, after reading the last section you know that not all mathematicians are mathematicians because they want to do something useful! They are more interested in finding insight, elegance and surprise. This affects the choice of system, as well. Sometimes a mathematical system can be chosen which results in axioms that seem at odds with anything useful at all. For example, in matrix multiplication, the order of multiplication matters (Khan Academy). That is, when working with matrices, $a \times b$ is not the same as $b \times a$. Now, our ordinary numbers don't work that way, but we can get some very interesting maths out of working with this mathematical system.

The surprising thing is that, if we construct a new mathematical system, it often turns out, later on, that applied mathematicians can find a use for it, even though it was designed purely with aesthetic properties in mind. This seems to indicate a profound truth about the relationship between mathematics and the universe, and reminds us of Hardy's comment: '*Beauty is the first test:*

there is no permanent place for ugly mathematics.' This ability to apply to the real world mathematics that seemed initially to have been entirely abstract and which seemed to have been entirely invented by human beings explains why some people think that maths is actually out there in the world, waiting to be discovered. It would be a wonderful thing indeed, if, as the physicists Dirac and Einstein hoped, the mathematics describing the world is, at a deep level, profoundly satisfying aesthetically. Perhaps the two criteria for choosing axioms, utility and elegance, are not so different after all.

So we are perfectly at liberty to define any mathematical system that we want, and to work with it to see what develops. Some systems (the vast majority) will be sterile and uninteresting. Others will generate rich areas with seemingly endless practical and/or aesthetic possibilities. Versions of mathematics that are at first sight bizarre are easy to dismiss, but like the genius artist who starts a new style of painting or music, the genius mathematician is the one who imagines and develops the axioms nobody else even suspected.

You may think that this axiomatic approach must be very tedious; must even professors start right from the basics and prove everything absolutely rigorously? The answer is no; in practice once someone has proven a result to the satisfaction of the mathematical community then that result can be used without further proof. So, for example, you can use Pythagoras' theorem, or the cosine rule, or the formula for the area of a circle, quite happily *as they have been proven already*. In theory you could go right back to the axioms and prove them again from scratch, but there wouldn't be much point in doing so – even though it must, in fact, be possible to do exactly that. When we use these already-established results as the basis of work we tend to refer to them as theorems rather than axioms, but in practice they play the same role; we use them without proof – and theorems can then be used as some of the premises for new mathematical proofs. The difference is that 'real' axioms *cannot* be proven as they are the original starting points; whereas *theorems* have already been proven and so can be used as more advanced starting points. Mathematicians have a huge body of theorems on which they draw; it is unheard of these days for them to go back to the axioms of the familiar systems that you study in school maths, not least because it would take so long to do so. Mathematicians are human after all!

Considering this axiomatic method may yield a resolution of the discovery/invention dilemma. We are free to invent, or define, whatever systems we choose, and we then discover the consequences of our choices. What we are saying here is, in a sense, blindingly obvious – that we must start our argument from somewhere, and even if we don't like the starting points we can develop an argument from them. Any lawyer knows this!

It turns out, however, that there are some very surprising consequences of adopting such an approach. In adopting a particular defined system, mathematicians are committing themselves to its logical consequences, which can sometimes be unexpectedly problematic.

The so-called 'axiom of choice', for example, first noted by Ernst Zermelo in 1904, states, roughly, that if you have a collection of non-empty sets, then you can make a new set by choosing elements of the original sets (Schechter). So, for example, if you have 15 rugby teams, then you can create a new team of 15 by choosing one player from each of the 15 teams. This seems almost too obvious to bother stating – and it turns out that if you reject it then you have to reject a lot of standard maths with very practical applications in the real world. To lose this axiom would hobble maths.

Knowledge framework:
Historical development of the area of knowledge

You can see from the discussion here that the historical development of mathematics has been from applied maths to pure maths and then back again to applied mathematics.

Our mathematics have become more and more complex over time, and, concurrently, our technologies have also become more and more sophisticated. The history of mathematics shows a direct correlation to the developing history of culture.

So far so good – why would you reject such an intuitively obvious axiom? Why not accept the axiom of choice and all its consequences? This is where the details get very technical indeed, but, to cut a long story short, depending upon how you define the word 'exists' in Zermelo's formulation of the axiom of choice, it has some consequences which are so counter-intuitive that some mathematicians have actually rejected it! When you consider how 'obvious' this axiom is, this is extremely surprising. The trouble is that if you accept the axiom you have to accept its consequences, and one of them goes by the name of the 'Banach–Tarski paradox', after its discoverers (inventors?).

The Banach–Tarski paradox illustrates that we can take a mathematical object the size of a pea or of a tennis ball, make some carefully defined mathematical cuts, and then rearrange the pieces – without changing their sizes – into much larger mathematical objects; double the original size – or more, even to the size of the Earth or larger! Naturally, this defies any of our expectations and intuitions which are based on how the physical world reacts, and it is therefore easy to think that this mathematical construct simply cannot be true, and thus lead us to want to reject it, and hence also reject the axiom of choice.

Banach–Tarski paradox

14 Why might it be unsafe to rely on intuition in maths and to say 'that just cannot be right!'? When and for whom might it be safe?

15 What are the links between intuition and proof?

16 Maths is often about seeing links between apparently different areas. This can yield surprising insights about both areas, and often result in 'retraining' our intuition. Consider the familiar set $N=\{1,2,3,4,5,6,7,8,9,10\ldots\}$

- **a** Split N into two equal sets, E and O, where $E=\{2,4,6,8,10\ldots\}$ and $O=\{1,3,5,7,9\ldots\}$. Clearly, $N=O\cup E$. ($\cup$ meaning '+' in set language)
- **b** Now divide each element in E by 2, to give $E'=\{1,2,3,4,5\ldots\}$
- **c** Now add 1 to each element in O and divide by 2 to give $O'=\{1,2,3,4,5\ldots\}$.
- **d** It seems our original set N has been divided into two sets O' and E', both of which are identical to it. How is this linked to the Banach–Tarski paradox? What does this tell us about the nature of the paradox?

Question 16 is getting at the idea that the Banach–Tarski paradox is only paradoxical when we think of it as applying to physical objects; we are in fact (fairly) well used to numbers behaving strangely. So as long as we remember that we are talking about mathematical and not physical objects, it becomes less of a paradox and more of a normal theorem. (An excellent and accessible discussion of this paradox can be found here: http://tinyurl.com/cu77qgb). Obviously this mathematical system is not one that maps directly to real objects – a physical pea cannot be physically rearranged into a globe the size of the Earth; no real problem there.

So this, then, is the inevitable, logical, consequence of an 'obvious' axiom, and it highlights a very important aspect of mathematics: when we are dealing with mathematical objects, we are dealing with mental constructs, and not directly with the physical world. For a more detailed and fairly technical discussion of

the Axiom of Choice and the Banach–Tarski paradox, check this page from the Vanderbilt University website: http://tinyurl.com/6bk6zy.

17 Give an example of what it means to create a new set from a collection of non-empty sets. Do you think it is always possible to do this?
18 Do you think it is possible to cut and rearrange a mathematical sphere and obtain a bigger one?
19 How would you deal with the fact that agreeing with the first question above commits you to agreeing with the second? Which of your answers would you change?
20 Why do you think very, very few mathematicians are happy with saying 'Yes' to the first question but 'No' to the second?

In general, mathematicians are not perturbed by these extremely odd theorems – after all, they apply to the world of mathematics, not the physical world. You might think that the axiomatic approach is then a good way to proceed – and this was indeed the way that mathematics did proceed last century, when the possibilities for this approach seemed enormously exciting. The German mathematician David Hilbert started a search for the perfect mathematical tool – a method of telling for sure whether a theorem could be deduced from the axioms or not. Recalling that mathematics is about proving theorems from axioms, and that the theorems follow by the rigid application of logic to the axioms, this does not seem like too much to ask; we want an algorithm (or computer program) into which we can feed the axioms, and the suggested theorem, and then be told if the theorem is correct. All we need to do is find a way to formalize the process of logical deduction into a set of formal rules. This would then provide an incredible shortcut to the mathematical process. In the early parts of the last century, this seemed very exciting.

Knowledge framework:
Scope and applications

The content of pure mathematics is the mental construct of mathematics itself. When a mathematician works on the properties of a circle, for example, he is working on the idea of a circle which would have a perfection of form that we cannot achieve in the physical world. No matter how beautifully and carefully we try to draw a circle, if we look at it closely enough, we will find that the line we draw to represent the circle has imperfections. A mathematical circle has no line. A mathematical circle is perfect.

Similarly, infinity is an idea, not a physical object; and, arguably, even all numbers are ideas, not representations of a physical state.

We can apply mathematical ideas in the real world to create objects (say, a circular swimming pool or a spherical cricket ball), and we have technology which creates objects with a margin of error small enough that there are no real consequences to the imperfections in our created object.

Applied mathematicians can use mathematical ideas to model real-world processes and this allows us to manipulate our world effectively. We do not need to be precise to an infinite number of decimal places in order for buildings to stand, planes to fly, or computers to function. In pure maths, absolute precision is possible and desirable; in applied mathematics, close – usually very close – is good enough.

The limitations of mathematical systems

So in the early twentieth century, Hilbert set out to pursue the holy grail of mathematics: a system which would be (i) *complete*: that is, tell us the truth/falsity of all conjectures and (ii) *consistent*; that is, contain no theorems which

contradict each other. This was, for mathematicians, the perfect knowledge-generating system, and they enthusiastically set about finding (inventing?) it. It was a shock, therefore, when in 1931, Austrian Kurt Gödel, at the remarkably young age of 25, proved, in two breathtakingly ingenious theorems, that Hilbert's dream was unattainable. In his famed *incompleteness theorems*, Gödel showed that no matter how clever or inventive we are, for any system of mathematics which is complex enough to express the basic operations of integer arithmetic, we will not be able to prove that the system is both complete and consistent (Feferman). Gödel's work poses the ultimate obstacle in the search for a system that could answer with absolutely certainty all questions of mathematical truth.

Gödel's ideas are complex (and beyond the scope of our investigation here), but the point is that Gödel drove in a wedge of uncertainty where mathematicians had hoped to be free from doubt. But in a sense this is unsurprising, and in fact Gödel's incompleteness theorems reveal something about the nature of the mathematical endeavour which parallels the scientific endeavour: at any given time we have to take some things on faith, without absolute proof. We proceed in all our knowledge-making endeavours on the assumption that what we believe is true, simply because doing so works. Just as in the natural sciences we have to accept as a matter of pragmatism that there is an external world outside of our own minds, and that the scientific principles we develop describe the processes of that external reality, so we have to proceed in maths with the systems we have, even if we know that we cannot prove that they are both consistent and complete. If, one day, we find that our maths does not work then we will have to reconsider and likely revise our understanding. This is how science proceeds, how we work in everyday life, and so perhaps it is not all that surprising that it applies to maths too. So while the concept of 'proof' is fundamentally different in science and maths, perhaps Gödel is best understood as showing that there is, after all, also a fundamental similarity.

It is important to understand that contrary to what is sometimes said about Gödel's findings, he did not demonstrate that mathematics can give us no truth; his work simply revealed that *no one particular* system can reach all truths. So if we find that there is some statement expressed in one system that cannot be adequately proved, then we could always make a more complicated theory – that is, develop a new system – to prove that statement – so long as the statement actually *is* true. If we find that our current model of physics is insufficient, we just need a more complicated model (Stauffer). Thus, if our explanation turns out to be insufficient, we just need a better explanation, and Gödel therefore provides us with no reason to think that the human mind is too limited to develop, over time, the explanations we need (there may, of course, be other reasons to think so, but if so, they do not come from Gödel).

21 Summarise in your own words:
- **a** what Hilbert hoped to do with the axiomatic system of mathematics
- **b** what the terms 'complete' and 'consistent' mean
- **c** what Gödel's results did and did not show for the possibilities of mathematical truth
- **d** differences between maths and science that emerge from these ideas.

Maths as a human endeavour

Knowledge framework:
Links to personal knowledge

We have seen that the main method of the pure mathematician is the rigorous proof, and that one critical way of knowing for the rigorous proof is reason. But we also saw, in Chapter 5, what a close relationship there is between reason and imagination.

We see here that a mathematician's reason is also related to her developed mathematical intuition, about which you will learn more in Chapter 10.

We can also see that some powerful emotions contribute to the making of mathematical knowledge: curiosity, for one, and a passion for exactitude for another. Many mathematicians speak of the beauty of mathematics, and we might presume that it is that sense of beauty which feeds their commitment to solving difficult problems. Andrew Wiles worked for nine years on the proof of Fermat's Last Theorem. How long are you willing to work on a maths problem?

Many mathematical theorems and ideas are named after the individuals who developed them. This is in tribute to the personal skills, dedication and imagination which led them to discover what others had not been able to discover.

We have so far looked at mathematics as a structure, and examined the model of a deductive axiomatic system heavily focused on formal proofs. While this is a commonly held view, and while proofs are the 'content' of the subject, it does overlook the whole process of actually doing mathematics and the fact that it is done by humans – at least for the most part!

Once we identify this gap, some obvious points emerge. First, there is the obvious fact that people make mistakes! We may think we have a result that is 'certain', but that may simply be because we have made an error, and the history of mathematics is littered with false 'proofs'. Perhaps the most famous example of this is the German mathematician David Hilbert's twenty-first problem; last century he gave a list of challenges, and the best minds in the mathematical community set out to solve them. The twenty-first problem in the list was proven in 1908, and according to a simple model of mathematics you might think this was the end of the matter – but in fact a counter-example to the theorem was found in 1989, and only then did mathematicians discover that the proof was incorrect! Eric Bell has gone so far as to say that: '*Experience has taught most mathematicians that much that looks solid and satisfactory to one mathematical generation stands a fair chance of dissolving into cobwebs under the steadier scrutiny of the next*' and one wonders how many other mathematical 'truths' are, in fact, false.

A further and perhaps more important problem is that there are fads and fashions in mathematics, just like in any other human endeavour, and so the very standards of mathematics are open to change – contrary to the 'eternal truth' school of thought. Recently the **four colour theorem** was controversially proven by an ingeniously programmed computer; and while the programmers obviously knew what they were doing, they did not actually do the proof. Some mathematicians at the time did not accept this as a valid proof – but this view is increasingly rare, and we are currently seeing huge growth in 'experimental maths' that relies far more on inductive results from number-crunching machines than on pure deduction. The important point is that if standards of mathematics are open to change then the best mathematicians can do is to say that 'it seems to work for us, now'. In this

respect perhaps we see again that there is another powerful similarity between mathematics and the sciences. Mathematician Raymond Wilder has claimed that '*we don't possess, and probably will never possess, any standard of proof that is independent of time, the thing to be proved, or the person or school of thought using it*' (Epstein and Carnielli 28).

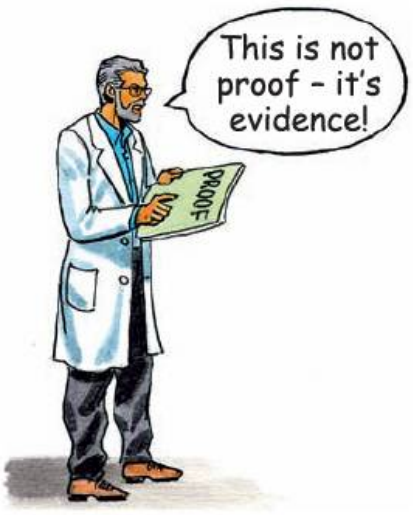
This is another hotly contested idea among mathematicians, but if it is the case then the lofty claims of the 'queen of the sciences' seem rather overinflated, and are perhaps more about the desires of the mathematicians than the reality. G.H. Hardy put it strongly:

There is, strictly, no such thing as mathematical proof… we can, in the last analysis, do nothing but point … proofs are what … I call gas – rhetorical flourishes designed to affect psychology, pictures on the board in the lecture, devices to stimulate the imagination of pupils (Ayoub 59).

Once we start thinking about the psychology of the subject then we are alerted to the fact that to focus solely on the proof is to miss the mathematician's struggle, his adventure. Imre Lakatos puts it well: '*The whole story vanishes, the successive tentative formulations of the theorem in the course of the proof-procedure are doomed to oblivion while the end result is exalted into sacred infallibility*' (Kadvany 135).

Of course being sceptical about the methodology we have outlined in this chapter does not require that we resort to total scepticism as to the truth of the results. Most mathematicians would claim that theorems are true or false independent of our knowledge of them. Perhaps what evolves is not maths but our knowledge of it – which is surprisingly close to what many historians would say about their discipline – and perhaps what Percy Bridgeman was thinking of when he said, '*It is the merest truism, evident at once to unsophisticated observation, that mathematics is a human invention*' (Kline 325).

Whatever your view of these ideas, it is clear that, contrary to the popular image of maths as right or wrong, black or white, the subject is deeply controversial even to professionals.



Where have we been? Where are we going?

In our quest for truth, we looked to mathematics to provide certainty, and to some extent we have been successful, but perhaps not as successful as we might have hoped. We have learnt that mathematical reasoning based on assumed axioms can generate certain, proven knowledge and, what is more, there even seems to be the possibility of an aesthetic element. Despite Gödel's theorems, this seems to be very promising, and we are immediately led to ask if the mathematical method can be generalized to things other than mathematical objects. If so, then perhaps we have made a significant step in our quest for truth. So now we can take the logical rigour of maths and try to extend it to more than the mathematics world; that is, we can explore reasoning as a tool in its own right.

Further study

- It is difficult for the non-specialist to get to grips with much of the mathematical literature, but G.H. Hardy's *A Mathematician's Apology* (Cambridge University Press, 1940 repr. 1994) is a brilliant and engaging description for the layperson. If you would like to get a first-hand, totally non-algebraic experience of mathematical imagination, then Edwin Abbott's classic *Flatland* (Penguin, 1952) and its more readable descendent, Rudy Rucker's *The Fourth* Dimension (and how to get there) (Rider and Company, 1985) are unsurpassed for expanding conceptions of mathematics. Two very readable accounts of humans at the centre of mathematics are David Blatner's *The Joy of Pi* (Walker & Co., 1999) and Simon Singh's *Fermat's Enigma* (Walker & Co., 1997).
- Getting slightly more technical, an outstanding description of what mathematicians actually do can be found in Philip Davis and Reuben Hersh's *The Mathematical Experience* (Houghton Mifflin, 2000). The creative and very human side of the notion of proof is brilliantly explored in play form in Imre Lakatos' *Proofs and Refutations* (Cambridge University Press, 1977). If you want to follow up the ideas behind the Banach–Tarski theorem and similar issues then Morris Kline's difficult but fabulous *Mathematics: The Loss of Certainty* (Oxford University Press, 1982) is well worth the investment in time it will take. A more accessible, rich, wide-ranging and funny account of Gödel's works (linking maths, music and art) can be found in Douglas Hofstadter's *Gödel, Escher and Bach* (Vintage, 1989) – which is more an intellectual experience than a book. The same ground is also covered in the excellent Ernest Nagel, James R. Newman and Douglas R. Hofstadter's *Gödel's Proof* (New York University Press, 2001).
- For two rather lighter but equally worthwhile books, try John Allen Paulo's *Mathematics and Humour* (University of Chicago Press, 1980), which is a short and funny book, or, as previously mentioned, David Blatner's *The Joy of Pi* (Walker & Co., 1999).

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7 Reason

We should take care not to make the intellect our god; it has, of course, powerful muscles, but no personality. It cannot lead; it can only serve.

Albert Einstein

He that will not reason is a bigot; he that cannot reason is a fool; and he that dares not reason is a slave.

William Drummond

I do not feel obliged to believe that the same God who has endowed us with sense, reason, and intellect has intended us to forgo their use.

Galileo Galilei

Man is a rational animal who always loses his temper when he is called upon to act in accordance with the dictates of reason.

Oscar Wilde

The further the spiritual evolution of mankind advances, the more certain it seems to me that the path to genuine religiosity does not lie through the fear of life, and the fear of death, and blind faith, but through striving after rational knowledge.

Albert Einstein

The reasonable man adapts himself to the world; the unreasonable man persists in trying to adapt the world to himself. Therefore all progress depends on the unreasonable man.

George Bernard Shaw

If you want to make someone hate you, explain to them, logically and politely, why they are wrong.

J. Baylock

Fantasy, abandoned by reason, produces impossible monsters; united with it, she is the mother of the arts and the origin of marvels.

Goya

The best way I know of to win an argument is to start by being in the right.

Lord Hailsham

Arguments are to be avoided: they are always vulgar and often convincing.

Oscar Wilde

People generally quarrel because they cannot argue.

G.K. Chesterton

Aims

By the end of this chapter you should:

- understand that the use of reason is a way to extend our knowledge from known facts
- be able to distinguish between inductive and deductive arguments – in both cases to evaluate the strengths and weaknesses of the arguments
- understand the premises/conclusion nature of an argument
- be very clear about the relationship between a valid argument and a true conclusion
- be aware of the need to be rigorous when using logic, the difficulties associated with choice of premises, the dangers of hidden assumptions and the problems with definitions
- be familiar with some possible errors in logic – in terms of some elementary fallacies and some common cognitive biases
- be able to apply these ideas to everyday examples
- appreciate that real-life problem solving requires imagination and creativity, and more than simple logic
- understand how induction and deduction are used in both personal and shared knowledge.

Introduction

There is a scene in a short story where a guest at a party meets a Catholic priest. The guest asks the priest to describe his adventures. The priest replies, 'As a matter of fact, the first confession I ever heard was that of a murderer.' Later on in the story, a newcomer joins the party and, after being introduced to the priest, says to the assembled company, 'Although he doesn't remember my name or face, I knew him when I was a boy – as a matter of fact, I was the first person who ever confessed to him' (Rose).

Aha! You immediately realized the connection here. You combined the two pieces of information you had to produce a third piece, and it seems as if you have generated new knowledge just by thinking about it! This seems rather useful; and what's more, the new knowledge is certainly correct. If it is true that the first person who saw the priest for confession was a murderer, and that a particular person was the first person to see the priest for confession, then the conclusion that that particular person was a murderer is inescapable – we just use logic!

Just as in our investigation of maths, we seem to have hit upon a great method for getting new knowledge – all we need to do is apply our reasoning faculties. If this is true then we can forget all those messy science experiments … or is this beginning to sound too good to be true? Can we really get very far just using reason? If we think that we can, then we are embracing what is called the **rationalist** approach – the idea that we can ascertain truth by thinking and by the process of reflection alone.

We shall begin the chapter by considering a central aspect of the rationalist approach – the use of logic, its strengths, problems and pitfalls; we shall then consider other possible approaches that are needed to complement logical analysis.

Deductive and inductive logic

Philosophers often make a distinction between two types of logic. **Deductive** logic involves examples like the one above, where, given the truth of some information, the conclusion *must* also be true. If the priest and the newcomer

were telling the truth then the newcomer *must* be a murderer. Another very simple example is:

A: All humans are mortal.
B: I am human.
therefore
C: I am mortal.

Arguments in this form are called **syllogisms**. They consist of two premises (here, statements A and B) and a conclusion (statement C). The beauty of a syllogism is that so long as the premises are **true** and the logic is **valid**, then there can be no doubt that C is true. The conclusion is absolutely certain. In the example, you can easily see that it would be ludicrous to assert A and B but deny C, so we can immediately understand that C is as compelling a conclusion as we are likely to find. If this example is anything to go by, then, logic seems like it might play a prominent role in a search for reliable knowledge. But what is it about the syllogism that makes certainty possible?

Logic: another thing that penguins aren't very good at.

Consider another example:

A: I am either a schnoodlepopper or a birshteinwaller, or both.
B: I am not a schnoodlepopper.
therefore
C: I am a birshteinwaller.

Once more, so long as A and B are true, then we are somehow compelled to accept C. Notice that the logical *structure* of the argument is important in this case, rather than the content (what is a schnoodlepopper anyway?), and this means that deductive logic can be applied to any subject. When the initial statements (A, B, etc.) are more complex, applying logical analysis can be a very powerful tool. We'll examine deductive logic in more detail later, to investigate ways we can know whether the premises are true and the logic valid.

1 Make up some other absolutely convincing arguments.
2 Make up some arguments which seem convincing, but in fact are not.

There is, however, another type of logic. **Inductive** logic does not involve certainty in the same way. The classic example involves the European naturalist observing European swans. He sees one swan – it is white. He sees another – it also is white. The third, fourth, fifth ... they are all white. After many years he has seen thousands of white swans, and he therefore says that the logical conclusion is that all swans are white. This is inductive logic. The naturalist has gone from several specific instances to a general conclusion. The question is, was he correct in doing so? We now know that there are black swans in Australia and New Zealand, so his conclusion was incorrect. The problem of generalizing like this is that we use past experience to predict the future. That is called the 'problem of induction'.

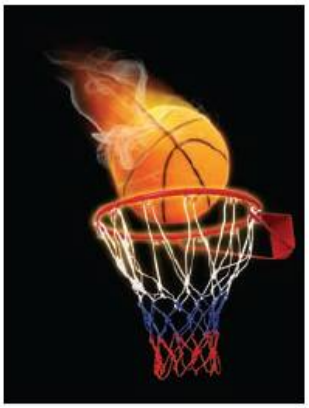
This may seem a million miles away from 'real-life' problems (when do you ever hypothesize about the colours of animals?). But in fact, it is very common. If you think of induction as 'drawing general conclusions from specific examples', then you should see that we all do it all the time. A friend buys a car from a dealer, and it turns out to be a bad buy. On the basis of this one case, I will almost certainly not use the same car dealer. We all know that it takes a teacher to be unpleasant only a few times, or a student to miss a deadline a few times, before general conclusions are drawn. In both these cases, the conclusion may or may not be true, but in each case it is still a 'reasoned' conclusion. Of course truth is not simply a function of the number of times that something has happened; our past observations cannot *cause* future reality, even though they may be a pretty good guide about what to expect. So with induction, the problem is that it takes only one counter-example to undermine our conclusion. Think of the thousands of white swans that were observed before one black swan altered the finding irrevocably. We need to realize that drawing general conclusions from specific examples is a very tricky business.

The problem of induction

We all use induction all the time. You have always enjoyed going for a run, so you assume that when you run today you will enjoy that, too. Day has always followed night in your experience, so you assume that it will continue to do so. Every time you sit down in a chair, you find yourself supported by the chair, so you assume that the next time you sit down you will not fall straight through to the floor. It might be suggested that this is just the way the world works – if something has

happened often in the past, there is a good chance it will do so again. This is, it might seem, only reasonable. And in these cases, it probably is.

But consider the times you have seen someone on a lucky day, perhaps a card player or a sportsperson having a good day. People talk about 'being on a roll' or 'having a hot streak'. For that person, it seems that nothing can go wrong, and nobody wants to bet against them. Is this another valid application of induction?



Interestingly, the answer, certainly in sports, is a resounding 'no'. Two researchers from Stanford University studied detailed shooting records from the Philadelphia 76ers and free-throw records from the Boston Celtics, and they ran a controlled shooting experiment with both the men's and women's basketball teams at Cornell University. Their work showed that the idea of a lucky streak is an illusion:

Basketball players and fans alike tend to believe that a player's chance of hitting a shot are greater following a hit than following a miss on the previous shot. However, detailed analyses … provided no evidence for a positive correlation between the outcomes of successive shots. … The belief in the hot hand and the 'detection' of streaks in random sequences is attributed to a general misconception of chance according to which even short random sequences are thought to be highly representative of their generating process (Gilovich et al. *295).*

In other words, despite what the intuitions of both fans and players suggest, past successes have no bearing on future successes. And being fooled like this is the problem of induction; sometimes the past is not, in fact, a good guide to the future.

So why does the idea of the 'hot hand' still linger? Well, partly because when the player has shot five baskets in a row, one time in five she will shoot six! These freak occurrences will happen by the laws of probability (and when vast quantities of data are available to computers to look for freak occurrences, you can bet they will be reported every time). But more importantly, the idea of a 'hot hand' still lingers because humans have a great tendency to see what they want to see and to remember selectively bits of data that stand out as significant. We saw this in Chapter 5 when we discussed Michael Shermer's work with Type 1 and Type 2 errors, and we shall see it again and again in different guises. Induction is about the human need to look for patterns in observations over time, but we need to be careful that our need to categorize and classify doesn't lead us to seeing what isn't really there. William Gibson put it succinctly in his novel, *Pattern Recognition*: '*Homo sapiens are about pattern recognition. … Both a gift and a trap*' (23).

Consider the chicken which is fed every day by the farmer. Being a philosophical sort of chicken, after a few weeks it applies induction and comes out to greet the farmer each morning, expecting food. One day, the farmer wrings its neck. Bertrand Russell, the philosopher, remarked that perhaps '*more refined views as to the … [problem of induction] … would have been useful to the chicken*' (44).

3 What do we 'know' about the world by the process of induction?
4 Have you ever drawn an inductive conclusion and been surprised?
5 Identify some examples where inductive reasoning seems reasonable to you, and some where it seems unreasonable.

Of course, we don't want to go too far down this road and reject all inductive reasoning; we want to be able to distinguish the good from the bad.

As we noted before, we use induction extensively for making a wide variety of personal knowledge. Consider how we learn language: how do you know that the

colour of your favourite T-shirt is blue? You learnt the concepts – both of T-shirt and of blue – through induction. Your parents and other people you came in contact with while you were learning language used the words over and over, and you gradually induced that that particular visual sensation is properly identified with a word – both auditory and visual – 'blue'. And it's not just language that you learnt by induction. You also learnt things such as what foods you like, which of the people you know are honest or dishonest, and how you can expect your mother to behave if you come home two hours after your curfew. We learn how to get along with others in the world largely through induction because these are not matters that can be deduced through a syllogism or other formal abstract reasoning. Without induction, we could not trust the physical world or the people around us to behave in reasonably predictable ways; thus, despite the problem of induction we use inductive reasoning extensively and, most of the time, it serves us well.

Depending on your point of view, the fact that a developing child learns most of what she knows about the world in this manner is either reassuring (since it seems to work a lot of the time) or deeply disturbing (since it cannot be strictly justified, does that mean all our ideas are rather dubious?). In any case, the problem of induction is a serious one for anyone looking for reliable knowledge.

6 How 'refined' are our views on induction?
7 What would the world be like if induction ceased to be reliable?
8 Are we going to have a shock one day if we rely on induction?
9 How can we justify the use of induction? Here are two possibilities:
- 'It has always worked before.'
- 'It is probably correct.'

Neither of these are good justifications, because they are **circular arguments**. What do you think this means?

Sometimes induction seems to work, and sometimes it doesn't. But how do we tell the difference?

In practice we often draw conclusions from limited evidence because we have no choice but to do so. Sometimes this seems reasonable (the sun has risen every day, so it will do so tomorrow), but sometimes not (shares have risen for the last few years, so they will always do so). In the following exercise, we consider when evidence supports a conclusion and when it does not. In particular, we will see if we can find some general principles which might indicate when inductive logic is likely to be reliable and when it is likely to lead us astray.

Exercise 1

An investor has purchased one hundred shares of oil stock every December for the last five years. In every case the value of the stock has appreciated every year by around 15 per cent, and it has paid dividends of about 8 per cent. This December she intends to buy another hundred shares of oil stock, reasoning that she will probably receive modest earnings while watching the value of the stock increase over the years.

In each of the following scenarios, decide:
1 whether the additional fact makes the inductive conclusion more or less likely to be true
2 what principle governed your decision in the above.

■ Suppose in the last five years she had always bought shares of one particular company, and she intends to purchase shares in the same company.

- Suppose that she had been buying oil stocks every December for 15 years, not five.
- Suppose that oil stocks previously purchased had gone up by 30 per cent each year instead of by only 15 per cent.
- Suppose that her previous purchases of oil stock had been in six different companies, and that she intended to buy stock in a different, seventh one.
- Suppose she learnt that major oil-exporting countries have decided to meet every month instead of every six months.
- Suppose she discovers that cocoa stocks have just raised or lowered their dividend payments.

You should now have a set of principles to guide you in your use of inductive logic. Use them in this exercise:

Exercise 2

Bill has taken four philosophy courses and has found them all extremely stimulating and worthwhile. He therefore signs up for another one, expecting it, too, to be worthwhile. On the basis of the principles you have just found, would the following statements, if true, make the conclusion more or less likely?

- His previous philosophy courses were in ethics, science, logic and language.
- The previous courses had all been taught by the same teacher, and the same teacher is scheduled to teach the present one.
- Professor Abacus taught all the previous courses, but Professor Calculator is scheduled to teach the present one.
- Bill found the previous philosophy courses to be the most exciting intellectual, personal and spiritual experiences of his entire life, and indeed were the only things that gave his life any meaning.
- All previous courses met at 6.50p.m. on Tuesday, but the present one is scheduled for 6.50p.m. on Friday.
- In addition to enjoying philosophy, Bill also enjoys anthropology, economics and political science.

More about deductive logic – arguments

Although we use induction all the time, it seems that if it is certainty we are seeking then we ought to stick with deduction. The examples in the introduction to this chapter showed clearly that deduction allows us to deduce a conclusion with **absolute certainty**. That is, if I am human and if all humans are mortal then it is absolutely certain that I am mortal. It is difficult to say, absolutely precisely, why the conclusion is so compelling, but it is. In this case, the logic of the situation strikes us with some force – which is a very promising start! This is an example for which the logic is clearly valid.

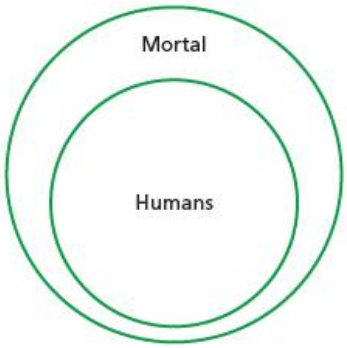
Here are a couple of more examples, rather less straightforward. In the following two cases, suppose that A and B are true. Must C also be true?

A: No monkeys are soldiers.
B: All monkeys are smelly.
C: Some smelly creatures aren't soldiers.

A: No emperors are dentists.
B: All dentists are feared by children.
C: No emperors are feared by children.

These are examples where it's quite hard to get your head around the relationships between the monkeys and the soldiers, and the emperors and the children. Whatever you think about the conclusion, it is clearly less obvious than in simpler examples.

Venn diagrams prove to be a useful tool for determining whether the logic of a syllogism is valid. Imagine all the things in the problems to be in sets. For the syllogism about humans and mortality, we would represent the reasoning this way:

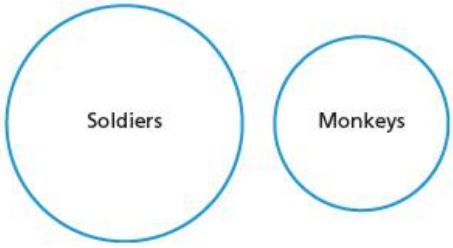


These two circles show the relationship between the two ideas in the first premise of the syllogism: since the statement is 'All humans are mortal', we include the circle representing 'All humans' entirely within the 'Mortal' circle; so that anyone in the 'humans' category is automatically also inside the 'mortal' category.

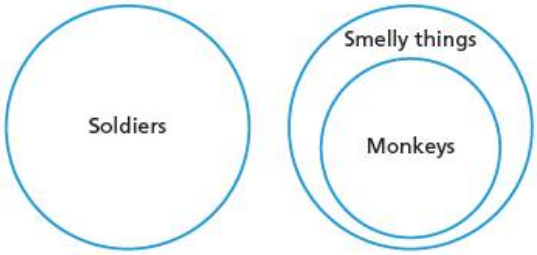
Now we can take the 'I am human' and place 'me' in the right place:

The diagram clearly shows that because I am human, I am also mortal. Furthermore, it shows that it must be true; it is *necessary*. There is no way that I can be inside the 'Humans' circle, and not be inside the 'Mortal' circle. The diagram shows, in other words, that my reasoning was valid.

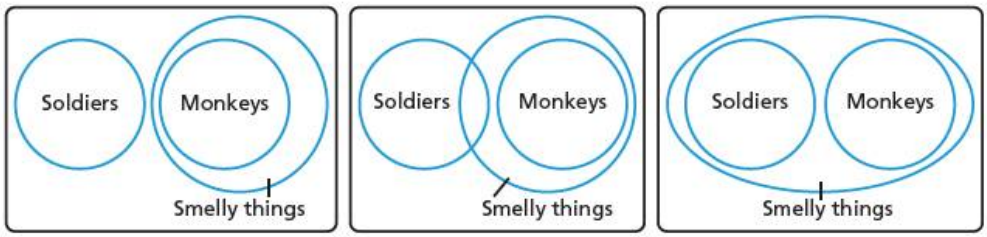
Let's try making a Venn diagram to represent the logic in example 1 on the previous page. In that syllogism, we have the sets of monkeys, soldiers and smelly things. We represent these as three overlapping sets – monkeys, soldiers and smelly things. The first two are easy; since the first statement tells us that no monkeys are soldiers, we have to show that there is no overlap between those two categories:



Now we have to figure out how to represent the idea that all monkeys are smelly. That suggests that the 'Smelly things' circle has to enclose the 'Monkey' circle.



Think carefully about how to arrange the circles and ovals in these diagrams – there is one little problem here, can you see it? The diagram above does indeed model the fact that all monkeys are smelly, but it also represents that no soldiers are smelly (check you understand this). But this is a step too far as we do not know this for sure (as it is not in the premise). In fact, there are three ways to draw the diagrams (see below). In the first case, this is a model of both premises given, but also of the additional premise 'No soldiers are smelly.'

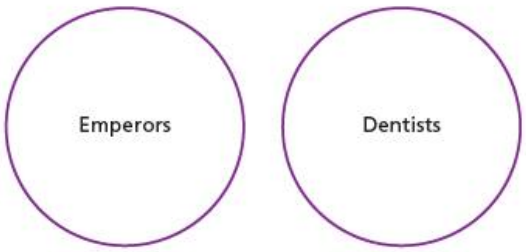


(Note that in these diagrams we are using the convention that there are no empty regions – not important for Theory of Knowledge but you might want to follow up with your maths teacher as it does matter in maths!).

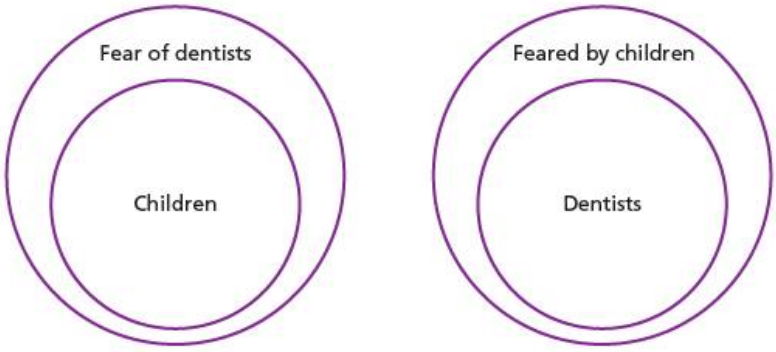
10 For cases 2 and 3 above, what extra premise is implied by the model given in the Venn diagram?

Now in fact in this case it doesn't matter which diagram we draw; it is clearly true in each case that 'Some smelly creatures aren't soldiers' – namely, the monkeys. So this is another valid argument.

What about the syllogism about emperors, dentists and children? The first statement 'No emperors are dentists' states that there is no overlap between the two categories, so the first step is simple:

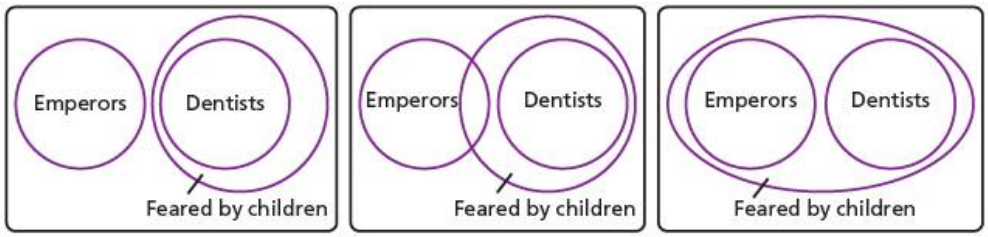


Representing the second premise 'All dentists are feared by children' is a little trickier; overleaf are two options:



11 Which of the above diagrams is a better representation (model) for 'All dentists are feared by children.'?

In fact, as we seek to combine the Venn diagrams for each syllogism, it helps to have the same sets in each diagram – so having 'Dentists' is better than 'Fear of dentists', as otherwise 'Dentists' is a common term. (Is it by reason, intuition, experience or imagination that we might know this?) Thus we will choose the second option above, and we now need to combine the two Venn diagrams, to see what conclusion we can draw. As before, we have three possibilities:



12 What relationships between 'Emperors' and 'Feared by children' do each of these diagrams represent?

You should see the problem here – that the conclusion we are examining is consistent with only *one* of these possibilities. That means that the conclusion might be right, but it might not be. And so we cannot conclude that 'No emperors are feared by children'; and this is therefore an *invalid* argument.

We've gone through these examples in detail for clarity – usually it's a straightforward process. Try drawing Venn diagrams for the syllogisms in Exercise 3 below.

Exercise 3

Identify the valid and invalid arguments here, using Venn diagrams if you like.

1 If my house is bombed it will be reduced to rubble.
My house is not bombed.
therefore:
My house will not be reduced to rubble.

2 If my house is bombed it will be reduced to rubble.
My house is reduced to rubble.
therefore:
My house must have been bombed.

3 If my house is bombed it will be reduced to rubble.
My house is not reduced to rubble.
therefore:
My house cannot have been bombed.

4 All monetarists control the money supply.
Margaret Thatcher controlled the money supply.
therefore:
Margaret Thatcher was a monetarist.

5 All accountants are tennis players.
All youngsters are tennis players.
therefore:
All accountants are youngsters.

6 All poets are imaginative.
No poets have business acumen.
therefore:
No one with good business acumen is imaginative.

7 All Buddhists are vegetarians.
Peter is a vegetarian.
therefore:
Peter is a Buddhist.

8 Some boys don't like football.
All piano players are boys.
therefore:
Some piano players don't like football.

9 All women are either singers or criminals (but not both).
All women in jail are criminals.
therefore:
No woman in jail is a singer.

10 All of my Theory of Knowledge students are very tall.
No very tall student can resist giving his teacher large gifts.
therefore:
All of my Theory of Knowledge students will give me large gifts.

More about deductive logic – truth and validity

You have probably noticed that so far we have been focusing on how to determine the **validity** of the reasoning used in deduction. We need to make a vital distinction in what we are doing, however, because just because an argument is valid does *not* mean that the conclusion is certain. There are two requirements for an argument before we can achieve certainty. Consider the following syllogism:

A: All students are lazy.
B: I am a student.
therefore
C: I am lazy.

You can see that this is a perfectly *valid* **logical argument**. If A and B are true, then C must be true. However, the conclusion is obviously dubious because at least one of the **premises** of the argument is incorrect. Premise A is patently

false because it is certainly not true that all students are lazy. There are two completely separate issues here – *the truth of the premises themselves* and *the correctness of the method used to draw a conclusion* from the premises (the logical argument). This is an extremely important point. For the conclusion of a logical argument to be true, the logic must be correct *and* the premises must be true. If you want to undermine an argument, therefore, you can try to fault the logic or you can dispute the premises of the argument. We can summarize this in the following table:

		Truth of premises	
		True	False
Validity of logic	Valid	Conclusion must be T	Conclusion may be T or F
	Invalid	Conclusion may be T or F	Conclusion may be T

Notice that if either the logic is invalid *or* one or more of the premises is false, the concluding statement may still be true, but if it is, that is just coincidental, because the truth of that statement will not have been derived through deduction. We saw that with the emperor–dentist–children argument above. Perhaps it is true that no children are afraid of emperors (this seems unlikely!), but we have no way to determine this one way or the other using the argument that was presented.

Exercise 4

A Here are some arguments. Decide whether the premises are true or false, whether the logic is valid or invalid, and hence whether or not the conclusion *must* be true.

1 All Australian cities are in the southern hemisphere.
Sydney is not an Australian city.
therefore:
Sydney is not in the southern hemisphere.

2 All Australian states are in the southern hemisphere.
Queensland is an Australian state.
therefore:
Queensland is in the southern hemisphere.

3 All American states have beaches.
Hawaii is an American state.
therefore:
Hawaii has beaches.

4 All politicians are exceptionally honest people.
I am a politician.
therefore:
I am an exceptionally honest person.

5 Most people in England speak English.
Most people in New Zealand speak English.
therefore:
Most people in China speak English. (What sort of logic is this?)

B Make up an argument for each of the categories in the table above.

The importance of premises

The previous section alerts us to a crucial problem about knowledge – that the validity of the logic is one thing, but the truth of the conclusion is something entirely different. If the truth of the conclusion depends on the truth of the premises, then we need to take a close look at what we use as premises.

Consider, for example, the earlier argument about humans and mortality. We thought that the certainty of that conclusion was obvious, but that conclusion depends on the fact that we accept as true the premises. Premise A claimed that all humans are mortal. We accept this without question, but we should notice that that is an *inductive* conclusion. We know that all humans are mortal because all humans in the past have been mortal. We use those past observations to predict the future – but that is the problem of induction. Does this mean that we have to consider that Premise A is potentially untrue and so cause us to throw out our conclusion? Actually, no. Our faith in Premise A is solid. It may not be 100 per cent certain, but it is pretty close. Over the centuries we have amassed a great deal of observational data and – combined with our scientific understanding of how the human body works and why it cannot function for ever – this gives us a very high degree of confidence in the conclusion. This is, in fact, a good example of one of the ways that induction can be trusted – and it exemplifies why much scientific knowledge is also solid, even though it is largely inductively generated.

Contrast that, however, with the premises of the argument about monkeys and soldiers. We have no problem with the statement that no monkeys are soldiers, for all the same reasons that we have no problem with the statement that all humans are mortal. Still, we are making some assumptions that are not acknowledged in the statement: you have probably seen movies in which monkeys are soldiers – *Planet of the Apes* and *The Wizard of Oz*, to name just two – so in order for the statement to be true for the purposes of our argument, we have to make the assumption that we are talking about real live monkeys, and not any monkeys in fiction. We are also making the assumption that by 'soldier' we mean a literal soldier who wears a uniform and carries a gun in the service of some country's army, rather than a monkey who might be soldiering for his own tribe by defending his territory. These verbal quibbles do not seem to cause that much of a problem, and we are all likely to be comfortable with the statement, but if the argument were about something more important, or something more complicated, such a careless statement might get us into trouble (and we will see that problems of language are not always trivial ones).

A still from *Planet of the Apes*

And what about the statement that all monkeys are smelly? Do we know that for a fact? Perhaps you have encountered monkeys at a zoo and noticed that their cage smelt bad. Was it the monkeys that smelt? Or did the zookeepers simply find it very difficult to keep up with cleaning the enclosure? Perhaps your next-door neighbour had a monkey for a pet, and you had the opportunity to hold the monkey, at which time, you noticed that it smelt bad. Since you were holding the monkey and the smell emanated from its fur and not from the room, you feel confident that that monkey smelt bad. But does that mean that all monkeys smell bad? This is a very small sample of observations on which to base the argument. And what about the vagueness of the language? To count as 'smelly', does a monkey have to smell bad all the time? Or is a monkey smelly if it smells bad only sometimes? Do we think a monkey smells bad because its faeces smell bad? Or does the fur have to smell bad? We will investigate the problem of precise definition of terms in a later section of this chapter, but already you can see that these problems show that the wording of a premise matters when we are constructing an argument – if we want to be able to say that our conclusion is absolutely certain.

There is one more thing to consider about the accuracy of premises, and that is that most of the time when we are making deductions in the real world we are not writing them out as tidy syllogisms or other formal arguments. We simply choose our premises and make assumptions – sometimes without acknowledging what those assumptions are. To make the point here we shall try to apply logic to a set of facts (given in story form) to test the truth of certain conclusions.

Exercise 5

The dangers of crossing the road

The old lady had just finished her shopping and was starting to cross the road when a car sped around the corner. The cyclist, fearing an accident, shouted 'Watch out', and the car driver slammed on the brakes – but it was too late. A collision was unavoidable. Shopping bags were scattered all over the road, but fortunately no one was seriously injured.

The police appeared soon afterwards and interviewed all the relevant witnesses. The lady's poor vision had contributed to the accident and the car had been speeding.

A First, read the above story.

Now look at the statements below.

- If the statement is definitely true (based on *only the information in the story*), mark 'T'.
- If the statement is definitely false (based on *only the information in the story*), mark 'F'.
- If there is not enough information, and you cannot decide, then mark '?'.

There is, however, one catch. Once you have marked a statement, *you should not go back and change any of your earlier answers*. Doing so will invalidate the exercise.

1 There was a car travelling faster than the speed limit.
2 The old lady in the story had been shopping.
3 A vehicle came round the corner just after a lady had stepped off the pavement.

4 The car driver was unable to avoid a collision.
5 The police came to investigate the incident.
6 Although the old lady was struck by the car, she was not seriously injured.
7 Shopping was scattered over the road.
8 The driver slammed on his brakes.
9 The police interviewed the car driver.
10 The old lady had poor eyesight.
11 The car's speeding contributed to the accident.
12 The old lady was riding a bicycle.
13 The cyclist was seriously injured.
14 There was at least one car driver involved in the accident.
15 The lady crossed the road near a corner.

B Now follow the same procedure for the story and set of statements below.

Incident in the store

The old man had just turned off the lights in the store and was preparing to lock up and go home when a youth appeared and demanded money. The owner opened the cash register; the contents were grabbed, and the man ran away. The police were informed immediately.

1 A young man appeared after the lights had been turned off.
2 The old man was preparing to go home.
3 The robber demanded money.
4 Someone opened the cash register.
5 The robber demanded money from the owner.
6 The person who opened the cash register was a man.
7 The cash register contained money, but we are not told how much.
8 The robber did not demand money.
9 After the man grabbed the contents of the cash register, he ran away.
10 The young man appeared after the lights had been turned off.
11 The robber was a man.
12 The owner was a man.
13 The owner appeared and demanded money.
14 The man ran away after he had demanded money.

C Go back and look again. The majority of your answers should be '?'. What do you learn from these stories?

D Make up a situation, like the two stories above, where the reader naturally makes all sorts of assumptions.

In the cases above, few people manage to follow the instructions remotely accurately. You should discuss these stories and see exactly what you assumed (these assumptions were the premises you used in order to deduce your answers!) and why the stories are so easy to misinterpret. As a matter of fact, it seems that humans find it very difficult indeed to make deductions strictly on the basis of evidence. Instead, we seem to tell ourselves a story, to make assumptions and to embroider events according to our own personal prejudices. The full picture here will have to wait until Chapter 15 when we discuss paradigms and culture; for now we should note merely that strictly accurate deduction is very difficult to achieve.

Logic in the real world: arguments, axioms and assumptions

Those two exercises with the stories might not seem to be too realistic, but they do reveal how we use reasoning in the real world. For example, consider the following, very familiar, example:

- If inflation is allowed to continue, the unions will demand a steep rise in wages. And that is what is going to happen, because inflation is going to be allowed to continue.

To see if this is a valid logical argument, we can rewrite it as:

Premise 1: Inflation will imply wage rises.
Premise 2: There will be inflation.
Conclusion: There will be wage rises.

Hopefully, you can now see that this is a valid argument. That is, if the premises are true then the conclusion will also be true. In this case, however, we can't really be sure about the truth of the premises, although an economist might be inclined to agree with the first one in general terms. It is important to recognize the arguments inherent in this kind of statement, because we get them all the time in the news media. Often the people making the statements may be unaware of the implications of what they are saying; sometimes these statements are made in just such a way as to disguise the problems in the claims. If you are to be a truly well-informed citizen, you need to be able to spot the problems of logic and the dodgy premises!

Exercise 6

A Evaluate the logic in the following arguments.

1. The alternatives seem to be that either the US government weakens its NATO commitment by withdrawing troops from Europe or that it meets increasing criticism at home for the enormous funds spent in maintaining these troops abroad. The government will never weaken its NATO commitment, so we can expect criticism to increase.
2. The streets are no safer today than they were five years ago, yet if the Crime Control Act was effective we would expect the streets to be safer. Hence the act was not effective.
3. Granted, if there were no problems on Earth, humankind should explore the moon. But there are plenty of problems on Earth, so we should not be spending money to explore the moon.
4. Maybe the President did accept bribes from business interests to pass certain laws. On the other hand, these might be vicious rumours spread by his political enemies. This I cannot believe, so I conclude that the President did accept the bribes.
5. By 2018, either we will institute far-reaching procedures to recycle our waste, or by then we will have to find room for 900 million tonnes of waste paper, plastic and other junk produced by our affluent society. However, we believe that somehow such room will be found. Hence there will be no need for large-scale recycling.

6 If the French tend to eat, drink and smoke more than people in other European countries then we might expect their life expectancy to be lower than people in, say, Great Britain or Italy, and this is exactly what we find. French men live for an average of 70.1 years and French women for 83.2 years, as opposed to the European male average of 72.5 years and the female average of 85 years. Hence the French must eat, drink and smoke too much.

B Now that you have had a look at the sorts of problems we encounter in 'real-world' logic, we can try something a little more involved. In Questions 7–10 below, all the arguments are valid; they are good deductive logic. But they arrive at opposite conclusions. Examine each one and decide which argument in each pair you find most compelling and why.

7 • Welfare systems discourage people from working. Having lots of people unemployed is bad for the economy. Therefore, if we want a healthy economy we should look for ways to abandon the welfare system.
• The more very poor people you have in a generally rich country, the higher the crime rate. A high level of welfare stops people from being very poor, so to keep crime low we should maintain this high level of welfare.

8 • Minorities suffer from increasing racism in a certain country. An increase of foreigners will lead, in practice, to more people suffering from racism. Therefore existing minorities are actually helped by tough immigration laws.
• Minorities suffer from increasing racism in a certain country. An increase of foreigners will, over time, lead to greater acceptance of all minorities. Therefore existing minorities are disadvantaged by tough immigration laws.

9 • Killing someone, unless in self-defence, is wrong. Abortion kills unborn babies. Therefore abortion is wrong.
• What happens to a person's body is ultimately their decision. To prevent a person deciding about their own body is wrong. Having an abortion involves a woman deciding about her body, so to prevent her doing that would be wrong. Hence preventing abortion is wrong.

10 • A race that places itself above all others is despicable. Humans place themselves above all other animals. Therefore humans are despicable.
• A race that did not place itself above all others would not have survived for very long. Hence placing one's race above all others is a natural survival trait. Hence it is perfectly acceptable to place one's race above all others.

Questions 7–10 reinforce the crucial distinction between validity and truth. In particular, it is interesting to see that logic is of no help in choosing between arguments. This is perhaps rather surprising, especially since we were hoping to use reason as a tool in our search for truth and certainty. It seems not to be living up to our initial hopes.

C Our final set of arguments illustrates once more the problem of choosing correct premises. In each of the following arguments, there is an unstated assumption required to make the argument valid. Identify that assumption.

11 Property prices are bound to drop soon since they have been rising for a long time now.

12 It must be a good school – the fees are so high.

13 I'm not doing maths homework today because I need to work on my history.

14 Female office workers work just as hard as male office workers and are just as productive. Therefore female office workers doing the same job as men should receive the same pay.
15 Marijuana should be legalized because it is no more dangerous than alcohol, and less dangerous than tobacco, both of which are already legal.
16 Marijuana should not be legalized because it leads to the use of harder drugs such as heroin.

A little more about being careful in arguments: definitions

You may have participated in, or listened to, an argument which seems to go round and round in circles, with neither side able to progress towards a conclusion. This is sometimes inevitable – agreement on certain topics may never happen. But sometimes arguments are particularly frustrating because one or both sides seem unable to hear what the other side is saying. This can sometimes be due to problems relating to the language we use and, in particular, to problems relating to *meaning* and *definition*. (In Chapter 17 we shall see that meaning is a very complex and subtle concept; for now we take it at face value).

You have already seen that if we attempt to define terms such as 'art' or 'life' or 'science', then what initially seemed obvious quickly becomes fraught with confusion and ambiguity. It's not so much that we don't know what we mean when we use these terms, but pinning them down precisely can be difficult, and often other people will hold to slightly different definitions.

Even if we pick a very precisely defined word, we can see that difficulties arise. A 'bachelor' is defined as an adult human male who has never been married. It seems clear enough, but now ask yourself if these people are bachelors:

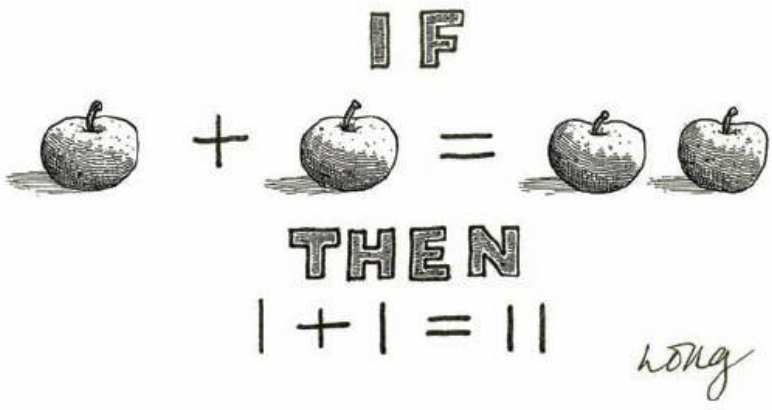
- Ahmed is 17 years old. He attends school and lives with his parents.
- Bertrand is 17 years old. He left home at 14 to start his own company and is now a millionaire. When not abroad attending business meetings, he lives in his own house and has a playboy lifestyle.
- Charlie and Chris are a same-gender couple who have been together happily for 20 years.
- Diego has been living with Daphne for the last ten years. They have three children. He has never been married, and has no intention of ever getting married.
- Edward is married to a woman who paid him $25,000 so that she could become a citizen of his country. He has met her once, and they have never lived together. They will divorce as soon as it is possible for the woman to retain citizenship. Meanwhile, Edward is seeing other women.
- Father Francis is a Catholic priest.

If you were to argue about any of these, then it would be clear that your argument has nothing to do with the facts of the situation. If I think that Diego is a bachelor but you don't, then there are no new pieces of information that would help solve the problem. It would be fair to characterize our disagreement as being more about the word 'bachelor' than about Diego's status.

This sort of disagreement can happen frequently unless we are careful. Most often it happens when terms are vague or emotionally loaded, but it can

happen with seemingly 'well-defined' terms like 'bachelor'. We might therefore distinguish between two different types of disagreement:

1 **The factual dispute.** If I think that Singapore is south of the equator, and you maintain that it is just north of the equator, then our disagreement is easily resolved by reference to an atlas. We almost certainly agree on the meanings of 'Singapore' and 'equator' and we have a genuine disagreement.
2 **The merely verbal dispute.** This is where the presence of an ambiguous term conceals the fact that there is no real disagreement. Disputes like these are not always easy to spot, but once we recognize them we can usually resolve the problem by clearing up the ambiguity. As shown in the bachelor example, the ambiguity can arise even with words in common use.



Cartoon from www.cartoonstock.com

Notice that it is quite possible for both of these types of dispute to be present in an argument! If two people are arguing about a film with explicit sex/violence in it, then there may be a disagreement of type 2 over the term 'explicit' and/or differences of type 1 about whether or not children should see these films (whatever the meaning of the word 'explicit').

Exercise 7

A What sort of disputes are these? If merely verbal, resolve the dispute by explaining the ambiguity.

1 A: Davide is the best tennis player in the club. His serve is faster than anyone else's.
B: No, Nick is much better! His volleying is amazing.
2 A: I read in their annual report that General Industrial's earnings have increased again this year.
B: No, they haven't. They may say that they have, but they are currently being investigated for false reporting. Their earnings are actually lower.
3 A: National Conglomerate are doing well. Their sales so far this year are 15 per cent up on last year.
B: No, they aren't doing very well. Profits so far this year are 30 per cent lower than they were this time last year.
4 A: Jamila is a great student. Although her assignments are always late, she always asks perceptive and intelligent questions in class.
B: Jamila is one of the worst students I've ever met. Her smart answers in class don't make up for never getting assignments in on time.

5 A: Even though they are several hundred years old, Shakespeare's plays are enormously relevant. Love, death, duty, sacrifice and honour ... these themes are as important today as they were when the plays were written.
B: I don't agree. What does Shakespeare have to say about overpopulation, environmental degradation and unemployment? Nothing. His plays are irrelevant today.

6 A: Amira finally got rid of that old computer of hers and bought herself a new one. She uses a Mac now.
B: No, Amira didn't buy herself a new computer. That Mac is a good three years old.

7 A: Jia-Wei finally got rid of that old computer of his and bought himself a new one. He's using a Mac now.
B: No, Jia-Wei didn't buy himself a new computer. It's his roommate's new Mac that he's using.

8 A: George lives a long way from here. I walked out to see him the other day, and it took me nearly two hours to get there.
B: No, he doesn't live such a long way from campus. I drove over there and we reached his place in less than ten minutes.

9 A: It was in very bad taste to serve roast pork at the banquet. There were Muslims present, and it is against their religion to eat pork.
B: Bad taste! No way! That was the tastiest meal I've had in a long time. Lovely!

10 A: Our daughter is a wonderful mother to our grandchildren. She lets them want for nothing; they have a beautiful home, wonderful toys and are sent to a fantastic school.
B: I don't think she is a good mother at all. She is so busy working that her children hardly know her. They know their childminders better; she is just someone who pays the bills.

11 A: A tree falling in a wilderness with nobody around to hear will produce no sound. There can be no auditory sensation unless someone actually senses it.
B: No, whether anyone is there to hear it or not, the crash of a falling tree will set up vibrations in the air and will therefore produce a sound in any event.

12 A: Mr Zebedee is a real Christian. He's such a nice guy and is always helping out in community projects.
B: I wouldn't call Zebedee a Christian. He only goes to church at Christmas.

13 A: Don't ask your wife about it. You should use your own judgement.
B: I will use my own judgement, and in my judgement, I should ask my wife.

14 A: Pablo committed the murder of his own free will. Nobody told him, made him, or even suggested to him that he should do it. It was his own freely made decision.
B: That is impossible. Either it was something in his nature that made him do it, or something in the environment, or maybe some combination. And Pablo is not responsible for his own nature (that's his parents' genes) nor his environment (that's society). So he has no free will.

15 A: Professor Dogsbreath is one of the most productive scholars here. He has written more than any other staff member.
B: He's not productive! He may have written a lot, but none of it is original or interesting. He is actually completely unproductive.

16 A: Unemployment here is only 1 million according to government statistics.
B: Oh no, there are far more people unemployed! The President's Economic Report states that there are 35 million employed in this country, and the Census Bureau reports a total population of over 55 million. So the government's figures reveal that there are over 20 million unemployed persons in this country.

17 A: That man just broke the law by driving like that.
B: No, he didn't – that was perfectly legal.

B From the local newspaper, identify three disagreements in current political or social controversy that exhibit the features described in this section.

Errors of formal reasoning: fallacies

So far we have looked at formal reasoning, and the rules for getting an argument right, but we have also seen that in practice it is often very difficult to comply with those rules, and so we end up with invalid arguments. Invalid arguments, in this context, are said to be 'fallacious', and there are many, many **fallacies** – that is, there are many ways to go wrong.

13 Examine each fallacy listed below, and explain the principle behind each one; particularly, how it seeks to persuade without being really good evidence for the truth of what is suggested.

Ad misericordiam

- We hope you'll accept our recommendations. We spent the last 12 weeks working extra time on them and we are quite exhausted.
- Please give me a good assessment – my parents will be furious if you don't!
- You *always* win these arguments we have. Can't you let me win just this once?

Ad hominem

- You may argue that God doesn't exist, but that's just because you are so bigoted.
- Jim's argument about his ex-wife should be ignored because he is very bitter towards her.
- You claim that Tim is innocent, but why should we listen to you? You are a criminal, too.

Hasty generalization

- Fred the Australian stole my wallet. All Australians are thieves.
- Six of my friends like the new school uniform – it will be really popular.
- All the newborn babies I've seen are so cute! Our child is going to be absolutely adorable!

Appeal to authority

- One of the world's top economists states that interest rates will fall soon, so it must be true.
- The Prime Minister says that traditional educational methods are in dire need of reform and he must know what he is talking about as he did make it to be prime minister.
- It must be true – our Theory of Knowledge teacher says so!

Unpalatable consequences

- Evolution cannot be true because, if it were, then we would be no better than the apes.
- You must believe in God, otherwise life would have no meaning.
- I don't believe a nuclear war will happen because I could never sleep at night if I did.

Loaded language

- Clear thinkers will agree with me that we should have another free vote on abortion.
- The Minister *claims* that the new tax rate will benefit the poor.
- The proposal is likely to be resisted by the bureaucrats in the Government.

Appeal to common practice

- Some people say that cheating in tests is wrong, but everyone does it, so it's OK.
- Political corruption is just a way of life; there's no point in complaining.
- You shouldn't pick on me for not doing my homework when others haven't done it either.

Straw man

- I can't understand anyone wanting to cut military expenditure. Why would anyone want to leave our country defenceless?
- Evolutionists say that life came about by chance – how ridiculous!
- To be anti-abortion is wrong since pro-lifers believe a woman should bring her foetus to term even if it means she dies in the process.

False dilemma

- Either you're for me or against me.
- America: love it or leave it.
- Either we cut welfare benefits or we raise income tax: that is the choice we face.

Ad ignorantiam

- You can't explain where God is, so God doesn't exist.
- Scientists have not proven that global warming will occur, so let's not worry about it.
- God must exist because it is impossible to prove that he doesn't.

Ad bacculam

- You had better agree that the new policy is a good one if you expect to keep your job.
- The defendant is innocent because, if he isn't, there will be a very violent riot.
- If you don't turn to religion you will face eternal damnation.

Contradiction in terms

- There are no absolutely true statements.
- It is impossible for written words to communicate anything.
- I do not exist.

Begging the question, or circular arguments

- Whatever is denser than water will sink, because such objects cannot float.
- God exists because the Bible says that he does; and the Bible is God's own truth.
- The stock market fell yesterday due to profit-taking by investors.

False cause, or *post hoc ergo propter hoc*

- Smokers get bad grades; to improve yours you had better give up!
- College-educated people earn more money than those who haven't been to college; if I want to earn a lot of money I had better get a good education!
- Both times I have had a car accident I was wearing that shirt. I'll never wear it again.

14 Find some examples of fallacies in everyday conversation and in the editorials and adverts of newspapers.

15 Many of these fallacies are not entirely distinct; if you are interested in seeing some relationships between them, and indeed a whole host of other material and explanations on fallacies, see http://tinyurl.com/363t89 and related pages.

It's worth pointing out that just because an argument is fallacious, it doesn't mean there is no good reason for action ('reason' in this context being a motivation, and a cause, rather than 'reasoning' as a process of coming to a conclusion), or indeed that a statement is untrue. In the first example above under the *ad bacculam* fallacy, this may be a very good reason to agree with the new policy (you probably don't want to lose your job); or you may agree

with it anyway because it is in fact an excellent policy! The point is simply that the argument as given gives you *no reason to believe* it is an excellent policy, even if it might persuade you to agree with it for other reasons. So it's worth distinguishing between fallacies as a tool for persuasion and fallacies as logical errors.

You do not need to memorize the list on pages 147–49, but if you can begin to recognize the fallacies in other people's speech and writing, you will be able to spot problems in their reasoning. We saw that the Venn diagrams offered us one way to check the validity of logic; the formal fallacies give us another approach.

Vertical and lateral thinking

We have seen that valid logic allows us to construct a chain of reasoning that can extend our knowledge. In some cases, notably mathematics and science, logic allows us to construct incredibly long and complex chains of reasoning. These chains can bring surprising results from 'obvious' premises and the deduction of new knowledge. So the role of logic in deriving knowledge is clear. We are aware of the problems that we may encounter (they are largely the subject of this chapter) but, even so, we can use the methods of logic in a straightforward way. Or can we?

Sometimes logic does not help us find what we want to know, and there are many puzzles which make entertaining use of this fact. Try this problem: a man went to a party and drank some of the punch. He then left early. Everyone else at the party who drank the punch subsequently died of poisoning. Why did the man not die? (He did not put the poison in the punch himself!)

It is interesting that the answer to this problem is 'logical' (in the everyday use of the term) and yet quite difficult to see. There are no random or bizarre events going on – this is a straightforward application of reasoning. So why is it difficult? Why is the solution far from obvious? (The poison in the punch came from the ice cubes, so when the man drank the punch the ice was fully frozen, but gradually it melted, poisoning the punch.)

16 Think of some other problems where the solution seemed very difficult, but was 'obvious' once you knew it.

17 Explain why a solution can be both difficult and obvious.

18 Explain this: a man walks into a bar and asks the barman for a glass of water. The barman pulls out a gun and points it at the man. The man says 'thank you' and walks out.

There is a useful metaphor here, which was put forward by the writer Edward de Bono. He described logic as the tool that is used to dig holes deeper and bigger, but he pointed out that '*You cannot dig a hole in a different place by digging the same hole deeper*'. He argues that sometimes logic simply isn't enough and you need to think again – that is, you need to dig your hole elsewhere. This process of digging elsewhere, of abandoning the familiar and 'obvious' ways of thinking, has been called 'lateral thinking' (a term invented by de Bono in 1967).

Lateral thinking describes a way of thinking that is supposed to be less constrained and more creative than 'normal' logical thinking. However, we have already looked at 'normal' logical thinking in enough detail to understand that lateral thinking may not be so completely different after all.

The concept of lateral thinking is a useful way of alerting us to all the things that we assume without realizing that we have assumed them. In this respect, it is a crucial part of any form of critical analysis. But this also means that there is not much else that can be said – if there was a formula or a sure-fire method for identifying hidden assumptions then they would not be so hidden, and lateral thinking would be less lateral and more straightforward!

19 What are the problems associated with 'hidden assumptions' in regular thinking? Why do we make these assumptions?
20 Would it usually be desirable to make no assumptions at all?
21 How does lateral thinking fit into this way of analysing the issue?

No guarantee of certainty

We started the chapter with what has been seen as a very attractive idea: the possibility of certainty (and perhaps even truth) in the form of deductive logic. This logical approach is one that has been adopted (sometimes implicitly) in many areas of human endeavour, and with apparently great success in many of them. But as the chapter progressed and we moved from the clean application of logical principles in the abstract to real-life examples, we saw that there are some profound problems with logical analysis and that it may not be as powerful a tool as we had hoped.

It is important to remember that, as we saw with mathematics, the *potential* for certainty is not a *guarantee* of certainty. Deductive reasoning *can* result in absolute certainty, but that achievement depends on our ability to get our facts (premises) right, settle on a clear definition of terms and precise formulation of statements, and reason well. These are not easy matters.

We saw in Chapter 6 that some proofs which were once believed to be absolute have been discovered to be flawed, and that as mathematical concepts get more and more complex, and proofs get longer and longer, it will be harder and harder for mathematicians to ensure that their proofs meet the standard of rigour required – that of absolute certainty. Andrew Wiles, after working for seven years on his famous proof, announced it to the world, only to have to retract it because the peer review process uncovered a flaw. This was not because Wiles was careless about his facts or cavalier with his logic; it was because of the difficulty of the task. He had this to say about it:

It was an error in a crucial part of the argument, but it was something so subtle that I'd missed it completely until that point. The error is so abstract that it can't really be described in simple terms. Even explaining it to a mathematician would require the mathematician to spend two or three months studying that part of the manuscript in great detail ('Andrew Wiles').

Most of us do not have to work on problems so complicated that it takes two years to uncover an error and months to explain it to someone else but, nevertheless, we should not take our ability to reason for granted – nor should we just assume that any statement presented to us as a logical argument is, indeed, logical (that is, founded in both true facts and valid reasoning). Error is always possible.

Problems with rationalism

We have seen how difficult it is, in deductive reasoning, to construct premises that are definitely true in order to get conclusions that are absolutely certain. The complexity of trying to make statements which are completely unambiguous – whose language cannot be misinterpreted or argued about – and which are unequivocally accurate could lead to lengthy explanations of statements which would then have to have explanations of their own, with those claims needing further explanation, and so on indefinitely. (We will see in the next chapter how emotion helps us to temper this problem of reasoning indefinitely, but for now, just try to imagine the difficulty and the length of time it would take to develop a perfectly logical argument.) Think of the smelly monkey example: how much effort would have to be expended in order to define, clarify and constrain the premises so that we could ultimately assert that our conclusion was, indeed, absolutely certain?

Faith in the power of logic to provide absolute certainty is a recurring theme in a great deal of modern thinking, and it's interesting to see why some thinkers claim that we need to rethink the uses of reason, and in particular to temper the hard-nosed approach of logic. Michael Oakeshott, a conservative professor of political science at the London School of Economics, for example, suggested that devotion to rationalism is dehumanizing. In his view,

Rationalism depends upon a view of morality that is both gnostic and perfectionist in character, a view that at once denies the uncertainty of existence and tries to arrange all of experience into logical, 'rational' categories. It explicitly ignores the pervasiveness of the mystery that pervades human life, arrogantly boasting that it can 'fix' this mystery by constructing a system. To embrace Rationalism is to build a Tower of Babel (Cory 250).

This criticism argues that rationalism promotes a dedication to the philosophy that there is only one correct way to think about things, and that the job of the logician is to formulate that correct way.

Oakeshott sees this as the central epistemological assumption behind modern Rationalism: one can (and should) abandon habit, custom and tradition as ways of knowing, since these are imprecise and uncertain. One should depend only on the sort of knowledge gained through a clearly formulated method of inquiry (Cory 258).

This in turn implies that no individual creativity is required or indeed allowed; such a rigid form of logical enterprise could be done by anyone – perhaps even a machine – so that human ingenuity is devalued.

One further implication of this argument is that logic has traditionally been seen as the academic's way of repairing the cognitive errors of the stupid; a way for 'intellectuals' to get one over on the 'common' man or woman. So logic might be presented (indeed, *has been* presented by some philosophers) as a way to attack common-sense judgements for their superficiality, incoherence and general inadequacy.

Philosopher Stephen Toulmin, former professor at the University of Southern California, in his book, *Return to Reason*, argues for a concept of 'reasonableness' which he bases on the model of the skilled craftsman's 'knack' – the instinctive knowledge that musicians, teachers, engineers and athletes show in their everyday practice (D'Evelyn). Toulmin argues that we recognize that knack is rooted in non-verbal knowledge, and perhaps cannot be reduced to strings of clinically articulated logical arguments, suggesting that the current 'obsession' with logic is a passing fad. He notes that whole civilizations have historically valued reasonableness; he cites, for example, the Chinese sage Chuang-Tzu, who tells of a cook whose dimensionless blade effortlessly and perfectly separates bone from meat. The cook '*tries to use what cannot be measured in an entirely practical way*' (180), and it is this emphasis on the practical that is most important. What is the point of a philosophical system such as rationalism, Toulmin asks, if it cannot effectively guide practice in such a concrete, contingent and complex world?

Toulmin's thesis is quite appealing to some, but others think he has gone too far. Against Toulmin we might argue that logic may be abstract, but it is the very abstraction that means it is useful, because it means that one generalization can be used to guide us in many different circumstances. Logic is like science in this respect – we seek general principles to guide us, and while we recognize that the principles are, strictly speaking, wrong (because they are idealized abstractions from our experiences), they are nevertheless very useful.

These criticisms of logical analysis have in some cases come from philosophers who argue that if we want to understand how knowledge is made and judgements are justified, then armchair thinking is not enough. They claim it needs to be complemented by a willingness to take a close look at how people in their various activities actually do such things, quite efficiently and to their general satisfaction. And it is certainly true that extremely skilled people like engineers, nurses, cooks, drivers, surgeons, and in

fact most people, are not very much interested in metaphysical concepts such as reason, logic, induction and validity. Thomas D'Evelyn sums up Toulmin's perspective rather strongly: '*research universities may resemble madhouses, each researcher locked in his dream of reason, incapable of addressing the needs of others or of society at large.*'

22 Are these concepts of 'knack' or 'reasonableness' useful? Are there things that you know that cannot be described logically?

23 Is Toulmin right that logic cannot 'adequately instruct … how to sail this particular boat, fire this particular cannon, or roast this particular chicken'?

24 Tim Sprod has suggested that we are faced with two alternatives:
- rationality is something like deductive logic + inductive logic + informal logic and, as emotional humans, we are never completely rational in our decisions
- we need to expand the notion of rationality (and maybe like Toulmin call it reasonableness) to embrace all those ways in which humans use their mental capacities to draw useful or even true conclusions.

Is he right that these are the two options, and if so, what are the advantages and disadvantages of each?

It is easy to see that a devotion to logical reasoning might be carried to a fairly ridiculous extreme, and if that extreme is set up as the goal of thinking, so that we are only satisfied that we know something if we have constructed perfectly logical arguments, then that would seem to discount human flexibility and imagination. Taken to that extreme, logic would not only be ineffective, but might also be seen to be detrimental. Clearly, however, such a cold and calculating way of knowing lacks appeal – and doesn't really seem to match our actual experience with reasoning in the real world. This is perhaps because it is too extreme and is not how discussion and debate work in the real world. As we noted with applied mathematics, we don't need to achieve the ideal of absolute certainty in order to be confident in our reasoning and to get along effectively in the world. If my granny at home has managed to do perfectly well just as she is, ignorant of the kind of technical structures we have been talking about that organize inductive and deductive logic, then she really doesn't need formal logic to inform her thinking or help her make judgements in her life. It does not seem likely, however, that my granny never uses reasoning of any kind, so we need to consider what other kinds of reasoning there are.

Is there more to reasoning than logic?

You have no doubt very often been asked to give your reasons for something – the reason you want to be allowed to travel with your friends to Paris, the reason you want an extension on your TOK essay deadline, the reason you want to join the chess club or the football team, – and on and on. The fact that we use the word 'reason' when we ask for and give justifications suggests that there is something rational about our desires and intentions, but it is unlikely that you formulate in your own mind anything like a syllogism to explain why you like the poetry of Jorge Luis Borges better than the poetry of T.S. Eliot; and when we talk about 'reasoning' we often mean the informal, ongoing daily type rather than the formal type we have been focusing on so far.

Exercise 8

This is an exercise designed to highlight informal and formal reasoning processes.

1 You have four cards shown below, and each card has a number on one side and a letter on the other side. Someone tells you that they think that if there is a G on one side then there is a 2 on the other. Which cards do you need to turn over to see if they obey this rule?

2 You go into a cinema complex which is showing two movies; one 'G' rated, and one 'R' rated. Anyone can watch a G-rated movie, but only those 18 years old and over can see the R-rated movie. To see if anyone is breaking the rules, who would you check?

This is a well-known pair of problems, because people tend to find the first one quite difficult (do check your answer with someone) and the second one is very easy; even though, *from a formal logical point of view, these are identical problems*. This means that both problems are the same in logical structure (to see this clearly, note the mapping G ↔ G-rated, R ↔ R-rated, 25 ↔ 2 and 14 ↔ 1). The difference in difficulty between these two cases tells us quite categorically that we do not always think in formal terms, and that our informal reasoning processes can be very quick and highly reliable is some situations, but fairly stumped in others.

So why is there a difference? Well, we know how to reason because the human brain has evolved for it; there is a region of the brain – the prefrontal cortex – which is the reasoning centre, and it exists and functions in all healthy humans. The process of evolution has shaped it so that it can operate effectively and fairly automatically in common situations (like the second example above); but using formal logic (like the first example above) is a relatively modern development, which piggybacks on the informal process, and the brain can do it, but it's harder, and certainly slower. So our ability to reason is built-in biologically – it's innate, and it develops over time, whether we study formal logic or not. This is why my granny can reason without formal schooling.

Of course modern formal reasoning in science and maths has brought us many wonders, but nevertheless much of our personal use of day-to-day reasoning is probably more like Toulmin's idea of 'reasonableness' than it is like formal logic. Through experience and practice, we develop a knack for understanding what is or is not reasonable in a given context. You know, without having to work through a formal structure, that it would not be reasonable to expect your best friend to do all of your chores for you every day

without recompense, or to ignore traffic signals and run through every red light you come to. You also know, without having to formulate carefully controlled syllogisms, that it is reasonable to expect the police or an ambulance to respond when you dial the emergency number, and that it is also reasonable to be honest with your parents and your friends.

Notice, finally, that this informal reasoning is not going to give us certainty. What you consider reasonable might vary a great deal from what others consider to be reasonable, because our sense of what is reasonable depends greatly on what we value, which itself is influenced by culture, personality and experience. You may think that it is unreasonable to buy a new car every two years because you are concerned about the impact on the environment, the waste of limited resources and the unnecessary expense. Someone else might think it is perfectly reasonable, because the newer the car, the more advanced the technology, the better the safety features and the more efficient the fuel usage. Go back to the list of disagreements on pages 145–47: how many of them boil down to a difference of opinion about what is reasonable?

This sounds, once again, like inductive reasoning, and so it would seem we depend on induction for much of our ability to recognize and to give good reasons for things. Because of the problem of induction, our understanding of what is reasonable is always going to be open to reinterpretation or to revision depending on circumstances; thus, this kind of reasoning cannot be taken to the kind of extreme that Oakeshott and Toulmin worried about. We must always keep our human understanding, emotions, flexibility and creativity in play if we are to make this kind of reasonable decisions and if we aim to behave reasonably.

25 Is there a clear distinction between logical reasoning and 'everyday' 'common' thinking? If so, is one superior to the other? Justify your response.

26 Is the philosophical study of reason, as, for example, we have seen in this chapter, rather a pointless, ivory-towers exercise, or might it in any way inform your everyday thinking?

27 Do you think it would be a good thing for everyone to understand the ideas that we have looked at in this chapter?

Errors of informal reasoning: cognitive biases

The idea that we can reason informally and automatically without recourse to syllogisms is a relief; and we could not function any other way. Certainly when we were evolving, hunting and maybe being hunted, the ability to make judgements rapidly and accurately would have been highly advantageous. (The early human who stopped to make a syllogism about a rapidly approaching predator would not have survived to leave any descendants!) So most of the time, the process seems to work, but you will not be surprised to find that, like formal reasoning, informal reasoning has its problems. Here are two simple questions to illustrate the idea:

28 A bat and a ball together cost $1.10. The bat is $1.00 more than the ball. Quick – how much is the ball?

29 Which is more common in English, four-letter words with 'R' in the first or the third place?

- R _ _ _ (e.g. ring, reef, real)
- _ _ R_ (e.g. fork, park, sure)

For the first problem, most people have a gut reaction that the ball is $0.10; but if you stop and think, you'll see that cannot be right. In the second case, most people say that 'R' in the first place is the more common – whereas in fact there are far more words with 'R' in the third place. Now these are more than simple errors, because they indicate patterns of cognition that we can learn a lot from. So why do most people make these errors?

First, note that the errors come quickly, without conscious thought. To answer quickly, the unconscious mind does not work by a careful, formal examination (that's the formal way of doing things), but rather by using shortcuts, which psychologists call **heuristics**. In this case, it has been argued (Kahneman) that the mind uses what is called the **availability heuristic** – that is, the unconscious mind does not stop and ponder, it merely uses whatever data is available to hand. In the first case, we have available the sums of $1.10 and $1.00, and we are clearly looking for something much smaller than a dollar … so why not subtract? In the second case, it's simply easier to recall things by their first letter than by the third, so it seems there are more of the former, whereas in fact they are simply more available. This availability heuristic, then, allows us to get to an answer quickly – which is often useful, but in cases such as these it does not get us to the right answer.

Consider this further example, again from Kahneman. Groups were asked to imagine they were doctors preparing for the outbreak of an unusual disease, which, untreated, is expected to kill 600 people. There are two alternative programmes to combat the disease, and two groups were required to choose between them. One group was given Scenario 1; another group was given Scenario 2.

30 **Scenario 1**: your choice is between:
- Programme A: '200 people will be saved.'
- Programme B: 'There is a one-third probability that 600 people will be saved, and a two-thirds probability that no people will be saved.'

Which programme will you choose?

31 **Scenario 2**: your choice is between:
- Programme C: '400 people will die.'
- Programme D: 'There is a one-third probability that nobody will die, and a two-third probability that 600 people will die.'

Which programme will you choose?

32 Make a prediction about which options would be most popular in each case. Do you see any issue here?

In the experiment, 72 per cent of participants preferred programme A to B, and 78 per cent preferred programme D to C. What is remarkable is that from a practical perspective, the scenarios are identical, but are simply described ('framed') in different ways! So programme A is identical to C, as saving 200 is the same as 400 dying; similarly for B and D. Thus when the programmes were presented in terms of saving lives, the secure programmes (A/C) were preferred,

but when expected deaths were used to frame the description, participants preferred the gamble (B/D). We should perhaps be worried that in such life-and-death matters, simply the choice of description seems to reverse how we reason about these decisions. Of course by now we know the power of language – but these descriptions are not overtly biased one way or another, so this 'framing effect' is surprising.

33 The risk to women from getting a dangerous blood clot from a contraceptive pill is 1 in 7000. A new pill is introduced and the risk doubles. What will be the effects if doctors talk about:
- **a** a 100 per cent increase in risk
- **b** an increase in risk of 1 in 7000?

The framing effect and the availability heuristic are two examples of **cognitive biases** – which are not just errors, but are predictable *patterns* in our reasoning that are known to deviate from what might be regarded as 'correct' reasoning. Cognitive biases are for informal reasoning what fallacies are for formal reasoning – possible ways to go wrong. There are many such biases and, as with fallacies, they have their own names. Some are very well known – indeed one might argue that much of the scientific method is designed to overcome **confirmation bias**. This does not mean that informal reasoning is terrible – remember, it works most of the time. Rather, these cognitive biases are simply the cost of having an unconscious mind that can take shortcuts in reasoning and come to a decision rapidly and (usually) accurately.

34 Go to this site: http://tinyurl.com/p8eoxp4 and explore three cognitive biases (if you need them – three suggestions are confirmation bias, the overconfidence effect, and the rhyme-as-reason effect). Construct some examples to explain these biases to a classmate.

35 Compare the list of cognitive biases with the list of fallacies. You will see that there are significant similarities. What does this tell you about the links between formal and informal reasoning?

36 It is easy to point out the problems with these biases. But what are the advantages to these cognitive biases?

Reason and shared knowledge

We saw in Chapter 6 how much maths relies on deductive logic, and we also saw that the standard for pure mathematics, which is abstract and which can deal in imagined constructs rather than physical realities, is absolute certainty. Deduction is also used in the natural and human sciences for such processes as analysing data and determining the significance of findings. In the sciences, though, unlike in mathematics, we are less concerned with the ability to determine something absolutely. Since the premises of any scientific argument have almost certainly (!) come from observations over time, they are inductive, and we are not, therefore, likely to be able to construct premises which are themselves absolutely certain. This is a significant difference from mathematics, which works from axioms and theorems which are absolutely certain.

Other areas of knowledge rely more heavily on inductive and procedural reasoning for their findings. The historian, for example, uses reason to determine how best to interpret the information and artefacts that she is using to try to understand a particular time, place or event from the past. Her determination of the function of a particular object, for example, will depend, in part, on her past experience with other, similar knowledge, ideas that other people have generated about the culture under study, whether her ideas cohere with what any records from that time and place say, and so on. Consider this example of an historian trying to understand Abraham Lincoln's attitude toward race relations:

In the second document, Lincoln's rebuttal of Douglas, Lincoln states that he has 'no purpose to introduce political and social equality' between the races. At this point Alston paused: 'Just rereading the sentence again. Again trying to think about how Douglas' statement about Lincoln thinking the two were equal could have some truth if it falls outside the realm of what Lincoln identifies as political and social equality.' Seven lines later, Alston stopped again: 'I'm going back and rereading the sentence. These 19th-century orators spoke in more complicated sentences. They weren't used to sound bites. I'm wondering what he means by 'physical difference' (Wineburg 15).

The historian, Alston, is working with the documents, withholding judgement, trying to figure out what is reasonable, based on the information that he has in front of him. Formal deduction is not likely to be useful in developing this kind of knowledge, but a process of considering 'if this, then this' is. The same kind of reasonable thinking is used in other areas of knowledge such as ethics, the arts, and religion.

Exercise 9

What kind of reasoning might professional practitioners use to solve each of the following problems?

1. A mathematician wants to prove that there is an infinite number of prime numbers.
2. An entomologist wants to determine what triggers the emergence of the periodical cicadas every 17 years.
3. An historian wants to understand the significance of a stone plinth in an ancient culture.
4. A psychologist wants to know the likelihood of children whose parents have divorced later getting divorced themselves.
5. An economist wants to predict the performance of a particular stock on the stock market over the next three months.
6. An art critic wants to interpret the significance of the animals in Picasso's painting *Guernica*.
7. A government employee wants to determine whether revealing state secrets is the right thing to do or not.
8. A student wants to determine whether she should tell the teacher that her best friend cheated on the test.

37 Could we get by without abstract theories to guide us?
38 Toulmin writes that mathematical proofs 'have no direct contact with the World of Real Things', and that abstract theories that apply always and everywhere 'hold good nowhere-in-particular'. Is he right?

Where have we been? Where are we going?

We turned to rationalism hoping to generalize the mathematical method. Did we succeed? Well, only partly. We have seen that it is often possible to construct compelling formal arguments, but only when we are certain about the starting points, or premises, and that this certainty is difficult to find for a number of reasons, not least the problems of meaning in the words we use. We have noted, though, that for most purposes, the kind of absolute certainty that is possible through deduction, however difficult to realize, is not necessary for our everyday work. We can use deduction personally and in the maths and sciences, for example, to draw conclusions about which we can be confident enough to achieve the things we want to achieve in modern society. The ideal of absolute certainty is fine, but it is rarely practical, and it is not necessary for functional knowledge. Perhaps this reflects a difference between psychological certainty and philosophical certainly; the former being a step towards the (unreachable?) latter.

(We should also mention that we have not really inquired too closely into exactly *why* a valid argument is compelling – this would take us a little too far afield and into the specialist area of logic.)

We have seen, however, that formal deduction is not the only kind of reasoning, and that we rely on induction and informal reasoning in a wide variety of situations for both personal and shared knowledge. We also rely on a kind of procedural knowledge that comes from our experience and which gives us the ability to determine what constitutes a reasonable conclusion, interpretation or action.

In the introduction to this chapter, we asked if using the approach of rationalism was 'correct'. We have seen that it has its strengths and weaknesses, but we will leave a full answer to that question until we have considered the concept of paradigms in Chapter 15, by which time we will be in a better position to see the complete picture.

In dealing with the abstract and perhaps remote worlds of maths and logic, it may have emerged that we cannot, as humans, really study these without recourse to the non-rational side of our minds, and just as we turned to the arts to balance the natural sciences, so we can now turn to the emotions to see what they can add to our search for reliable knowledge.

Further reading

- ★ For further exploration of these ideas, see this profound and hilarious video: http://tinyurl.com/mhoxmt; the discussions below the video also raise some interesting points.
- ★ The best introduction to informal fallacies that we have come across is *Bad Thoughts* (Corvo, 2003) by Jamie Whyte – delightfully readable and based in interesting and current examples.

- Daniel Kahneman's *Thinking Fast and Slow* is a fairly tough but readable and excellent overview of cognitive biases.
- A sparkling, accessible but at the same time profound approach to reasoning and the possibility of paradox can be found in Raymond Smullyan's brilliant *What is the Name of this Book?* (Prentice Hall, 1978); informative though probably overrated is Edward de Bono's classic *Lateral Thinking* (Ward Lock Education, 1970).
- More analytic approaches to the use of reason in general can be found in A.J. Ayer's *The Problem of Knowledge* (Open University Press, 1956) and Bertrand Russell's *The Problems of Philosophy* (Arc Manor, 2008).
- There are quite a few books around that question the whole nature of the rationalist project; they are generally difficult, but we would recommend two of Michael Oakeshott's essays – 'The Tower of Babel' and 'The Voice of Poetry in the Conversation of Mankind', both of which can be found in *Rationalism in Politics and Other Essays* (Methuen, 1962).
- Also recommended is Julian Baggini's 'Philosophy as Judgement' in *What Philosophy Is*, ed. H. Carel and D. Gamez (Continuum Press, 2004).
- Stephen Toulmin's *Return to Reason* (Harvard University Press, 2001) is a call for abandoning the rational project and broadening our conception of rationalism; and for a superb case study of such a conception in the medical profession we recommend *Complications* by Atul Gawande (Profile Books, 2003) – it is a magnificent set of reflections on the role of reason in medicine.

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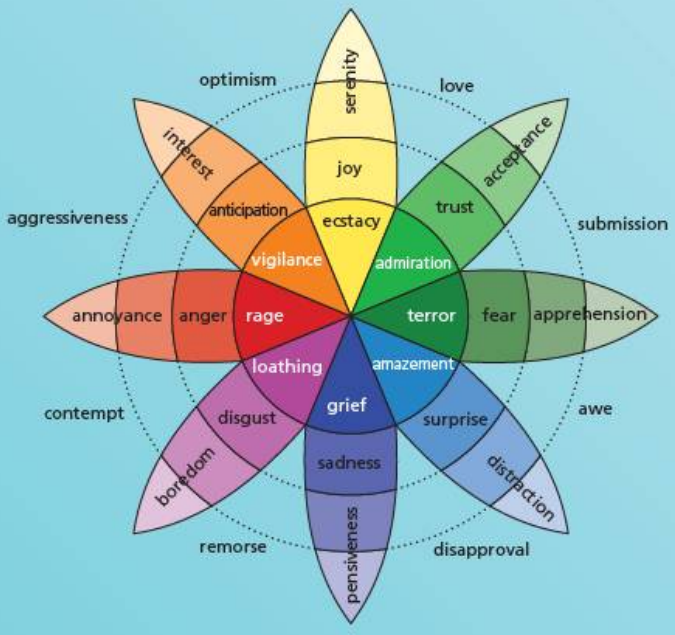
8 Emotion



I hate to lose more than I like to win.

Jimmy Connors

Reason's last step is recognising that an infinity of things surpass it.

Blaise Pascal

To understand via the heart is not to understand.

Michel Eyquem de Montaigne

The mind leads, the emotions follow.

Ayn Rand

People who are sensible about love are not capable of it.

Douglas Yates

Feelings are not supposed to be logical. Dangerous is the man who has rationalised his emotions.

David Borenstein

Anger is never without a reason, but seldom a good one.

Benjamin Franklin

The heart has its reasons whereof Reason knows nothing.

Blaise Pascal

Love is the only way to grasp another human being in the innermost core of his personality.

Victor Frankl

Some states of feeling can and others cannot survive an honest scrutiny.

J.L. Mackie

Reason is, and ought only to be the slave of the passions, and can never pretend to any other office than to serve and obey them.

David Hume

Depend on it Sir, when a man knows he is to be hanged in a fortnight, it concentrates his mind wonderfully.

Samuel Johnson

No one is truly literate who cannot read his own heart.

Eric Hoffer

People think love is an emotion. Love is good sense.

Ken Kesey

If you can once engage people's pride, love, pity, ambition (or whatever is their prevailing passion) on your side, you need not fear what their reason can do against you.

Lord Chesterfield

Aims

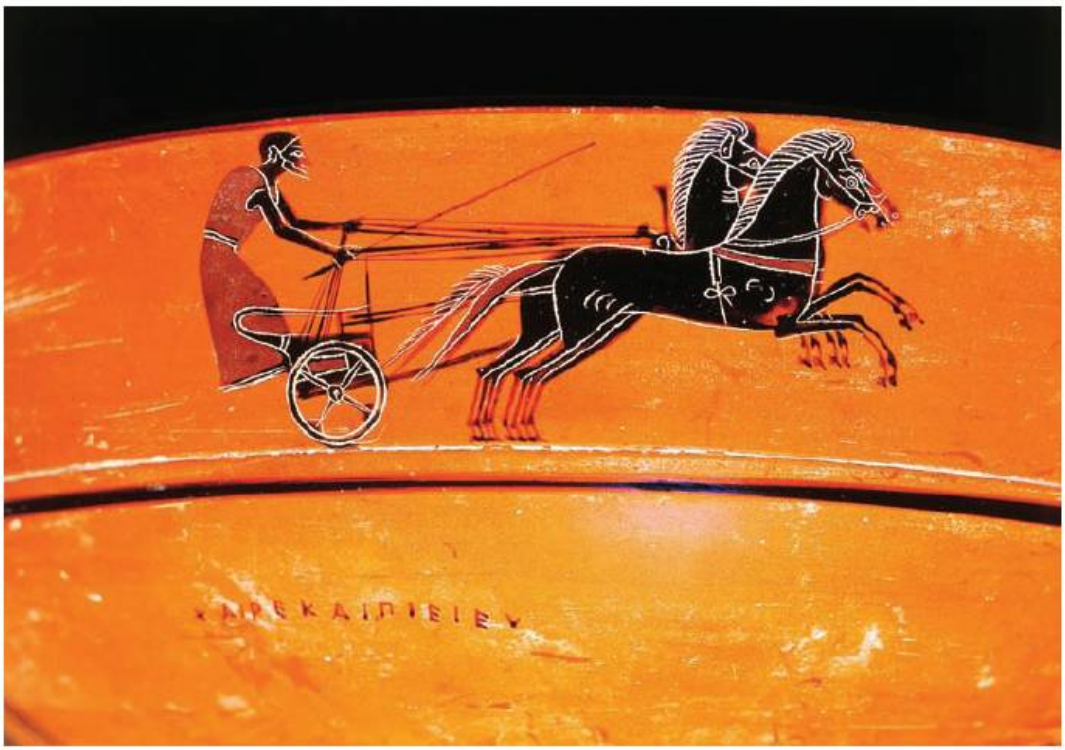
By the end of this chapter you should:

- be able to offer various ways of defining and characterizing emotions, moods and feelings
- be able to discuss the relationships between emotions and physical signs of emotions
- be able to comment on both traditional and modern views of the interplay between emotion and reason
- understand the role of qualia in our emotional experiences
- understand why our emotions are not 'raw' but products of our engagement with the world.

Introduction

Our everyday decisions are often based largely in the emotions: we eat food because we enjoy the taste or dislike hunger; we avoid arguments because they upset us; we have friends because they make us feel good; we attempt to achieve a good Diploma score because of our pride (or, perhaps, not). So our immediate experiences are thick with emotions; we cannot get away from them even, as we saw in the previous chapter, when we look at reasoning, which appears to be totally a domain of the intellect. And in fact it is quite comforting to see that the rather abstract ideas of rationalism can be tempered, perhaps humanized, by integrating them with the messier but more vital emotional side of our lives.

There has been a philosophical tradition of separating feelings and emotions from other aspects of human life, especially reasoning, and this has usually downplayed the role of emotions. In Plato's metaphor, the charioteer represents reason.



■ Reason controlling the passions and appetites?

The two horses represent the passions (or spirit) and the appetites, two driving forces pulling the chariot in different directions and, according to Plato, reason must master and control the passions and the appetites (Lorenz). This model has had lasting influence in the Western world, so that, even today, the common view tends to be that we must overcome our emotions and listen to 'the voice of reason'. We talk about people 'letting their emotions get the better of them', or 'giving in to' our emotions. Anyone operating under today's technological paradigm may even view the emotions as a troublesome remnant from humanity's savage past – they are for small children and stupid adults. Problems are solved by the application of reason, by the appliance of science and by appeal to the 'higher' faculties. Phrases such as 'If only he would stop being so angry and listen to reason' or 'Will you just calm down and stop being so emotional?' are common enough, and they tell us about how we view our feelings and reason.

This negative approach has rubbed off on those areas that deal with this aspect of our 'inner life', especially when they malfunction. In many cultures, emotional unbalance is a source of shame in a way that a broken leg is not – there is a joke, for example, that says neurotics build castles in the sky, psychotics live in them and psychiatrists collect the rent, but few would mock medical doctors in the same way. And so we often do not examine our emotions with the care that they deserve – we merely experience them passively. As a result, we sometimes tend to have stereotypical and perhaps even naïve views of what emotions are, and what role they play in acquiring knowledge.

1 To what extent are emotion and reason separate things?
2 Do you agree that we tend to treat the two as separate things and that emotion is often looked at with suspicion, if not dismissed outright?

Having noted the relatively low status of emotions as vehicles of knowledge (rightly or wrongly), we should remember that we have been looking at human knowledge, and our search for certainty is very much a human search. In our everyday lives we use our emotions as guides all the time, and they are worthy of study. A view of human nature that ignores our emotions is short-sighted – although the title *homo sapiens* (literally, 'wise man') encourages us to do just that. Emotions should form an important part of our search for knowledge, but this is not to say that they should be immune to rational criticism. We will be vigilant for problems of knowledge, but we will not dismiss the emotions. Instead, we shall try to find a place for these complex and difficult things.

To start, let us consider the various emotions that humans have.

Classifying the emotions and feelings

We know that feelings and emotions are particular types of mental states, but this is hardly helpful. If we are to discuss feelings and emotions in a meaningful way, we need to decide how we are going to name and classify the experiences we have, and how we are going to communicate clearly. To start with, what is the difference between a feeling and an emotion and a mood? Rather than refer to a dictionary, let's look at how we actually use the words.

3 Here is a list of some things you can feel. Add some others.

joy	relief	hungry	certainty
love	wonder	happy	tired
sadness	wonderful	helpless	irritated
anxious	grief	hopeful	dizzy
afraid	energetic	merciful	longing
lust	dread	lucky	relaxed
envy	empathy	content	embarrassed
rapture	disgust	pity	surprised
angst	apathy	vulnerable	amused
gratitude	sympathy	guilty	horrified
jealous	sweaty	hatred	excited
confident	cold	sleepy	annoyed
compassion	stupid	anger	proud
awe	ashamed	bored	nervous

4 How many different types of love can you think of? What does this tell you about the list?

5 Psychologist Mihaly Csikszentmihalyi has pinpointed an interesting sensation/emotion, which not everyone has experienced. He calls the effortless physical or intellectual state associated with an exceptionally high level of expertise at a particular task as 'being in flow':

'You yourself are in an ecstatic state to such a point that you feel as though you almost don't exist. I've experienced this time and again ... I have nothing to do with what is happening. I just sit there watching in a state of awe and wonderment. And it just flows out by itself.'

He says that this feeling is common among many, including athletes, composers, surgeons and engineers. Diane Roffe-Steinrotter, an Olympic gold-medallist skier, said that during her performance she 'felt like a waterfall'. Have you ever had such an experience?

6 If you said 'I feel ...' and finished the sentence with a word from the list above, it would make sense. Does that mean that every item in the list is a feeling?

7 It is clear that the feelings above are of several different types. Identify a few types of feeling that are distinct from each other.

8 Can you reorganize the list above into categories of emotions, feeling and moods? What was the basis for your choices?

There are many ways of classifying emotions, but we can quickly identify a few likely categories. The list in Question 3 makes clear that we use the words 'feeling' and 'emotion' in different ways, because the feelings of being hungry, sweaty, dizzy, sleepy and cold are not what we would call emotions in themselves (although we may certainly have an emotional reaction towards, say, hunger). These physical feelings can be separated from the others, which seem more mental in nature, and we will not consider them any further. (Note, however, that the categorization is not without its own problems – where would you put the feelings of relaxation or lust?)

The rest of the items in the list seem likely candidates for emotions, though we might wonder about putting 'certainty' in the same category as 'anger'. Imagine the state of feeling either condition – they seem rather different. Perhaps the same could be said of 'fear' and 'awe'. There are other potential ways for categorizing emotions; here are two common ones:

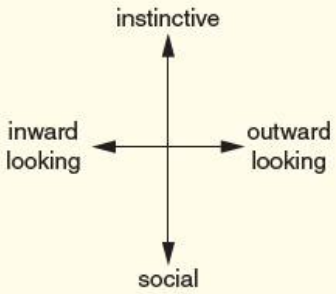
- the instinctive emotions, such as anger or love
- the social emotions, such as guilt or shame.

We can also distinguish between:

- the inward-looking emotions, such as fear, where we are drawn into ourselves
- the outward-looking emotions, such as wonder, where we are drawn out of ourselves.

The classifications are interesting because they emphasize two very different aspects of emotion (remember there are always problems of classification – it is never neutral). The first one stresses the origins of emotions, and perhaps leads us to ask which of our emotions are under our control. The second one takes a less scientific and more humanistic approach, asking about the nature of our experience in relation to the world.

9 Plot the emotions in the list in Question 3 (and any others that you care to name) on the axes.



10 Is it easy to classify the emotions on either axis? If not, what, if anything, does this tell you about the classifications?
11 Where does 'certainty' go?
12 Are there any 'better' classifications of emotions?

Moods

One more category of emotional experience we should consider is 'mood'. Moods seem to be different from emotions in that they are not fleeting, but rather stay with us for a period of time.

Edvard Munch's *Scream*

One very interesting mood is the existential 'angst', which has been described as 'the mood in which we rediscover our freedom and autonomy'. To get at this complex experience, let me describe what happens in my mind when I am driving on a motorway and suddenly – and rather sickeningly – I realize that I could quite easily swerve into the oncoming traffic, almost certainly causing a serious, if not fatal, accident. Nothing is actually stopping me other than my own will (irrespective of ethics, laws, expectations, etc.). I could do it. A similar feeling happens while waiting for a train – I suddenly understand, in a visceral sort of way, that I *could* throw myself under the wheels. You can probably come up with similar situations, but the conditions do not have to be extreme. You could start dancing on the table now, ignoring your teacher's requests to stop; he or she could join you. Anyone could rip up his or her books and throw them in the air. In everyday life we may sometimes think that we have no options, but the reality is that we always have many, many choices. The powerful awareness that these choices are real is what we can call angst. Some describe angst as liberating, others as oppressive.

13 How does a mood differ, in your experience, from emotions or feelings?
14 List some other moods. Can you think of the different emotions and feelings associated with those moods?

Before we leave the idea of classification, having done our best to achieve some sort of clarity in our thinking, let's remember that our descriptions are not the real thing; that any classification is an aid to insight, not a description of reality, and that, however useful a map is, it is not the territory. As G.K. Chesterton says:

Man knows that there are in the soul tints more bewildering, more numberless, and more nameless than the colours of an autumn forest … Yet he seriously believes that these things can, every one of them, in all their tones and semitones, in all their blends and unions, be accurately represented by an arbitrary system of grunts and squeals. He believes that an ordinary civilised stockbroker can produce, out of his own inside, noises which denote all the mysteries of memory and all the agonies of desire (Pinker 367).

What is an emotion?

Now that we have considered feelings and emotions from the perspective of our own personal experience, and bearing in mind the warning of the above paragraph, we need to tackle head-on this very difficult question. If we are going to appeal to emotions as a way of knowing, and if we are going to hold that they are a vital part of human nature, then we ought to try to understand precisely what it is that we are talking about. It is clear that an emotion is some sort of experience, but what kind precisely? We have suggested earlier that 'blue', or colour in general, is an experience, but this seems to be a completely different type of experience.

The scientist Edward O. Wilson has defined an emotion as '*the modification of neural activity that animates and focuses mental activity*', which may not be incorrect, but which seems to miss the vital human element – the experiential part of an emotion. To define an emotion in this way is like describing music as a collection of air vibrations – perhaps helpful for scientific experiment but not for philosophical inquiry.

If we are, in this section at least, to focus on the human side of emotion, then we should notice immediately that emotions are bound up with our bodies – they have a very visceral component. When we are angry or frightened, for example, our heart thumps; blood is re-routed from the gut and skin to the muscles (which is why we feel 'butterflies'); our breathing speeds up; and adrenaline releases fuel from the liver. Now the conventional wisdom is that physiological manifestations are expressions and results of inward emotion – after all, the two go together. So surely the emotions cause the changes in the body?

An alternative, however, was proposed by William James, a psychologist in the late nineteenth century, who described emotions as *cognitively processed physical feelings*. He explained that all emotions begin as physical responses in the body to some stimulus or another, and that emotions are our interpretation of the meaning of these clusters of feelings. This is a definition that makes a certain amount of sense, if you think about it. When you are afraid, how do you know? You hear footsteps behind you in the dark as you are walking alone down an almost-empty street. Your adrenaline level goes up, your heart starts to pound, your muscles tense, your breathing gets shallow, and so on. What about when you see that special someone across the room? What does love 'feel' like? You almost certainly feel a different set of physical reactions – your heart pounds again, your body temperature rises, your cheeks flush, and so on. James's argument was that we learn to give names to the particular collections of physical reactions, and that, once we are consciously aware of them, we experience them as emotions.

Some people may be sceptical that emotions have such a deep basis in physical reactions, but James makes a compelling argument:

I now proceed to urge the vital point of my whole theory, which is this. If we fancy some strong emotion, and then try to abstract from our consciousness of it all the feelings of its characteristic bodily symptoms, we find we have nothing left behind, no 'mind-stuff' out of which the emotion can be constituted, and that a cold and neutral state of intellectual perception is all that remain (Dean).

Think about that. Try to imagine that you are afraid. Now eliminate from your fear all the physical symptoms – no pounding pulse, no shortness of breath, no adrenaline, no physical sensations at all. Would you still feel fear? I imagine you find it hard to think you would, and there is, therefore, a close relationship between our physical responses to stimulus and the emotion we end up experiencing.

So there seems to be an element of truth to James's idea. The thrill of a roller coaster, for example, is presumably to do with the effect of speed and other motion on our bodies, and it is well known to runners that the release of endorphins during exercise can cause a natural euphoria. So physical states do seem to be able to cause emotions.

15 James's theory (which psychologists call the James–Lange theory, as C.G. Lange argued a very similar case) seems to reduce emotions to experiences of our bodily reactions to our surroundings. What is your emotional reaction to this theory?

16 If James is correct, then each distinct emotion is associated with a distinct set of bodily responses. Think about your emotional experiences to determine if this is the case.

17 Does the theory cover all emotions, or are some not correlated with physiological effects?

"Am I looking sad or happy in the appropriate places?"

Cartoon from www.cartoonstock.com

Subsequent experiments, however, have shown that the relationship between body and emotion is more complex than simple cause and effect. American psychologists Stanley Schachter and Jerome Singer, for example, proposed the 'two factor theory of emotion' based on a study they did in 1962. They found that when injected with adrenaline, most subjects said that they felt elevated heart rates, butterflies, that they were clammy, and so on – but the emotion they felt depended upon other factors in the environment (some subjects were being entertained by a performer, and some were being deliberately annoyed by a pesky person who was in on the experiment). Some said they felt 'as if' they were angry, but they were clear that they were not (Schachter and Singer). Some careful thinking indicates that our whole awareness and knowledge of a situation must be involved. For example, if we are on a roller coaster then we may experience exhilaration; if we are in a serious car accident from which we walk away unscathed, but which duplicates the physical experience of the roller coaster, then our emotional experience is likely to be very different. We cannot separate the emotions from the intellect and knowledge in a simple way. So we should delay an answer to the question of what an emotion is until we have looked into this in a little more detail.

Emotion and human physiology

Earlier we considered the possibility that some emotions might be innate to every human being while others might be learnt. This is a question with a long history; the following two lists – one from the sixteenth century and the other from the third century BCE – propose to identify those emotions which are innate.

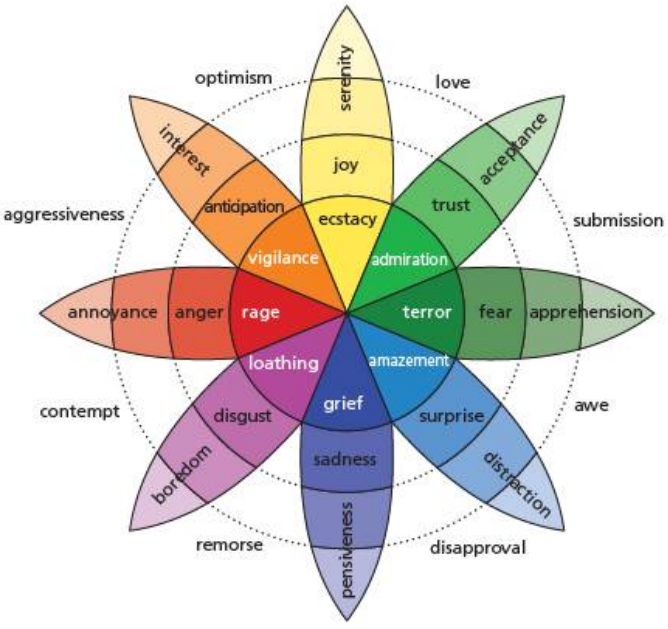
The seven emotions: T'oegye (Korean philosopher, 1501–70)

- Pleasure
- Anger
- Sorrow
- Joy
- Love
- Hate
- Desire

The six emotions: Hsün Tzu (Chinese philosopher, third century BCE)

- Fondness
- Dislike
- Delight
- Anger
- Sadness
- Joy

Modern psychologists offer a similar, but not identical list of innate emotions. Robert Plutchik, who was a professor at the Albert Einstein College of Medicine and the University of South Florida, proposed eight innate emotions: anger, fear, sadness, disgust, surprise, anticipation, trust, and joy (Plutchik 2001). Plutchik also proposed an emotional wheel, illustrated on the next page, which categorizes emotions by type. You can see that each branch on the wheel shows a related complex of emotions working from the most intensely felt (at the centre) to the least intense version at the outside.



■ **Plutchik's emotional wheel**

Quite a body of research now supports the contention that some basic emotions are universal. To cite just two examples:

- In 1971, Paul Ekman and Wallace Friesen published a study which demonstrated that emotional reactions to events in stories were reflected in faces the same way in highly advanced Western cultures and in a pre-literate culture from New Guinea, demonstrating that culture did not influence the emotional reactions or the expressions of those reactions (Ekman and Friesan 124).
- A more recent study out of San Francisco State University showed that blind athletes made the same facial expressions in response to parallel situations in judo matches as seeing athletes did ('Facial expressions').

No matter what our circumstance, it seems, we all feel a certain set of emotions that we do not learn from the people or culture around us.

Plutchik makes the additional point that these innate emotions have developed as an evolutionary advantage because they are related to our survival (Plutchik, 1991: 55). We'll investigate the role of emotions in processing sensory stimulus in the brain a bit later, but for now consider that these basic emotions are related to our ability to bond with friends and recognize (and flee from or fight) enemies. An interesting implication of this finding is that any basic emotion which humans experience as a matter of survival is likely to be experienced by other animals.

Interestingly, a lot of current research into animal emotions is undertaken because researchers believe that knowing about animal emotions will help us understand something about our inherent nature and the role that emotions play in our lives. Just one recent study from the University of Bristol determined that animals use emotions to make certain kinds of decisions ('Emotions help animals to make choices'). Possibly every pet owner could already attest to this from anecdotal evidence, and this striking video of the bond between a lion and humans http://tinyurl.com/6zwjq5 is powerful, but science offers a little more certain understanding!

■ **Familiar expression? Recognizable body language and expression in the animal world**

If, in fact, emotions are involved in making choices, that suggests that there is a connection between emotion and reasoning, at least in some instances, so we need to investigate that interaction.

Emotion, reason and knowledge

There is one uncontroversial sense in which knowledge and feeling are separate things – a person's desire to be famous is not the same as that person's knowledge that they are famous; someone's grief at their friend's death is not the same as their knowledge that their friend is dead. This much is clear. There is, however, a long tradition of working up such distinctions into complete dualistic accounts of human nature, and separating emotions from other areas of the mind. This has led to the commonly held notion that emotions are hot, urgent and irrational impulses that come from the body, and that reason is the cool, reflective analysis that comes from education and civilization. In this way of thinking, our emotions are 'forces' or 'substances' of some sort. If we examine the way we speak about the emotions, we find that the metaphorical way we conceptualize them reflects this. Consider the following:

- She could barely contain her joy.
- Don't bottle your rage up – go on, let off some steam!
- There isn't an ounce of goodness in her.
- He has a really nasty side to him.
- Her mother's death hit her very hard.
- Compassion welled up inside him.

These metaphors about emotions say a lot about how we think about them. If we liken ourselves to boats, then under this model the emotions are the tides. They push us around, whether we like it or not, and we have no control over them. Moreover, they are not dependent on cognition, reason or perception. We can use our reason to try to keep the emotions in check, though we need to be careful not to go too far because the emotions are the source of wisdom, innocence, authenticity and creativity, and to repress them is dangerous. The 'dark forces' can overwhelm us at times, and we are helpless before them. Sadly, Plato's model,

which associated men with reason and women with emotion, has had a lasting effect on our views of gender differences, even after more than 2000 years – how often have you heard women described as emotional and irrational, hysterical or out of control?

This 'tidal view' paradigm dominates the way Western societies view emotions, as witnessed by many films, songs and self-help books. Think of the wide range of very popular crime dramas whose bread and butter is characters whose passions lead them to extreme behaviours. In *The Great Gatsby*, by F. Scott Fitzgerald, Gatsby is so overwhelmed by his passion for Daisy that he loses touch with reality and gives in to the need to do whatever it takes to win her. Or consider *Phantom of the Opera*, the sweeping tale of the obsessive love of the Phantom for Christine. The former has been considered a classic novel for 50 years (and has been made into at least five different movie versions over the past 80 years), while the latter has been playing onstage in London and New York for more than 27 years.

There is an element of truth in this paradigm – there are times when someone is literally out of control through grief, rage, hatred or guilt – but is anyone ever out of control from hope, compassion or gratitude?

18 Why is it that the notion of a reasonable man 'giving way' to or 'losing control' of his emotions is a very popular theme in films and books, whereas the reverse seems rather dull and uninteresting? What does this say about our popular culture?
19 Have you ever been out of control due to strong emotions? How did it feel?
20 Which emotions can 'take over'? Do they have a common characteristic?

So far we have considered the very strong impulses – rage, grief, fear – all of which can be overwhelming. But we might also say that we are helpless before our emotions in a different, perhaps more subtle way. Imagine that you are in a situation where you feel awe (it doesn't matter if it is the view of some mountains; the stars at night; a mathematical insight; anything will do). Is it your decision to feel awe? Did you choose to feel it? Can you control your emotions?

The same argument applies to any emotion. When it happens, did you choose it? Imagine times you have felt disgust, happiness or hope. Were you in control? Most people say that they were not. This is sometimes taken as evidence for the view that we are helpless before our emotions, and that they are irrational. However, if we take a slightly broader conception of the role of reasoning in emotions then we can see that this is not necessarily the right interpretation of the evidence. Let's look more closely at rage and relaxation. Answer the following questions:

1 When might we go into a frenzy of rage?
- When our family is threatened
- When someone tells us a joke we find funny
- When we see a terrible injustice
- When we have won a valuable prize
- When our lives are threatened
- When we see a good friend unexpectedly

2 When do we feel relaxed?
- When we are on holiday
- Just before bungee-jumping for the first time
- At the end of the day before sleep

- In a traffic jam on the way to the airport
- After exercising
- During an argument

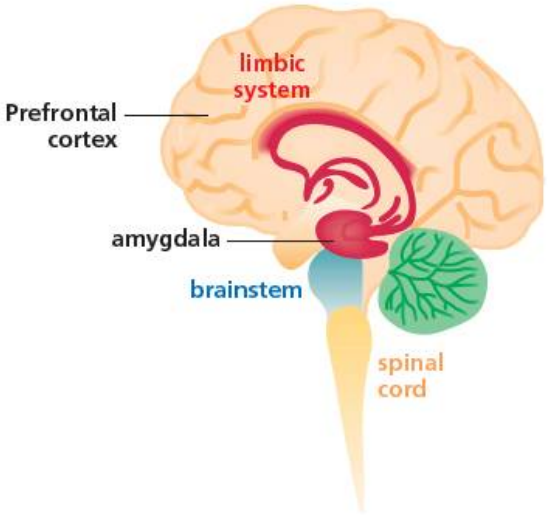
The answers to these questions tell us something important – that we only go into a frenzy, that we only feel relaxed, when it is 'reasonable' to do so. We do not go into a frenzy of rage when we hear a funny joke; we do not feel relaxed during an argument. Instead we feel 'appropriate' emotions, relevant to the situation at hand. In other words, there has to be a reasoned judgement before we 'know' what emotion to feel. Reason must operate on something – as we have seen, it does not operate in a vacuum – so we need the input of the senses so that the reasoning can take place. In retrospect, this is perhaps rather obvious – we cannot feel emotion about something if we don't know anything about it. So the emotions are not separate from our more familiar ways of knowing. In fact, they cannot be or we would be as likely to feel joy over a terrible tragedy as we would grief.

This idea is reflected in some criminal codes, where there is the concept of 'reasonable provocation'. Under some circumstances, a 'reasonable man' may 'reasonably' become 'uncontrollably angry and violent'. Adultery of a spouse (but not a fiancée), for example, or a blow to the face (but not a boxing of the ears) are often considered reason enough.

21 Consider the emotion of 'jealousy'. If I am to be jealous, what judgements must I make?
22 Choose another emotion and identify what must be rationally understood before the emotion can be felt.
23 Here is a quote from Bertrand Russell that some people find moving:
'I must, before I die, find some means of saying the essential thing which is in me, which I have not yet said, a thing which is neither love nor hate nor pity nor scorn but the very breath of life, shining and coming from afar, which will link into human life the immensity, the frightening, the wondrous and implacable forces of the non-human (Koestler 262).'
Small children would not find this moving, nor would many adults. Much of this comes down to individual temperament, but suppose we found a thousand people who said that they did find it moving. Would these people have anything in common, such as education or intellectual ability? What rational processing must go on before such a statement can be moving?
24 Are there any emotions that require no rational processing?

So it might appear, at the moment, that emotion comes after sensory data has been processed rationally. In this sense, we might think that emotion is derived from these two primary ways of knowing. This is not so surprising – in our long search for certainty we have not yet managed to find direct, unmediated 'facts', so maybe we were asking a bit much from emotional knowledge.

William James, as we noted earlier, suggested that there is a linear, cause–effect relationship between empirical data, physical feelings and then rational processing, which makes us cognizant of our emotions. His model was accepted for a long time and is borne out, to some degree, by our brain physiology. When sensory data travels up our nervous system, the first place it goes in the brain is to an area called the limbic system. The limbic system, which includes a structure called the amygdala, is a primitive system common to a wide variety of species, ranging from mammals to reptiles to birds, and is the centre for processing all of our emotional reactions.



■ The limbic system

If you think of the brain as a house, the limbic system is the guardhouse at the front door. It checks all incoming data to see if it signals anything important to your survival – whether it is food, whether you should mate with it (and thus preserve your genetic line), or whether it poses a danger to you. The amygdala is associated with the 'fight or flight' response, for example. This suggests that our emotional reactions are unconsciously constructed and that we are subject to them (in this, perhaps, not so dissimilar to informal reasoning).

Recently, however, Antonio Damasio, a researcher at the University of Southern California, has suggested a more nuanced model that suggests that emotions and cognition interact constantly, each informing the other. His theory, described in his book *Descartes' Error*, is quite technical, but the simplified version suggests that, although we do not have any control over our initial emotional reaction to stimulus in the body, we do have control over our behaviour in response. So, for example, when you hear those slow footsteps coming at you out of the dark on a deserted street, you cannot consciously stop yourself from feeling fear. Your amygdala will err on the side of caution and trigger the fear response in your body, urging you to fight or flight, but you are not victim to your responses to the point that you can only either scream and run or grab for the nearest weapon to start swinging or shooting before the person comes into view. You can, instead, process your emotional data rationally, and then you can make a more informed decision. Sometimes, of course, running is the right choice! But often those footsteps will belong to another harmless traveller in the night, and you can tip your hat, figuratively speaking, and go on your way.

25 Have you ever had the experience of feeling strong emotions that you were able to control? How were you able to control them?

26 Research suggests that the prefrontal cortex is not fully formed in humans until they are 25 years old. Does this mean that you have no rational control over your behaviour? Why not?

But the physical functioning of our brains cannot tell the whole story. There is a world of difference between my knowledge that, for example, 'there are eight planets in the solar system' and my knowledge that 'my friend is dead'. Even though both pieces of knowledge convey information, and both require certain rational interpretation for me to understand them, my emotional

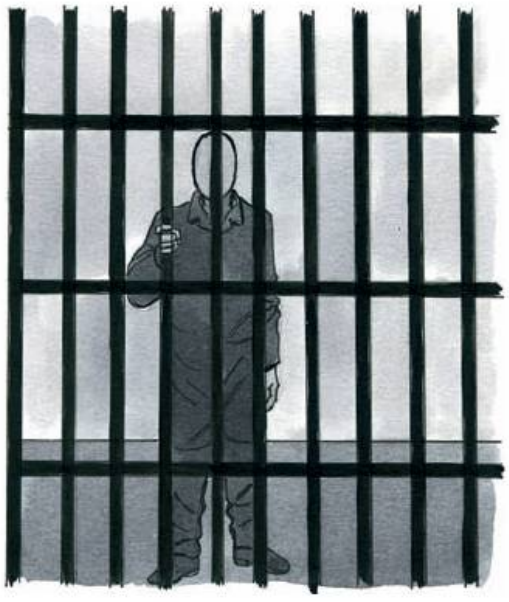
relationships to the pieces of knowledge are quite different. Even ignoring the question of how our bodies respond to emotionally charged information, my friend means something to me in a way that the solar system does not. In a human sense, information about my friend *signifies*. This may be the key to getting a handle on the slippery nature of emotions. I can *know* anything about anything, but I can only *feel* about things/people that have some personal impact on myself. (A possible exception is the emotion of wonder – do the stars or mountains have any personal impact on me other than the emotion they evoke?)

To make this clearer, let us perform a little thought experiment. Imagine a person with no emotions. For this person, the world exists as it is, with no shades of approval or desire. For him, everything is of equal value; he has no liking for any thing or any person, and no dislike either. The world is neutral to him, and no activity or project has anything to commend itself over inaction. This may sound boring to you, but it is not for him, any more than it is interesting. Now we ask, what is this person's engagement in the world?

The answer must be none. This person can have no engagement in the world, for such an engagement would necessarily indicate that some part of the world was more important to him than another, but in this thought experiment we know that this cannot be the case. In fact, our imaginary subject could have no interest in any human relationship, in any work or in any play. He could have no desire to live or die. It seems then, arguably, that far from some Spock-like character, this emotionless being is an impossibility. It is hard to see if we would even want to call such a person alive. Even if he were alive, would he be a person? With no emotions there can be no goals, and no *being-in-the-world*, as some philosophers have called it.

27 What would it be like to be this emotionless being?
28 Could a race of sentient but emotionless aliens exist?
29 Do all animals therefore have emotions? Does this question present the above account with difficulties? If so, state the difficulties precisely, and try to offer a solution.

The implications of this thought experiment have been borne out by science. Antoine Bechara, another psychology researcher at the University of Southern California, tells the story of one of his patients, a man called (pseudonymously) Eliot, who suffered severe damage to his brain, such that the end result was that he lost all ability to feel any emotions. He lost the ability to use emotion to inform his reasoning process, and was left with reason alone, devoid of emotion. Before very long, Eliot's life was ruined. He ended up divorced, and he lost his job, because he couldn't interact with anyone. More surprisingly, he couldn't make any decisions. He couldn't, for example, decide which pen to use to write something, because he would try to run through every possible factor that might logically have some bearing on the choice – what would look better on the page, which had more ink, which was more expensive, which would match the rest of the page, whether contrast would be better, and on and on. Eliot became 'pathologically indecisive' (Abumrad and Krulwich). You can listen to Eliot's story here: http://tinyurl.com/pewmq49. It is a very sad story, but it reveals something amazing about just what it is that our emotions help us to know as well as how they shape our actions in the world.



It seems then, that the key is to focus on our relationship with the world, and what our emotions do to represent that. To our imaginary, emotionless man, the world is not differentiated; metaphorically it is all a neutral grey. But our world is 'lit up' according to our purposes and priorities, and emotions are the lights – some red, some blue, but all illuminating. The world looks different under each light, and perhaps no one light gives us all we need, but it's all the light we have.

This view may answer the charge that the emotions are leftovers from our pre-sapient days. Rather than mere distractions, they are vital characteristics of any human being engaged in a physical world which is indifferent to human needs. Though enigmatic, the poetic and coherent logic of emotional experience is therefore a central aspect of human life.

30 This view suggests that emotions play a central role in our cognition and in our interactions in the world; that they allow us to create mental models of important features. If we focus on this idea of modelling, then we are reminded of empirical knowledge and the way that our senses provide us with a map of the world. Compare the emotions with some qualities which may appear to be in the world but are, in fact, in our minds. Are there analogies to be made between the emotions and concepts such as 'colour', 'pain', 'brightness' and so on?

31 The philosophers Sartre and Heidegger have said that moods 'disclose features of the world to us'. What features might they mean by this? Could they mean something other than the 'obvious' physical features? How does this relate to what we have said here?

32 Explain in your own words, and with your own examples, this view of emotions. Do you agree with it?

Emotional quotients and multiple intelligences

Traditionally, the intelligence quotient (IQ) has been seen as a good measure of 'intellectual ability' – whatever that means. In schools it has traditionally been thought that those students who do well in IQ tests, do well in examinations and, it is presumed, go on to be successful in later life

(however that is defined). Of course, there are many exceptions to the rule but, by and large, at least until recently, it was thought that this was the case. However, experiments at Bell Labs in the USA generated some interesting results. The researchers found that the most productive engineers were not those with the highest IQ, but rather those with the best ability to relate well to their co-workers, and who knew how to work together and who to call for help (Goleman 161–62). In a highly technical setting, one would assume that intelligence would be a key factor, so this was a very surprising result. Following this discovery, there has been a great deal of interest in broadening the concept of intelligence.

33 There may be good reasons that we have an information-processing model of the mind; on the other hand, it is just a model and so may be of very limited value. Do you think that intuition is an irreducible form of intellectual activity?

34 Is your answer to Question 33 made on logical, empirical or emotional grounds? Does it matter?

The term **emotional quotient** (EQ) was coined by Daniel Goleman in 1990, and is now a commonly used term used to describe the degree of control a person has over his or her emotions. EQ is often contrasted with IQ, and is usually thought to be independent – that is, an IQ score is no indicator of EQ score.

High-EQ people are supposed to enjoy high levels of self-awareness, and to use their self-knowledge to manage their lives skilfully. Most theorists believe that developing EQ is much like going to the gym – the more you practise the skills the easier it becomes. They tend to identify five areas of emotional knowledge:

- knowing your emotions
- managing your emotions
- motivating yourself
- recognizing emotion in others
- handling relationships.

The focus of the EQ concept is very much one of success and self-improvement. As such, it is a little beyond our scope. Nevertheless, we can ask some interesting preliminary questions.

35 There are people who have very high IQs, as measured by IQ tests, who nevertheless seem to do silly things. That suggests that IQ is a problematic term. Do similar issues apply to EQ, in terms of the five characteristics listed above?

36 We use the same word, 'emotion', in this section, as in the section on emotion, reason and knowledge on pages 172–77, where we were more interested in 'engagement with the world'. Are we using the word to describe the same thing in each case, or is the concept different in each case?

Psychologist Howard Gardner has written extensively on the multifaceted nature of intelligence, arguing that ability in several areas fulfils the requirements to be called a distinct intelligence. His theory of **multiple intelligences** (MI) has been refined over the years and is the basis of development plans in many US schools. Gardner lists several basic intelligences ('Educational resources'):

Gardner's basic intelligences

- Musical
- Spatial
- Bodily-kinesthetic
- Spiritual
- Logical-mathematical
- Interpersonal
- Linguistic
- Intrapersonal

As far as the emotions go, we can see that these come under the categories of intrapersonal and interpersonal intelligences. Intrapersonal intelligence is the capacity to understand yourself and subsequently to act adaptively. Those who have high ability in this area will have:

- an honest, accurate and comprehensive picture of themselves
- an awareness of their inner moods, motivations and desires
- a tendency toward self-discipline
- healthy self-esteem.

Interpersonal intelligence is the capacity to quickly grasp and evaluate the moods, intentions, motivations and feelings of other people. Those who have high ability in this area will have:

- sensitivity to facial expressions, gestures and voice qualities
- ability to discriminate among many personal cues
- expertise in responding effectively so as to achieve their goals.

If there is a good deal of truth to these theories – and certainly they seem to resonate with many people – they may lead us to look at the whole concept of 'knowledge' in a broader way. Perhaps we should not be focusing on what may now seem the narrow idea of beliefs and their justifications, and we should place the ability to handle our emotions and interpersonal relationships in the category of 'knowledge'. This would mean that we would have to expand our definition, but arguably this is now well overdue.

37 To what extent do you think that the intelligences mentioned above are separate and distinct qualities?
38 Are the MI and EQ theories compatible?
39 EQ and MI are both models for understanding certain aspects of our cognitive processes. As such they represent the phenomena they are trying to study. Are they good representations? Do they leave anything out or include too much? What are the inevitable problems of representation?
40 Few would suggest that we should have university degrees in knowing about our emotions, so should we expand our definition of knowledge in this way? If so, what would 'knowledge' mean?

Emotion, experience and culture

Despite what we have seen in the previous two sections, we have yet to consider another important aspect of emotion as a way of knowing. Without denying anything that has been said, there is more to feeling than a relationship with the world, or a 'reasonable' response to the world. It *feels like* something to be angry,

or disgusted, or in love – and, of course, we are all intimately acquainted with our own 'inner lives'.

Perhaps we could put it rather crudely:

Emotion = recognition of an event + recognition of my relation + something else to that event

The 'something else' of the equation is the thing that dominates our sense of the emotion – it's what the emotion *feels* like. Imagine the feeling of embarrassment. It is quite distinctive, it has a certain 'taste' and cannot be mistaken (and is separate from the sensation of shame, which often accompanies it). These feelings cannot be reduced to anything else – they are 'simple' in this respect, and we call them **qualia** (the singular is 'quale'). They are notoriously difficult to describe to someone who has never felt the emotion (in this they are like the more 'physical' qualia such as the sensation of 'blue' or the smell of freshly ground coffee). Given that they are so basic to our emotions (and other sensations), there is not much that we can say about them in themselves – they just 'are' and they are the building blocks from which we construct our inner world.

However, even if we cannot say much about the nature of qualia themselves (how intangible sensations like qualia can come about from a physical brain is probably the outstanding and most difficult problem in the philosophy of mind – often referred to as the 'hard problem of consciousness'), it is interesting to examine their role in an emotion. Imagine the last time you had a blazing argument with someone (if you ever have!), preferably when you were shouting and really furious. Try to recall the qualia – most people use words such as 'boiling' or 'trembling'. Now, could you be said to be really angry without that feeling or is it an essential part? It seems that the sensation is a crucial part of the emotion, but philosopher George Pitcher has asked us to imagine two situations:

- Helen arrives home to find Ingrid setting fire to her house. If Helen rushes violently at Ingrid, then must she be having the 'boiling' sensation of anger that we mentioned in the above paragraph?
- James is being interviewed for a job and is anxious to make a good impression. One of the interviewers, Katy, makes an insulting comment, and after that an observer might notice an icy tone creep into James's voice when he addresses Katy. Is James angry?

Now different people interpret the thought experiment differently, but many agree with Pitcher that Helen and James are both angry, though neither is having qualia of the sort we described above. Helen will likely admit she is angry, though James may not. But then that means that both are angry without the quale of anger, which seems like a contradiction.

41 Is it possible to be angry without realizing it? Can you think of a similar example from your own experience? What about other emotions?

42 Might we get around the problem by suggesting that there are (at least) two distinct types of anger – the 'hot' type and the 'icy' type, and that the quale associated with each one is different? Or would James still not have the right quale?

43 Are your emotional qualia the same as my emotional qualia? While we can never be sure about this one, what seems the most reasonable answer? (What does 'same' mean here?)

44 Are your emotional qualia the same as those experienced by somebody from a different culture who speaks a different language?

The cultural aspect of emotion suggested in Question 44 is a fascinating one. Anthropologists have studied cultures where grief is expressed in entirely different ways – the Inuit-Ifaluk tribe 'cry-big' at a death and a bereaved mother may pound her chest with her fists, while a Balinese equivalent may be far more restrained and even outwardly cheerful. What are we to make of this? Do people from different cultures really experience their emotions differently?

Those who have met and known people from a genuinely different culture seem to agree that emotional lives are broadly the same around the world, although the external displays, behaviours and rituals may vary significantly. The Ifaluk, for example, believe it is healthy to express grief energetically, whereas the Balinese believe that sad feelings are dangerous to the health and so they try to distract themselves. (Interestingly, this seems to relate closely to Damasio's claim that even if we have no control over our emotions, we control how we react to them.) While the emotions may not be as different as they appear, that is not to say that they are precisely the same.

Evidence for this claim can be found in many places. Martha Nussbaum notes that, '*The Finnish people intensely cultivate and prize the emotions connected to the solitary contemplation of the forest; one's own smallness and insignificance in the face of monumental nature*' (152). Few of those born in Calcutta have experienced these forests, and so we can say with some confidence that the emotional lives of these two groups will differ, at least in this respect. We can also point to an ancient Greek word for love, *erôs*, which has a connotation of longing to own and control and which carries no implication of being loved back, and ask if this reflects an experience of love that is nuanced from ours. (It is also interesting to note that there are two other words for love in ancient Greek – *agape*, the selfless love for all people, and *philia*, a mutually reciprocated love, which may or may not be platonic in nature.) There is a certain kind of highly self-conscious romantic love (which seems, in stereotypical films, to involve ladies holding the back of their hand to their forehead, and fainting), which may require a relatively luxurious and pampered lifestyle. Based as it is in the idealization of the perfect and pure chaste female, might we not conclude that this romantic love involves emotional experiences which are simply not available to many of us today?

Perhaps all this suggests that emotions are not as 'raw' and 'immediate' as we had imagined, but that they are filtered and moulded by our paradigms and culture as surely as are all our thoughts. This may be a disappointment but it is hardly a surprise – did we really expect emotions to be pure and 'true' in some abstract sense? If our emotions are about our being-in-the-world, and the relations we have to the world as we find it, then they must be linked intimately to our needs, perspectives and individual histories. If they were not, how could they be as important to us as we know they are?

In saying this, we should remember to neither demote nor elevate the emotions to some separate and special type of experience. They are entwined so closely with reason, perception, culture and language that we should not think of all these as separate categories, but as the stuff of human life. Stephen Toulmin put it this way:

Is the primary task … to find formal solutions to abstract problems, and impose those solutions on the raw material of the world, as we experience it? Or is [it] to get acquainted with the world of experience in all its concrete detail, stating our problems and resolving them later in the light of that experience? (40)

45 Consider your own emotional life. Do you think that the way you experience love, disgust, disappointment or any other emotion has been shaped by your culture?
46 Can you imagine having a different emotional life?
47 There is a popular stereotype that women are 'more emotional' than men (in extremes, some men say that women are 'irrational'; women counter that men are 'emotional cripples'). In light of what has been said above, and in your experience, to what extent, if any, is the stereotype true?

Emotions and shared knowledge

We have spent a lot of this chapter considering individual emotional experience and how our personal knowledge is shaped by our emotions, but we must consider how these ideas relate to the making of knowledge in the formal areas of knowledge.

It is tempting to say that emotions are too troublesome to be relied on in formal, professional knowledge-making endeavours, but that would be an oversimplification that perpetuates the stereotype of thinking about emotion that we have been trying to allay. Certainly emotion *can* create a bias that gets in the way of the identification of truth in various areas of knowledge, but it doesn't have to, and, in fact there are many ways in which emotion is an asset.

In the introduction to *Blink*, Malcolm Gladwell tells the story of a statue purchased by the Getty Museum. The statue, a Greek kouros, was a real coup for a small and relatively new museum, and staff were naturally extremely excited about it. They investigated the background of the statue for more than a year, and then paid about $10 million for it. As soon as experts from outside the museum began seeing the statue, however, they declared it to be a forgery. Eventually, after more tests were done, the fraud was established (Gladwell 3–8). The story illustrates the point that if emotional investment is too high – if we want something *too* badly, we see what we want to see and ignore even fairly obvious facts to the contrary. This might be said to support the easy interpretation of the dangers of emotion as a way of knowing; though an alternative perspective might be to point to informal reasoning and cognitive biases.

What might be easily overlooked, however, is the fact that it was largely emotional knowledge that brought the forgery to light. The experts from outside the museum talked about their reactions in emotional terms. One had '*… a sense that something was amiss*' (5). Another said that the first word that came to mind was '*fresh*' (5); this is clearly a word that describes a feeling rather than a solidly rational reaction. A third said that he '*… felt a wave of "intuitive repulsion"*' (6) – a very clearly emotional reaction. And it turned out that these intuitive emotional reactions were right, where the scientists and other researchers from the museum were wrong.

This is one example that shows how emotion was a great asset in determining the truth of a matter in the arts; however, it is indicative of two broader points to be made about the role of emotion in all the areas of knowledge. We will investigate the first further when we get to Chapter 10 on intuition as a way of knowing, but already we can see from this example that experts develop a reliable intuition from their long experience with their subject, and this intuition allows them to *feel* whether something is on the right track or not. Second, because they are aware that emotion can be problematic, practitioners of the formal areas of knowledge have developed formal procedures to help ensure that they do not fall victim to the problem (indeed that's some part of what it *means* to be an area of knowledge).

The museum curators did not do what a lot of us do when we see something they like; they studied the situation for 14 months to try to ensure that they had the best possible understanding. (Granted that in this instance it was not enough; remember that we are not guaranteed that our efforts to be cautious, rational and professional will always result in success! The important point is that it is not left up to chance.) Secondly, each area of knowledge has some form of peer review, so that we never consider that knowledge is satisfactory on the word of a single researcher.

Finally, obviously one powerful way in which emotion contributes to knowledge making in all the areas of knowledge is through motivation. It is the passion of the individual expert which drives her to do the work needed in the first place, and to try to ensure that the work is done as thoroughly and accurately as possible in the second. We saw in Chapter 6 that Andrew Wiles's passion led him to spend seven years trying to solve a single mathematical problem, and then, when an error was found in his proof (by a peer reviewer!), to spend two more ensuring that he got it right. In the natural sciences, a professor at the University of California at Berkeley, Jerry Powell, spent 30 years running an observational experiment that uncovered the mechanism that determines when yucca moths come out of diapause – a state similar to hibernation that can, it turns out, last for at least 30 years (Powell 677)! It takes an extraordinary kind of passion to pursue one mathematical or scientific question (or any other question) for so many years.

To say, however, that emotion provides motivation to researchers overlooks the more subtle role that emotion plays. Imagine for a second that Professor Powell and Professor Wiles were asked to change places. We will assume that they can learn the science or maths needed, and we will assume that their general tendencies toward diligence are unchanged. Do you think they would feel the same way about their new subject area as they did about their old one? If so, then why did the one become a scientist and the other a mathematician in the first place? In fact, it seems more likely that there is something about mathematics that inspires Professor Wiles's particular passions, and something about science that inspires Professor Powell's. Perhaps for Andrew Wiles it is the beauty in the order and the perfection of the absolutely certain answer which appeals. Perhaps for Jerry Powell, it is the connection between science and observable reality, and the deep honesty embedded in the commitment to always keeping lines of inquiry open, no matter how much data has amassed for a particular scientific finding. We don't know precisely what about these subjects awakens the intellectual passion of each of these men, but we can see, if we think about it, that each area of knowledge has particular characteristics for which some people have a deep love, while others do not.

As you study the areas of knowledge, look for the ways in which emotion is an asset to the people working in the field, and notice what formal procedures and structures are in place to try to ensure that the potential assets of emotion (and intuition and imagination, for example) are maximized, and that its potential liabilities are minimized. Consider, too, just what it is about each of the areas of knowledge which makes it different from all the others, and which then inspires lasting devotion among people willing to spend their entire lives pursuing it.

48 What is it about your favourite subjects that you love?

Where have we been? Where are we going?

We have seen, in this chapter, how the traditional view of emotion as problematic for humans is vastly oversimplified, and we have seen how there are many ways and many situations in which our emotions are an asset. We have also seen how, despite a physiological predisposition to a knee-jerk reaction to stimuli that might suggest a danger to us, we do not have to be victims to our emotions, but that we can consciously learn skills to help us master them. We have also considered how our personal experience with emotion translates into the realm of shared knowledge, where care is taken to ensure that emotions work for us, rather than against us.

Since emotion is a way of knowing that we generally take for granted, perhaps this detailed investigation seems a little abstract. Additionally, perhaps the fact that we have only considered three areas of knowledge so far, and in at least two of the three cases reason tends to predominate, emotion might seem to be less important as a way of knowing than this chapter suggests. But what about areas of knowledge which are less cut and dried, and for which absolute certainty is not an achievable ideal? We will turn next to religion, an area in which certainly reason is important, but where such ways of knowing as imagination, emotion, and intuition also have crucial roles. There, perhaps, we will get a better understanding of how different areas of knowledge rely more heavily on different ways of knowing for very good reasons.

Further reading

- The last few years have seen an enormous interest in this area so you really are spoiled for choice. Two excellent books are Dylan Evans' *Emotion: The Science of Sentiment* (Oxford University Press, 2001) and Antonio Damasio's *Descartes' Error* (Quill, 1995). Another possibility is Paul Griffith's *What Emotions Really Are* (University of Chicago Press, 1998). Broader and more sophisticated is *What is Emotion? Classic and Contemporary Readings* (Oxford University Press, 2003), edited by Cheshire Calhoun and Robert Solomon.
- Favourites for mixing science and sensitivity are Stephen Pinker's *How the Mind Works* (Chapter 6; Penguin, 1997) and Thomas Lewis *et al*'s *A General Theory of Love* (Vintage Books, 2001).
- The classic *A Grief Observed* by C.S. Lewis (Faber, 1961) was written after the death of his wife and is well worth reading. Martha Nussbaum uses her own life, poetry, literature and music to bring to life her long and difficult, but exceptional *Upheavals of Thought* (Cambridge University Press, 2001).

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9 Religious knowledge systems

There is no greater fool than he who says 'there is no God', unless it be one who says he does not know whether there is one or not.

Bismarck

My religion consists of a humble admiration of the illimitable superior spirit who reveals himself in the slight details we are able to perceive with our frail and feeble minds.

Albert Einstein

There is only one religion, though there are a hundred versions of it.

George Bernard Shaw

I do not seek to understand that I may believe, but I believe in order to understand.

Anselm of Canterbury

The further the spiritual evolution of mankind advances, the more certain it seems to me that the path to genuine religiosity does not lie through the fear of life, and the fear of death, and blind faith, but through striving after rational knowledge.

Albert Einstein

There is no God. This negation must be understood solely to affect a creative deity. The hypothesis of a pervading spirit co-eternal with the Universe remains unshaken.

Shelley

Christian fundamentalism: the doctrine that there is an absolutely powerful, infinitely knowledgeable, Universe-spanning entity that is deeply and personally concerned about my sex life.

Andrew Lias

My atheism, like that of Spinoza, is true piety towards the Universe and denies only gods fashioned by men in their own image, to be servants of their human interests.

George Santayana

To you I'm an atheist; to God, I'm the Loyal Opposition.

Woody Allen

I believe it because it is absurd.

Tertullian

A year spent in artificial intelligence is enough to make one believe in God.

Alan J. Perlis

I am an agnostic; I do not pretend to know what many ignorant men are sure of.

Clarence Darrow

Aims

By the end of this chapter you should:

- be able to define a religious system by knowing the necessary determining characteristics
- appreciate the different approaches that are possible to religious questions
- understand some of the arguments for and against the existence of God, and have some insight into the debate which is generated by competing claims
- understand the roles of reason and faith in the context of religious knowledge
- be able to justify a personal position on the question of the existence of God.

Introduction

Having now considered both reason and emotion as ways of knowing, we can consider an area of knowledge which generates considerable controversy about which of those two ways of knowing (or whether others we have not yet considered) should predominate: religion. In any search for truth, the issue of religion will arise at some point. You may have already seen that religious values, or lack of them, permeate our thinking about many issues, and most people naturally feel a deep personal interest in the whole question of the nature of God (or whatever gods there may be).

Religion addresses questions that most people find to be fascinating and important. What is the meaning of human existence? Do we have free will or do we live in accordance with a destiny planned for us by a being with a plan? Do good and evil exist as entities in their own right? What happens to us after death? Do we have an everlasting soul? As an area of knowledge, then, religion tries to answer deep questions of significant import to the human condition. That's a weighty undertaking!

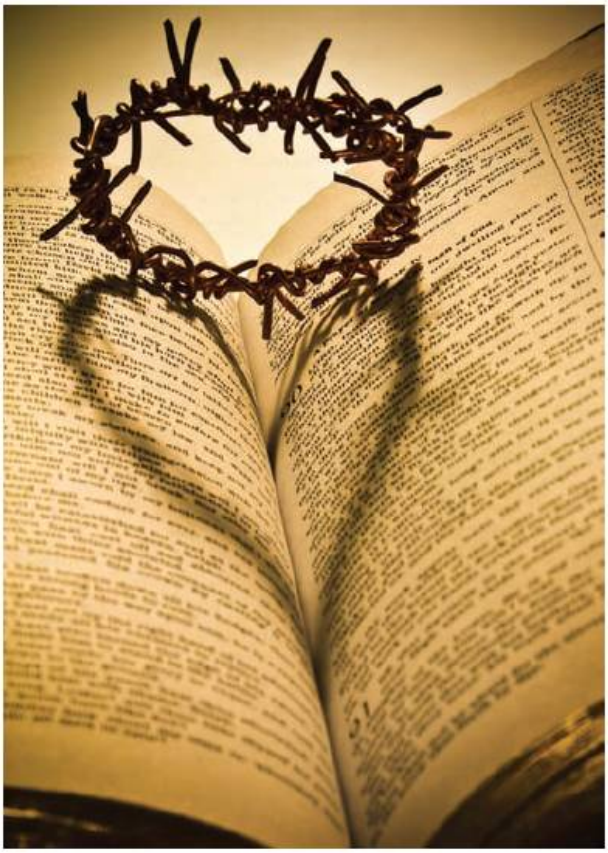
Although religious questions are asked universally (every single culture throughout history has, as far as we know, had the concept of one or more deities), there have been no universally accepted answers. Opinions vary from **atheism** (the belief that there is no god), **theism** (the belief that there is one god), to **polytheism** (the belief in several gods), to **pantheism** (the belief that the universe is God), and **agnosticism** (the lack of belief one way or another), and within each 'ism' there are numerous, sometimes strongly conflicting, beliefs. It is no exaggeration to say that wars have been fought and people have died – indeed been killed – over the answers to these questions for as far back as human memory goes. Clearly, we feel very strongly indeed about these matters.

Before we even start to try to understand how we go about answering difficult religious questions, we find that various ways of knowing are already in conflict. The twentieth-century philosopher A.J. Ayer dismissed the whole concept of God as meaningless, since '*no sentence which purports to describe the nature of a god can possess any literal significance*'. Ayer would only accept as meaningful statements which could be verified by empirical evidence (this is a position known as **logical positivism**). This quite extreme view relies as heavily on sense perception as a way of knowing as it does on reason. Similarly, in the eighteenth century, David Hume suggested that rational inquiry can play no part in religious matters. Of the whole concept of divinity, he wrote, '*Does it contain any*

experimental reasoning concerning matter of fact and existence? No. Commit it then to the flames, for it can contain nothing but sophistry and illusion' ('David Hume'). Here is another thinker who places value on reason above all other ways of knowing, and it leads him to denounce the whole idea of the divine.

In stark contrast, St Augustine's view was that humans must rely on God, not reason, to guide them to the truth. Dr Jeff Mirus explains St Augustine's ideas this way:

... if by faith a person comes to accept the role of God and grace in his life, he gains two enormous advantages. First, his pride and passions – his slavery to sin and the consequent darkening of his intellectual powers – are mitigated and gradually healed and overcome by grace. Second, Revelation provides certain points of absolute truth which can serve as a corrective to the inevitable mistakes that even the best thinkers make in the application of their reason to the elucidation of the reality they experience and observe.



Faith

C.S. Lewis agrees:

But though I cannot see why it should be so, I can tell you why I believe it is so. I have explained why I have to believe that Jesus was (and is) God. And it seems plain as a matter of history that He taught His followers that the new life was communicated in this way. In other words, I believe it on His authority. Do not be scared by the word authority. Believing things on authority only means believing them because you have been told them by someone you think trustworthy. Ninety-nine per cent of the things you believe are believed on authority. I believe there is such a place as New York. I have not seen it myself. I could not prove by abstract reasoning that there must be such a place. I believe it because reliable people have told me so. The ordinary man believes in the Solar System, atoms, evolution, and the circulation of the blood on authority – because the scientists say so (35).

Knowledge framework:
Scope and applications

The knowledge that **religious systems** develop is knowledge of a supernatural world, a world invisible to our human sensory mechanisms (detailed in Chapter 14). Religious systems assert that God or gods created the universe and guide its events to some degree, though beliefs about how much supernatural control is exerted differs from system to system. Religious systems also concern themselves with other invisible beings, such as angels or evil spirits, such as the Christian Devil, and with the places to which the human spirit moves after the death of the physical body.

The application of religious knowledge pertains largely to ethics. Religious **doctrine** tells us how we ought to live in order to fulfil the purpose intended for us by the god or gods, so that we may attain salvation and a more perfect existence after death.

Those are the extreme views – **reason** opposed to pure **faith**. These days most people would agree that there is a middle ground between philosophy and religion; certainly it would be foolish to dismiss the possibility out of hand. Arguing that both faith and reason are divine gifts, the great Christian philosopher St Thomas Aquinas rejected the idea of an inherent conflict between them. He saw them as complementary, even harmonious tools with which to study God (Blair). The Prophet Muhammad expressed a similar sentiment when he said '*God has not created anything better than reason, or anything more perfect or more beautiful than reason*' (Babu and Rao 31).

This whole course is based on the principle that we need to maintain an open mind and to try to apply honest reasoning where we can. Let us therefore see how far reasoning will take us, and if it proves to be an insufficient tool then let us recognize that and examine the alternatives.

1. What are your religious beliefs (if any)? Do you know why you believe what you do? Is it a set of beliefs (or lack of beliefs) you have come to yourself, or one that you have absorbed from your culture unquestioningly?
2. Do you believe that reasoning should play a part in determining religious beliefs?
3. Look at the different meanings of 'exist' in the following sentences:
   - Trees exist.
   - Pain exists.
   - Protons exist.
   - Dinosaurs exist.
   - Dragons exist.
   - Energy exists.
   - Ghosts exist.
   - Love exists.

   Which statement is most like 'God exists'?
4. Would any of the following demonstrate the existence of a god?
   - If believers lived on average 25 years longer than atheists.
   - If prayers of believers were answered.
   - If children started to quote the Holy Book as soon as they learnt to talk.
   - If believers were more successful in life than atheists.
   - If believers could perform miracles.
   - If believers after death were seen to fly up into the sky and disappear.

   Can you think of any empirical test that would prove that God existed?

The seven dimensions of religion

We have seen or will see that the arts and history both seem to address questions that religion addresses, and it is often said that science comes into conflict with religion for providing answers to questions which seem to contradict what tradition and holy books tell us. So just what is a religion?

One widely accepted definition came from Dr Ninian Smart, a Scottish writer and professor at the University of Lancaster (and several other prestigious universities in Britain and America). He delineated seven aspects of religion (Smart 1998: 3–6). These features, or dimensions, as Smart called them, are as follows:

Smart's seven dimensions

- The ritual dimension
- The mythological dimension
- The doctrinal dimension
- The ethical dimension
- The social dimension
- The experiential dimension
- The material dimension

Note that these seven dimensions apply to *any* religion. As you consider each of these dimensions, consider which ways of knowing are most useful, and what sort of knowledge comes out of each one.

The ritual dimension

You are probably familiar with several religious rituals – from your own religion or from someone else's. Perhaps you have attended a baptism, a wedding or a bar mitzvah. Maybe you are Muslim and participate in the traditional prayer five times a day. Maybe you or your friends fast at certain times of year or refrain from eating certain kinds of meat. All of these are examples of rituals that have meaning in one or more religions. The purpose of ritual in religion is to help the participants know, understand and ultimately gain access to the invisible world of the spirit, of the divine. Think of the marriage ceremony which incorporates God's blessing of the marriage. Prayer and meditation allow for an opening of the mind and heart to the spiritual.

These experiences serve an important function in any religion, although they can sometimes be abused. Smart describes it this way:

... since ritual involves both an inner and an outer aspect it is always possible that the latter will come to dominate the former. Ritual then degenerates into a mechanical or conventional process. If people go through the motions of religious observance without accompanying it with the intentions and sentiments that give it human meaning, ritual is merely an empty shell' (1996: 4).

There are, of course, people who go through the motions of religion because they think it is expected of them, or out of simple habit, without really making the effort to engage whole-heartedly in the search for the divine. Such people can be seen as hypocrites to others outside the religion, and are then sometimes held up as evidence that the religion is flawed. Just as we acknowledge that dishonest scientists do not undermine the scientific method, we should remember that the failure of some people to live up to the ideals of a religion does not mean that everyone fails, nor does it mean that the ideals are unattainable.

5 What religious rituals are you most familiar with? Do any of these have a deep spiritual meaning for you?
6 Can you imagine a religion – yours or someone else's – without rituals? What would be lost?
7 What do these religious rituals help you – or others – to know?

The mythological dimension

The **mythology** of a religion is absolutely critical, because it is through the mythology that the history and the meaningful stories are conveyed. We should note here that the word 'mythology' has a different meaning in the context of the dimensions of religion than it tends to have in everyday usage. We tend to use the word 'mythology' to refer to something that we know is patently false, as in the statement: 'It's a myth that the moon landing was a hoax!' (which it is!). This is not what the word means in the religious context:

... in accordance with modern usage in theology and in the comparative study of religion, the terms 'myth,' 'mythological' and so on are not used to mean that the content is false. ... the use of the term 'myth' in relation to religious phenomena is quite neutral as to the truth or falsity of the story enshrined in the myth. In origin, the term 'myth' means 'story,' and in calling something a story we are not thereby saying that it is true or false; we are just reporting on what has been said (Smart 1996: 5).

The important thing to realize here is that we cannot either justify or denounce a religion simply by pointing out that it is deeply rooted in myth. (Indeed, we shall learn about this in much greater detail when we get to Chapter 16 on indigenous knowledge systems). In fact, the truth or falsity of the religious myths relies much more on emotion, intuition and revelation than on any simple presentation of empirical fact. Put another way; perhaps the truths we arrive at from religion are more like the truths from the arts than the truths we get from science.

Religious stories serve as the vehicles through which the history and ideals of any religion are conveyed to new members and new generations; so in a sense their truth or falsity is hardly the point. Regardless of whether one is religious or not, one is likely to be quite familiar with a good many stories from the mythology of several religions. Maybe you know the story of the Garden of Eden, or the story of how first Joseph Smith and then Brigham Young led the newly joined followers of the Church of Jesus Christ of the Latter Day Saints to their new land in Utah. Maybe you know the creation story from the Bṛhadāraṇyaka Upaniṣad which tells of how the Self of the universe, desiring not to be alone, split into two, and then how subsequently the two changed themselves from one creature to another – from cow, to donkey, to mare, and so on – until all the creatures of the universe were created (Campbell 9). These stories and many hundreds more serve as models to express the values and beliefs of the adherents to that particular religion.

8 What religious myths are you most familiar with? Do any of these have a deep spiritual meaning for you?
9 Can you imagine a religion – yours or someone else's – without its attendant mythology? What would be lost?
10 What, if anything, do these religious stories help you – or others – to know?

The doctrinal dimension

The doctrinal dimension of religion is closely related to the mythological dimension, because the doctrinal dimension involves the interpretation of the mythology. Doctrine is the official position of the formal institution of any religion. Doctrine is the accepted explanation of what the stories mean in terms of values and expectations for right behaviour. The doctrine, then, is what the church teaches its members.

Original Sin is an example of doctrine from many different sects of Christianity (but not all). The relevant mythology is the story of the Garden of Eden and the fall from grace. In case you are not familiar with the story, here is a very brief version: God created Adam and Eve and told them that they had free access to anything in the Garden of Eden, except that they could not eat the fruit from the Tree of Knowledge. A serpent came and tempted Eve to eat the fruit, which she did, and she in turn tempted Adam, and he ate as well. God then punished them by ejecting them from the Garden of Eden. The doctrine says that as a result of the sin of Adam and Eve (and especially, and controversially, Eve!), all people are now born sinful and must be baptized into the church so that their sins may be forgiven. (This is, of course, a simplification. Learning the whole of the mythology and its accompanying doctrine takes long and careful study! You can read a more detailed version of the story of Adam and Eve here: http://tinyurl.com/nt2j2n2).

The story tells the history; the doctrine explains what that history means for Christians. The story of the Garden of Eden is shared by the Jewish faith, by the

way, but Judaism does not hold to the doctrine of Original Sin. Jews believe the opposite, in fact: that souls enter the world untainted by sin ('Judaism's rejection of Original Sin'). This difference between the two religions illustrates the difference between the mythological and doctrinal dimensions of religion.

Knowledge framework:
Methodology

As we can see from the description of the mythological and doctrinal dimensions of religion, one of the primary means of knowledge making is the interpretation of the stories and history of the particular religious system. For most individual learners, this practice relies heavily on the acceptance of the authority of religious texts and of religious leaders such as priests, ministers, imams and rabbis.

Interpretation of texts is also undertaken by religious scholars and theologians who publish formal papers, just as natural scientists or mathematicians do. Interpretation of texts is not, in religious systems, left to individual laypeople.

The idea of doctrine means that there is an official church position on what the mythologies and histories mean, and while the doctrines may, over time, develop, the development occurs as a slow process through which the religious community comes to an agreement about meaning.

Doctrine is conveyed to religious believers through written and oral means; you may be very familiar with the practice of a religious leader delivering a sermon during church services, for example, as one means of teaching the followers the doctrinal position on what holy texts mean.

The ethical dimension

The important role of doctrine in any religion is closely related to another important aspect of religion: the ethical dimension.

You are probably quite familiar with the role of the church in ethics. Maybe you know the Christian Ten Commandments, or the Golden Rule, which occurs in some form in many religions. There is a famous story from Judaism, for example, which illustrates the point; the moral of the story of Hillel and the Golden Rule is: '*That which is despicable to you, do not do to your fellow, this is the whole Torah, and the rest is commentary, go and learn it*' ('Hillel and the Golden Rule'). There are even more examples of versions of the Golden Rule in Chapter 11 on ethics (see page 244). Religions are always concerned with questions of what is right and what is wrong; and this is defined as in accordance with, or opposed to, divine will.

We noted earlier that sometimes individual people fail to live up to the expectations of their religions, and this can be seen as hypocrisy. Smart reminds us, though, that:

Ethics concern the behaviour of the individual and, to some extent the code of ethics of the dominant religion controls the community. Quite obviously, people do not always live up to the standards they profess … For instance, Christianity teaches 'Love thy neighbour as thyself.' As a matter of sociological fact, quite a lot of people in so-called Christian communities, where Christianity is the official, or dominant, religion, fail to come anywhere near this ideal. The man who goes to church is not necessarily loving; nor is the man who goes to a Buddhist temple necessarily compassionate' (1996: 5).

Some people may not try very hard to live up to the principles they claim to espouse; others may try very hard to do so and fail. The failure of individuals to successfully embody the ethical principles of a given religion, however, does not necessarily mean that those principles are false and not worth following.

11 What religious doctrines are you most familiar with? Do any of these have a deep spiritual meaning for you?
12 Can you imagine a religion – yours or someone else's – without its attendant doctrines? What would be lost?
13 What do these religious doctrines help you – or others – to know?
14 Can you identify any commonly held ethical principles which come from religious systems? Do you think we need a religion in order to promote these principles? Why or why not?
15 How are religious doctrine and ethics related?
16 Do you think that it is fair to draw conclusions about a religion from the behaviour of individuals or groups of adherents?

The social dimension

The fifth of Smart's dimensions of religion is the social dimension, which focuses on the fact that religions are institutions, they are not simply individual experiences. We worship in groups, we undertake the rituals of our religion in groups. When we talk about a religion, we do not intend to refer to any spiritual experience any individual might have. We would not consider a spiritual practice by one person to be a religion, even if, for that one person, it exhibited many of the characteristics that we have delineated here so far.

One important consequence of the fact that religions are institutions is that even people who are not religious, who are sceptical about the existence of a god or gods, or who are strong non-believers, are likely to be affected by the fact that religions permeate societies – especially with regard to the concepts of good and evil and right and wrong, but also with regard to rituals. Many people who do not think of themselves as religious, for example, may have a wedding that incorporates some of the features of a religious marriage ceremony. Think of the acceptable ethical standards in your community. These – or at least many of these – are likely to be considered reasonable and useful even to the atheists in your culture. Religions, in other words, influence their surrounding cultures; indeed they form part of the cultural landscape.

It is also true, however, that the dominant culture is likely to influence religious practice. Smart gives two examples: '*… Japanese fishermen reconcile the Buddhist injunction against taking life (even animal or fish life) to their activity as fishermen. The Christian's dedication to brotherly love or one's attitude to war may be determined more by patriotism and a national crisis than by the Gospel*' (1996: 6). Perhaps these influences seem hypocritical, or perhaps they seem to undermine the seriousness of religious belief, but it is also possible to argue the opposite – that it is only reasonable that any religion should have to adapt to the realities of any society. If the Japanese fishermen adhered closely to the literal injunction against taking the life of a fish, then they would clearly have to give up their profession. But if all Buddhist fishermen had to give up their profession and move somewhere where they could have a job that did not involve fishing, the fishing industry might collapse, which would have dramatic consequences for the ability to feed the population of Japan. If all Christians heeded the biblical injunction to '*Love your neighbour as yourself*' (Mark 12:31), then, if attacked by an invading force, the entire community might be wiped out. The ability of a group to adhere strictly and unwaveringly to the ideals of their faith is limited by other harsh realities that have little or nothing to do with religion. Some compromise is necessitated or there might eventually be no one left to carry on the traditions and beliefs of that particular faith!

The social dimension of religion, in other words, is the living expression of how the ideals about the invisible world actually get manifested in people's day-to-day lives.

17 Can you think of ways in which the culture in which you live has been affected by the dominant religion in your community – whether you are a practitioner of that religion or not?
18 Can you imagine a religion – yours or someone else's – without its social components? What would be lost?
19 What does the institutional nature of religion help you – or others – to know?

The experiential dimension

Perhaps it seems paradoxical, given the importance of the social dimension of religion, but the dimension of any religion which is arguably the most important one in terms of helping people to develop and sustain their faith is the experiential dimension, and that is all about individual experience with religion. Many, if not most or all, religions were founded by someone who had an intense personal encounter with the invisible world – often with the deity himself – which led him to try to spread the experience to others. There are many examples.

It was through such experiences that Muhammad began to preach the unity of Allah – a preaching that had an explosive impact on the world from Central Asia to Spain. One cannot read the Upanishads, the source of so much of Hindu doctrine, without feeling the experience on which their teachings are founded. The most striking passage in the Bhagavadgita … is that in which the Lord reveals himself in terrifying splendour to Arjuna (Smart 1996: 7).

These intense, personal, individual (and hence unverifiable and, for those who require verifiable evidence, problematic) experiences with the invisible world are what led these prophets first to powerful belief and then to the role of teacher.

These stories of awakening or conversion play an important role in the mythology of any religion, and they serve as models of the kind of personal experience that believers might have with the invisible world. This experiential dimension then becomes one of the main ways in which believers come to have faith in the invisible world which, they claim, is revealed through their religion.

No one can simply order up a conversion experience, however. Such an experience may come to a person in a very dark hour of extreme spiritual need, or from the devoted practice of the other dimensions of religious life. The ideas about the existence of a god or gods and a plan for the universe come first to any new member of a church – such as the children of believers – as simple authority.

These ideas will at first simply be 'theoretical' as far as young Christians are concerned, on a par with other non-observable theories they learn about the world, such as that the world goes round the sun. But suppose they progress to a deeper understanding of the Christian faith through particular personal experiences, or through responses to the ritual and ethical demands of the religion. Then they will come to see that in some mysterious way God is a person with whom they can have contact (Smart 1996: 8).

Smart talks about the personal experience of the Christian, but the same kind of experience is important to adherents of every religion.

20 Smart makes the analogy between a scientific claim that is non-observable to an individual, and a religious claim that is non-observable to an individual. He claims that both are stages through which novices pass, and seems, therefore, to put religion and science on the same footing. Do you agree?

Knowledge framework:
Links to personal knowledge

Given the framework Dr Smart provides for defining a religious system, we can see how important personal knowledge is. In the case of religious systems, the link to personal knowledge is an important – possibly the most important – means of developing and sustaining the dominant way of knowing: faith.

We see in this chapter many examples of the power of the individual, personal experience for making religious knowledge – the reference to the Bhagavadgita and the story of Arjuna here is just one such example. This story reveals that it is not just the personal experience of the individual believer in the present day which is important, but that the powerful personal experiences of important historical figures from any given religion are passed on as part of the justification for faith in that religion.

As we noted before, however, doctrine is an official position and a matter entirely of shared knowledge.

What if someone who goes to worship every week, who adheres to the ethical principles espoused by his religion to the best of his ability, who engages in the rituals and studies the doctrine and the mythology, never has a personal experience of revelation? Would that person be able to sustain any kind of true belief? Or would he simply be going through empty motions? When we talk about trying to know religious truths, acceptance of the authority of one's parents and community, of the religious leaders and of the religious texts is certainly important, but if that is the only means by which someone has to substantiate the belief in the invisible world, it may prove insufficient in the long run.

21 Have you ever had a personal experience of revelation? Do you know anyone who has?
22 Can you imagine trying to sustain religious faith for a lifetime without ever having such an experience? What important aspects of religion and religious faith would be lost?
23 Conversely, do you think that someone who has had a personal revelation could fail to believe in the invisible world? Why or why not?
24 What does the experiential dimension of religion help you – or others – to know?

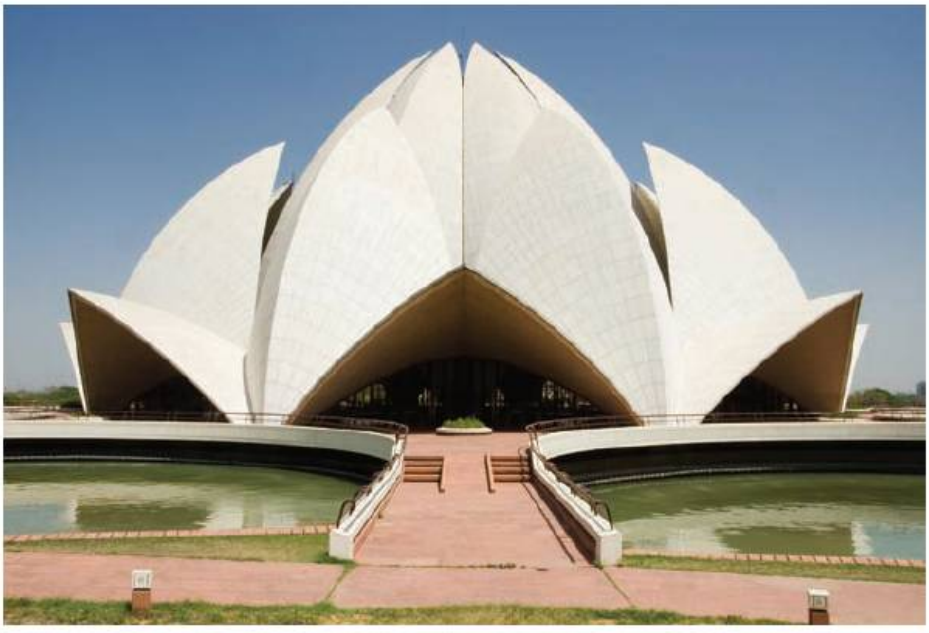
The material dimension

The last of Smart's seven dimensions of religion is the material dimension. This refers to all the material objects that have been created as symbols of religious ideas or as representations of religious history. Of course there is a huge body of religious artwork – much of it extremely famous. We considered Michelangelo's mural *The Last Supper* in Chapter 4. Countless paintings depict Mary, the Madonna, and the baby Jesus, and no doubt you can think of many other famous artworks which depict religious ideas. The material dimension of religion does not refer solely to works that were deliberately created as art, however. It includes all of the objects of day-to-day worship – the Catholic rosary beads, the Jewish yarmulke, the Muslim prayer rugs, and the Hindu household shrines containing a statue of a god such as Ganesha, for example. It also includes the buildings in which people go to worship.

What makes all of these material objects important to religion is the meaning ascribed to them by the practitioners of that religion. To a Christian, the statue of Ganesha might seem to be nothing more than a fanciful representation of an elephant. To a Hindu, the Jewish yarmulke is probably merely a sort of hat. To the Hindu and the Jew, however, these objects are sacred. Someone outside a given religion might appreciate the beauty of a material object, but someone inside the religion understands the deep symbolic significance of the object.

The material objects of any religion are not designed at random. They are deliberately created to reflect principles of doctrines or elements of ritual, history or mythology. Consider, for example, the design of the eight temples of the Bahá'í (one on each continent):

Offering an atmosphere of peace and tranquility to visitors, each temple has its own distinctive design. Nevertheless, each has nine entrances and a central dome representing the convergence of peoples from all directions gathering at one common site. … The Bahá'í temples invite visitors to immerse themselves in a beautifully designed environment that blends architectural innovation with delicate gardens and extensive green areas, planned to touch the soul and enable a meeting with God or with oneself ('Concept – Bahá'í Temple').



■ **The Bahá'í temple in New Delhi, India**

The Bahá'í temples, in other words, are deliberately designed to help foster the experiential dimension of religion. This is true, too, of many, if not all, of the other material objects which are central to any religious practice.

25 Do you have any material objects which have religious meaning for you? What are they? If you don't, do you know other people who do?
26 Have you ever been to a place of religious worship? How did the design of the place help to foster the appropriate atmosphere for worship?
27 Can you imagine a religion without any material dimension? What would be lost?
28 What does the material dimension of religion help you – or others – to know?

Now that we have considered seven dimensions which help to define the nature of a religious system, we've begun to outline the means by which religious knowledge is made. We will undertake, next, the examination of a case study of one religious question. We'll consider arguments for and against the existence of God; as you read, think about the ways of knowing that are important to the justification of these arguments.

Arguments for the existence of God

The scope of this book will not allow us to consider the interesting questions of religion for all religions – or even all of the most common ones. We have provided some suggestions for further study at the end of the chapter, but for the sake of illustrating the way knowledge is made within religion, we will focus in detail on one particular religious question: the argument over the existence of the Christian God. The specific details of the arguments may not apply to all other religions, but the general approaches, and their strengths and weaknesses, will. Consider, as you read through these arguments, what ways of knowing are used, and how each argument fits (or fails to fit) into the seven dimensions of religion.

Many brilliant thinkers have argued passionately that God exists; many have argued that He does not. Some of the arguments have been debated for the best part of 800 years, and still inspire new defences and counter-attacks from both

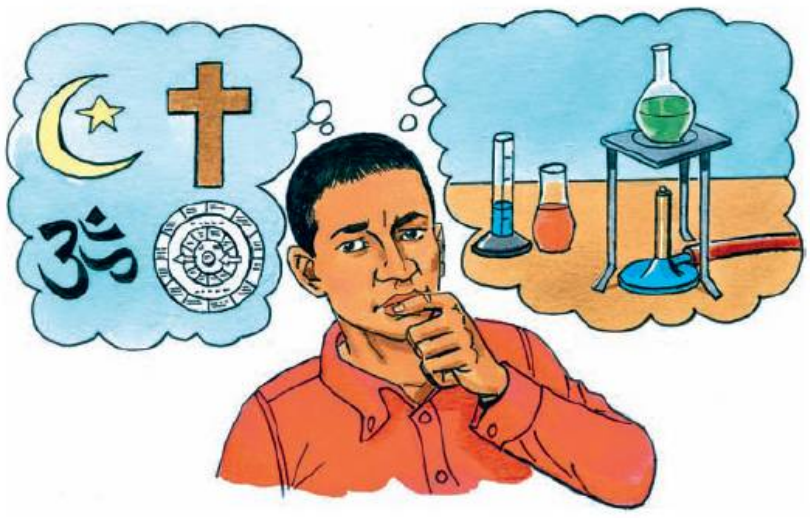
sides. We will review some of the more popular arguments and then stand back and take stock of what, if anything, we can conclude.

Argument from design

Imagine you are walking in a sandy desert, miles from civilization, through what you believe is completely uninhabited land. There have been no signs of human life for days; just sand in all directions, and the odd camel. Suddenly, in the distance, something small and shiny on the ground catches the light; you walk over to it and you find a camera. You were sure that there were no humans in the area, so you have two options. Either you were wrong, and the camera was put there by humans, or it somehow sprang into being by some mysterious, purely natural force. Which choice is the more reasonable?

In this case, we clearly require human intervention (neglecting the camel possibility) because the camera could not have come into being in an accidental way. The lens exactly fits the camera body, the shutter opens for exactly the right length of time to create a detailed image and there is a viewfinder lens for humans to look through to see the image they are recording. In short, the camera shows unmistakable signs of design and, what is more, design for human use. For many people, exactly the same argument applies to the world. The complexity of the world implies that it is clearly designed, so there must be a designer, and God is that designer. In fact, the argument arguably applies with far more force. You think a camera is complex? Look at the eye! Look at the brain! A single human brain is the most complex physical structure known to humankind, far, far more complex than the most sophisticated supercomputer. If a camera is designed, surely a brain must be designed?

For many people, this **argument from design**, or **teleological argument** (from Greek *telos* meaning 'goal' or 'end', and referring to the idea that this argument entails the idea that the creator had an end, or purpose, in mind) means that a compelling argument in favour of God's existence is all around them. It is in the intricacy, beauty and design of the natural world (Pecorino).



The most famous counter-argument against this comes from Charles Darwin, and in essence it is very simple.

Darwin makes a distinction between the concepts of **order** and **design**, suggesting that not everything which shows order must have been designed. As an example, consider walking upstream along a river. You notice that as you

walk further, the rocks in the river seem to be getting bigger; that the river is well ordered in this respect. But no designer is needed to explain this ordering, and the whole process is completely and convincingly explained by geographical theories of fluvial transportation and deposition – sorting rocks of different sizes is simply the result of natural physical processes. Similarly, Darwin argues that we can explain the order in nature through purely physical processes; that a designer is unnecessary. This means that we can account for the world without God, and that the apparent design of the world is no evidence for a creator.

Of course, the order in the natural world is far greater than that in a single river and Darwin's basic idea needed a lot of detailed work before it became convincing, but virtually all scientists working in biological fields believe that the evidence for it *is* convincing. Where there are disagreements, it's mostly in the fine details; the mechanism of natural selection is universally accepted among biologists. In fact, in 2009, at a conference marking the 150th anniversary of Darwin's *The Origin of Species*, the Vatican proclaimed that '*… Darwinian evolution and the account of Creation in Genesis are perfectly compatible*' (Owen). So the fact of evolution is now well established.

Note, however, that the theory of evolution is an argument against the teleological argument, not an argument against the existence of God (and once again note the precise meaning of the word 'theory' in scientific contexts, which is different to its everyday meaning).

Knowledge framework:
Historical development

For any given religion, history plays a significant role in forming the basis for doctrine. Certain events – such as the crucifixion of Jesus Christ, the parting of the Red Sea, the revelations to the Prophet Muhammad, or the emergence of the Hindu Upanishads as scripture – play a role in helping followers to know the ideals and values of their religious system.

Additionally, religious systems develop over time, and certain historical events are seminal in shaping the belief system. The birth of Christ, for example, ushered in a new era – and a new testament with God – for Christians; for Jews, however, the birth of Jesus did not have the same effect, as Jesus is not viewed, in Judaism, as the Messiah – or, to use the correct Jewish term, the Mashiach.

Doctrine may also develop over time as new scriptures are discovered or as new, more accurate, translations are developed. Scientific discovery may drive change in doctrine, as it did in the case of the shift from the geocentric to the heliocentric universe, or in the acceptance of the fact of evolution as a mechanism of change. Note, however, that such change is slow, and occurs only as deeper understanding develops of how holy scriptures can be understood in the context of scientific knowledge.

Knowledge of any particular religious system will include knowledge of what historic events were important in the shaping of the belief system of that religion.

The anthropic argument

One variety of the argument from design that is at least partly immune to Darwin's criticisms goes by the name of the **anthropic argument**. This argument notes from a scientific point of view that very slight changes in any one of several aspects of the universe would have made it impossible for us to exist, or even have evolved. If the Earth were a little closer or further away from the Sun; if the atmosphere were a little thinner; if the Sun were hotter or cooler; if the structure of water were a little different; if the electron/proton or neutron/proton mass ratios were different; if the ratios between the four fundamental forces were different; if there were different numbers of spatial dimensions (and so on), we would not exist. All these and dozens of other conditions must be

fulfilled for us to be able to survive or evolve. What is the probability of that happening? Extremely low, runs the argument, and this provides evidence that we are not here by pure chance. Astronomer Fred Hoyle, a primary proponent of this argument, said that '*It looks like a put-up job. A common sense interpretation of the facts suggests that a super-intellect has monkeyed with physics*' (Davies). A counter-argument suggests that the logic is incorrect: given that we are here, it is absolutely certain that these things are the way they are. If they were not, we would not be here, and it is a trick of conditional probability that it appears unlikely. After all, given an infinite universe, there is an infinite number of combinations of planets, stars and other objects on which the correct combination for life did not occur. There is nothing to suggest that random chance turned up the only possible viable combination on the first and only cosmic roll of the dice. Once again, however, we should note that this counter-argument may be convincing, but even so, it does not *dis*prove the existence of God.

29 The following argument has been made against Darwin's idea of evolution: The human body is vastly more complex than a jumbo jet. But we say that 'natural events' led to humans. Well, could natural events lead to even a jumbo jet? Could a natural event like a whirlwind sweep through a scrapyard and somehow assemble all the parts for a jumbo, ready for take-off? If not, then natural events can account for neither jumbo jets nor humans. Evaluate the validity of this analogy.

30 Augustine of Hippo, the fifth-century bishop and philosopher, anticipated Darwin by well over a thousand years, suggesting that God created the universe with built-in organizing principles through which all forms of life and non-life developed. So is evolution consistent with belief in God? What would scientists today make of Augustine's claim?

31 What do you think of the anthropic argument? Is it persuasive?

32 Let us grant the argument from design its full force, and accept that the universe was indeed designed. What can we conclude from this fact? Are we inevitably led to the existence of an omnipotent, benevolent God, or could God be of a completely different nature?

The cosmological argument

A second argument often put forward in favour of God's existence has been called the **argument from first cause**, or the **cosmological argument**. Like the argument from design, it is based in everyday experience. When we ask 'Why did this happen?' we always feel there is a cause, even if we cannot find it. And when we have found the cause, we can, like the proverbial curious child, ask why that happened, and so on. For example, in attempting to answer the question 'What causes the stars to twinkle?', we can imagine a (very truncated) sequence which starts 'stars twinkle because the light comes through the atmosphere; coming through the atmosphere causes twinkling because of the process of refraction; refraction is caused by ...' and which eventually ends '... because that is the way the universe is made'. In any explanation we either keep on going, or we stop somewhere, and the argument from first cause suggests that the somewhere at which the explanation stops is God. Most famously stated by Thomas Aquinas, this argument can be expressed in the following logical form:

1 Every event is caused by some event prior to it.
2 Either the series of causes is infinite, or it stops with a first cause which is itself uncaused.
3 An infinite series of causes is impossible.
4 Therefore a first cause, which is uncaused and which is God, must exist.

This common-sense approach has also been subject to stinging criticism from David Hume, who we have seen already in this chapter and in Chapter 8, and who disputed 1, 3 and 4. Hume thought that 3 is simply false, that it is another example of limited human understanding, and of our human need to impose human order on the universe. If we can conceive of an infinite future, why not an infinite past? It is not logically or empirically clear why 2 should be true, so we should not accept it. Hume also argued that even if 1, 2 and 3 are true, why does this lead to God? Couldn't the universe have created itself, uncaused? A related difficulty lies in the contradictory nature of the argument. Premise 1 seems to rule out the possibility of anything uncaused at all, which would rule out God immediately.

Recent attempts have been made to defend Aquinas against these charges, and it is fair to say that, despite Hume's penetrating comments, debate is still alive and well in some philosophical quarters.

33 Current scientific theory suggests that the universe began in a 'big bang' several billion years ago. It also suggests that some events on the quantum-mechanical scale are genuinely uncaused. Are either of these facts evidence for or against the argument from first cause?

34 What do you think of part 2 of Aquinas' argument? Is it possible to imagine an infinite past? Is this harder to conceive of than an infinite future? If so, why?

35 Some have argued that trying to find the first cause is like trying to find the smallest positive number – a meaningless task. Given any number (state of the universe), you can always find a smaller number (earlier cause) but you can never find the smallest number (first cause) because there is no such thing. This is obvious when you think of a number line – no matter how close you get to zero, you can always 'zoom in' and get closer. Is this a helpful analogy? Is it possible to imagine that every single event has a cause, but that there is no first event?

36 Let us grant the first cause argument its full force, and concede that the universe was indeed caused by God. What can we conclude from this fact? Are we inevitably led to the existence of an omnipotent, benevolent God, or are there other first causes equally consistent with design?

The argument from miracles

The final argument we shall consider, and one that has had great popular appeal over the centuries, is the **argument from miracles**. According to this argument, miraculous happenings throughout history, such as Jesus rising from the dead,

milk flowing from a stone statue of Ganesha, or sudden remissions of deadly diseases, are evidence of divine intervention because only God could cause such things to happen. Like the other two arguments, there is something very appealing about this line of thinking – some events seem so incredibly unlikely, implausible or even impossible for humans, that some sort of divine agency must be responsible.

However, like the other two arguments, there are problems. First, let us consider exactly what we mean by a miracle. Presumably it must be something which cannot be explained by any natural or scientific laws, so in this context we do not mean such miracles as the 'miracle of birth', wonderful and awe-inspiring as this may be, as it requires no divine intervention. Most physical and biological processes are reasonably well understood and there is every indication that those which are not will be explained by careful and painstaking scientific investigation. No, a miracle must be something which is beyond scientific explanation. Suppose, for example, I find that my cup of water has turned into wine. What can I make of this? Is it a miracle? It certainly seems to be unaccounted for by the known laws of nature, but that may well be because we don't (yet?) know the correct laws of nature. In past times, thunder and lightning were explained with reference to gods; they were thought to be miraculous. But now we believe otherwise. In the late nineteenth century, it was found that photographic plates kept in total darkness became exposed. At the time this was inexplicable, but in fact this 'miraculous' incident opened up the whole field of radioactivity to scientific study. To invoke God as the explanation for events which are not explained by science is possible but this inference is vulnerable to advances in knowledge. Opponents of the argument from miracles call this the 'God of the gaps' approach. They argue that throughout recorded history God has been proposed as the explanation for everything that is otherwise inexplicable. The problem is that as we learn to explain more and more phenomena through science, there is less and less need for God as the explanation. It is possible, then, to imagine that one day everything will be explainable through science, and no gods will be needed to fill the gap. Note, however, that there is no certainty that this is what will eventually happen.

It could be said that some events seem not only miraculous, but take place in such contexts that natural laws must be inadequate to explain them. For example, the Bible recounts that the sound of Joshua's trumpet caused the walls of Jericho to fall, and the Sun to stop still in the sky for several hours. By any account, this would have to be a miracle; how could the laws of science link a trumpet call with the motion of the Sun? If the story is true, even the most fervent atheist would have to admit that this is a good case for attributing divine intervention with causing the event. But is it true? We were not at Jericho at the crucial time. How can we know? Perhaps the description is not of a literal event, but is, instead, a metaphor to describe the emotional experience of some very dramatic natural event.

In *On Miracles*, David Hume writes that when we listen to stories of such miracles, we should weigh up two possibilities. First, that the account is genuine and the event is indeed miraculous; second, that those making the report are deluded, credulous or dishonest and that the event is not miraculous. This approach may seem rather brutal, but it would be foolish and simply incorrect to suggest that lying, exaggeration and gullibility are even rare, let alone miraculous:

No testimony is sufficient to establish a miracle unless the testimony be of such a kind that its falsehood would be more miraculous than the fact which it endeavours to establish. … When anyone tells me, that he saw a dead man restored to life, I immediately consider with myself, whether it be more probable, that this person should either deceive or be deceived, or that the fact, which he relates, should really have happened (Hume 114–16).

So which is the more likely? That miracles occur or that accounts of miracles are false or deceptive? There are no prizes for guessing where Hume stands on the matter, but what do you think? Hume argues that some deception is far more likely than a miracle, but it could be said that he is open to the charge of circularity. We do not know the likelihood of a miracle happening – if we did, then their occurrence would not be in dispute (a zero probability means miracles never happen; any other probability confirms the possibility of their occurrence). So how do we evaluate the probability? This question clearly illustrates the paradigmatic nature of religion – if we are atheists then the probability is zero, but if we are theists then the probability may, depending on our particular beliefs, be quite high. Under some circumstances then, by Hume's own account we may feel that the miracle is the better explanation, especially if the source is very trustworthy.

Perhaps all we can say is that the argument from miracles is hardly likely to win converts from atheism and, conversely, the problem of miracles is hardly a problem for any theist! Despite these issues, it is probably fair to say that if certain miracles were to be reliably witnessed at first hand, even the most zealous atheists would need to re-examine their beliefs, but that these miracles have not (yet?) happened. If someone appeared to us, telling us that he was God, with the ability to repeatedly perform under scrutiny such 'impossible' things as changing water into wine, reading minds, and predicting the future publicly, precisely and unambiguously, then many would say that the claim was a strong one. The conclusion that these events proved the existence of God could still be avoided in several ways – one might, for example, argue that we have seen professional magicians perform 'miraculous' deeds which we know are not really miracles, even though we do not understand how the illusions are created. We must still acknowledge, however, that just because any given 'miracle' turns out to be an illusion does not mean that *no* miracle is real.

Check out this video of magician David Copperfield, for example: http://tinyurl.com/3u4hmsq. At the end of the video (4:05), it appears that he can fly without any kind of support; do you think this a miracle?

37 Sometimes scientists are accused of arrogance because they believe that science has all the answers. How does this relate to the notion of miracles as being beyond the realm of science?

38 Even if we grant the difficult-to-satisfy criterion that an event must be inexplicable by science, where does that get us? Does an event that is 'inexplicable by science' necessitate divine intervention?

39 The science fiction writer Arthur C. Clarke wrote that '*any sufficiently advanced technology is indistinguishable from magic*'. Do you agree? What implication does this have for the argument from miracles?

40 In Hume's critique, we are required to assess the probability of a miracle. How do we do that? What are the problems with Hume's argument?

41 Did you think that the David Copperfield video demonstrated a miracle? What are the means by which you justify your position? Does the same kind of faith that causes people to believe in the invisible world of God apply here? Why or why not?

The above is by no means a complete catalogue of the rational arguments which attempt to support the existence of God, nor an exhaustive report of the subtlety, complexity or richness of the thorough arguments that philosophers and theologians have developed. It does, however, give a flavour of the genre and should inspire further research for the interested. We now turn to the arguments offered in the other direction.

Arguments against the existence of God

The no-argument needed argument

The most extreme defence of atheism has been to claim that it needs no defence. The thrust of this argument is that the existence of God is like the existence of Father Christmas – the notion is so far-fetched and lacking in rational or empirical basis that our base position should be that of atheism, and that the burden of proof is on the theist. This sort of statement is arguably circular and many find it more aggressive than persuasive in nature. It certainly demonstrates that the whole role of argument within the religious context is sometimes so clouded in emotion on both sides of the divide that rational discussion is difficult. This sort of argument is made when the speaker is less interested in the truth than in scoring rhetorical points, and since it is the former which interests us here, we shall go ahead and examine theism for strengths and weaknesses.

The paradoxes of omnipotence

The first argument against the existence of God is based around a set of questions which are collectively known as the **paradoxes of omnipotence**. Proponents argue that these paradoxes demonstrate that the very concept of an omnipotent God is inconsistent and hence impossible. The argument is quite radical as it claims to demonstrate not only that there is no God, but that there *could not be* a God, just as there could not be a square circle or a married bachelor.
The questions are those such as:

1 Can God make a stone so heavy he cannot lift it?
2 Can God make Himself omnipotent and not omnipotent at the same time?
3 Can God create another omnipotent being?
4 Can God cease to be omnipotent?

You can immediately see the problems – 2 seems downright absurd, and no matter how you answer the others there seems to be some limit placed on God's power. For example, in 1 if God can't make such a stone then there is something He cannot do (make the stone) and so He is not omnipotent; if He can make a stone that He cannot lift then there is something He cannot do (lift the stone) and so He is not omnipotent. Either way we have a dilemma.

Responses to these questions have been either to engage them directly or to acknowledge their force but to deny their relevance. We will turn to the latter tactic in the next section; for now let us see what we can do to resolve the paradoxes. Many have said that these objections have something of a word game nature to them and suggest that none of these questions generates paradox when looked at correctly. In the case of the stone too heavy to lift, for

example, to say that 'God cannot create a stone which is too heavy to move' is a direct and harmless consequence of 'God can create and move stones of any weight at all.' In case 4 a common response is to say that God cannot cease to be omnipotent any more than He can cease to exist, but that this inability is not a *contradiction* of His omnipotence but an *expression* of it. Note that, as with the counter-arguments to the arguments in favour of God's existence, these counter-arguments do not prove the antithesis of the original argument. The counter-arguments may cause the atheists to refine or expand and explain their arguments, but they do not prove the existence of God.

A separate but related issue to do with the nature of God is His omniscience – that is, His knowledge of all things at all times. The argument goes as follows: if God is omniscient then He knows what you are about to do; if He knows what you are about to do then you must do it (otherwise God would be in error); if you must do it then you have no freedom (since you couldn't do anything else). But we know that we have freedom, and hence God cannot be omniscient. There are several possible responses to this, although the response that we do not, in fact, have free will at all seems closed to most believers. An interesting line of argument is to place God in time (as opposed to the more common conception of God as timeless) and to suggest that His omniscience only extends to what can be known, which does not include the future, in which case, God's omniscience does not include knowledge of my future choice. The obvious counter-claim here, though, is to ask how this God makes prophecies and what it means for God to have been 'younger' in the past. The arguments seem endless; certainly they have been going on for several hundred years.

42 Why does the third paradox of omnipotence (above) provide an argument against the existence of God? Is there any way that two omnipotent beings can exist at the same time?

43 Some philosophers have suggested that omnipotence should be defined as the ability to do all logically possible things rather than just all things. (Descartes famously disagreed and thought that God could do the logically impossible.) Why do we place such an important role on logic? What does it mean to say that God must obey the laws of logic?

44 As with the argument that God's omniscience and free will are incompatible, we can argue that God's omnipotence and freedom are incompatible. Do you agree?

45 Take the argument that suggests that omniscience is incompatible with free will. Identify the premises, formulate them as a formal logical argument along the lines we saw in Chapter 7, and test them for validity. If the logic is valid then the argument is sound, unless you can fault one or more of the premises. Are any of them open to doubt? If so, which ones? Why?

46 Is there any way that theists could jettison free will and still believe in a benevolent God?

It is fair to say that these problems fail to strike a chord with many believers, even those who acknowledge the force of the arguments. Pure logic is not necessarily appealing to people whose emotions are strongly engaged. Maybe the atheist needs a more personal, immediate and less abstract argument if he is to persuade any waverers.

The problem of evil

The atheist points to the problem of evil as just such an argument; the idea being that an omnipotent, perfectly good God cannot exist simultaneously with evil. Since evil does exist, an omnipotent, perfectly good God cannot. Notice

that this argument does not rule out God in general, but just a specific type of God. If God is good, how can evil have come about? Even if we can answer that, if God is good, why doesn't He stop evil events? Over the centuries, the questions have been asked from far more than an intellectual point of view. Anyone with any knowledge of the world sees and feels the vast amount of suffering and pain that there is. John Stuart Mill obviously felt it keenly when he wrote, in *Nature*:

> *Nature impales men, breaks them as if on the wheel, casts them to be devoured by wild beasts, burns them to death, crushes them with stones like the first Christian martyr, starves them with hunger, freezes them with cold, poisons them by the quick or slow venom of her exhalations, and has hundreds of other hideous deaths in reserve … all this Nature does with the most supercilious disregard both of mercy and of justice, emptying her shafts upon the best and noblest indifferently with the meanest and worst; upon those who are engaged in the highest and worthiest enterprises (81).*

Unfortunately, increasing knowledge about the world has not given us any reason to doubt the description painted here; if anything it reinforces it. We find wasps whose stings paralyze but do not kill their prey, this in order to provide fresh food for the eggs which are laid in the body of the victim when they hatch. The still-living insect is eaten from the inside outwards. We find cats whose 'play' with mice we might call torture if the cats were human. All over the animal kingdom we find predators whose only way to survive is to rip other animals limb from limb. When we turn to human life, we may be lucky enough to find ourselves in a position of comfort, but looking over history this seems to be the exception rather than the rule. If the world has been designed, then it is difficult to see how the design could have come from a benevolent God. William James points out that '*to the grub under the bark, the exquisite fitness of the woodpecker's organism to extract him would certainly argue a diabolical designer*' (Giere 71).

A possible defence recognizes that evil exists, but suggests that it is all worthwhile because good comes of it (interestingly, this makes God a utilitarian, as we shall see in Chapter 11). The analogy can be made with a doctor who must inflict pain to ensure recovery. It may hurt in the short term, but in the long term it will be in our interests to undergo the treatment. Similarly, we can argue that God's ultimately good plans for us can only be realized through a certain amount of suffering.

There are several problems with this, however. First, we might question whether or not good arises from evil. Does the wasp eating its way out of a victim bring more good to the world than pain? Can we somehow justify the brutality and agony of the Holocaust, or more recent atrocities in Cambodia, Indonesia, the Balkans, Rwanda, East Timor and Central America? To say that these are all for the good, seems a little far-fetched. Leibnitz famously suggested that we live in '*the best of all possible worlds*' but the argument is remembered more for its implausibility than anything else. Even if we grant that good does come of evil, we still find the existence of evil to be a real problem for theists. To take the doctor analogy further, we recognize that the doctor may be forced to inflict pain, and we do not blame the doctor because we recognize her limited ability to stop it. But what do we make of the doctor who, when it is within her power to heal the patient painlessly, decides to inflict agony and torture? *That* is the true situation if there is an omnipotent God, for an omnipotent God would necessarily be *able* to make us achieve His goals without pain, but He seems not to have done so. In short, the idea that evil is necessary for good, or somehow

begets good, is difficult to sustain. If we are to resolve the problem of evil, we will need to look elsewhere.

Perhaps the most widely held and most plausible defence offered by believers is that which suggests that evil is caused not by God but by human freedom. This argument suggests that, in giving us free will, God had no choice but to give us freedom to commit evil. Freedom and inability to commit evil are logically inconsistent – if you have one you can't have the other. Being a little bit free is like being a little bit pregnant – it's impossible. Either we are totally free, and free to commit evil acts, or we are not free at all; therefore, if God wanted to give us free will, and he had to give us the capacity for evil, He is responsible for that, but we are responsible for the evil itself; He is not.

Do we have free will?

Of course, this argument is not free from controversy. A simple way out is to deny that we have free will at all. This renders the discussion irrelevant, but few people would want to go that far. Let us take free will at face value. Is the problem then resolved? Can we then forget about the problem of evil?

We should at this stage distinguish between **natural evils** and **moral evils**; the former are those which occur naturally without human intervention (earthquakes, floods, plagues); the latter are those inflicted by people on other people. Now the freedom defence clearly does not apply to natural evil, but let this pass for now. If we can deal with even moral evil then it will be a huge step forward, and if it is humans who are responsible for pain and suffering then is God not excused? Have we not solved the problem?

Maybe not. Atheists may point, for example, to the terrible acts of tyrants who go unpunished and the price paid by sometimes millions of innocent victims, and still maintain that this is incompatible with a good and just God. They can reasonably argue that even if the perpetrators of these evils and their victims eventually get their 'just rewards' in the afterlife, this is not really justice. If I have suffered terrible torture, or seen my children die horribly, then a happy afterlife does not compensate for such suffering; justice cannot be doled out like ice cream. Nor does the suggestion of an eternal punishment for my torturer or the murderer of my children provide me with comfort; the deeds have been

done. The only thing that God could do would be to prevent these terrible things from happening in the first place. And, says the atheist, the fact remains that He does not.

At this stage, we may have reached a stalemate. The believer says that the price is worth paying; the atheist says that it is not. The two sides differ in their assessment of the relative values of freedom and suffering, and they may have to agree to differ on this point.

47 Is this correct – that reason has reached its limits here? Is this a surprise given what we know about reasoning?
48 If reasoning has reached its limits, how do we proceed from here?

It is fair to say that the problem of evil, at least, is a major difficulty for believers who feel the force of the argument as keenly as any atheist. The Christian writer C.S. Lewis wrote on the problem of evil when his wife Joy was dying of cancer. He asked whether such pain and suffering is really necessary and answered: '*Well, take your choice. The tortures occur. If they are unnecessary, then there is no God or a bad one. If there is a good God then these tortures are necessary. For no even moderately good Being could possibly inflict or permit them if they weren't*' (Nicholi 202). Christians admit the problem, but do not give up hope: '*We are perplexed, but not in despair*' (2 Corinthians 4:8).

49 Consider the argument against God's existence based on the problem of evil. Identify the premises, formulate them and test them for validity (as we did when looking at rationalism in Chapter 7). If the logic is valid then it is sound, unless at least one of the premises is wrong. Which of the premises are open to doubt?
50 St Augustine said that there is no such thing as evil, merely the lack of good. If that is so, then there is no problem of evil. Let us make an analogy. Imagine a blind man wondering why he has been born blind. If we tell him that he is not really blind, he merely lacks vision, are we solving the problem? What do you think of this solution? Or is this a poor analogy? If so, why?
51 Could the problem of evil be resolved by blaming it on 'the devil' or some equivalent being?
52 Is the commentary on pages 205–206 too harsh when explaining the problem of evil by arguing that it is for the greater good? Can the argument be made to work? If so, how?
53 No one suggests that God created humans free to do absolutely anything imaginable. For example, we cannot fly unaided, or stand in the middle of a furnace unharmed. Might there be a way for God to construct a universe with morally free people who physically could not commit such atrocities as we do? And if so, since God created this world when He could have created that one, does this undermine the free will defence?
54 It is suggested that God is responsible for giving us the capacity for evil, but that we are responsible for the evil acts themselves. Let us make two analogies that involve giving guns to adults and children:
   - I gave the man the gun; I was responsible for giving him the capacity to shoot someone, but he is responsible for the act itself.
   - I gave the eight-year-old child the gun; I was responsible for giving him the capacity to shoot someone, but he is responsible for the act itself.

   Is there a difference between these two cases? Which analogy is closer to God giving us free will? Is either analogy helpful? Can you think of a better one?
55 Where do you stand on the problem of evil?

As with the arguments in favour of God's existence, we have given an account of only a few of the arguments, and explored these only superficially. This should, however, give you some idea of the ways in which people have approached

the problem, and it should reveal something of the difficulty in trying to construct through rational argument any definitive proof of God's existence (or lack thereof).

Should we believe in God?

In his autobiography, Bertrand Russell tells us that as a young man he believed in God until he was 18, when he decided that the argument from first cause was invalid, and became an atheist. Then he tells us about an incident in his fourth year at Cambridge University when he converted back to believing: '*I had gone out to buy a tin of tobacco and was going back with it along Trinity Lane when suddenly I threw it up in the air and exclaimed 'Great God in Boots! – the ontological argument is sound!*' (Nagasawa 21). Later he came to the conclusion that his insight had been mistaken, and reverted to atheism.

Despite our commitment to reasoning and rational inquiry that we reaffirmed at the start of this chapter, most of us find Russell's approach rather strange. Though we may admire his open mind and willingness to admit his errors, most people simply *do not respond* to the rational arguments for and against the existence of God in this way. We may find them interesting, and may even get into heated arguments about them, but for many these arguments do not really touch us or the core of our beliefs. William James expressed it well:

The arguments for God's existence have stood for hundreds of years with the waves of unbelieving criticism breaking against them, never totally discrediting them in the ears of the faithful, but on the whole slowly and surely washing out the mortar from between their joints. If you have a God already whom you believe in, these arguments confirm you. If you are atheistic, they fail to set you right (273).

A similar statement can be made with regard to all the arguments against the existence of God. The theistic arguments are all open to criticism, and atheists use those criticisms as reasons not to accept the arguments. Theists likewise reject the logical arguments of atheists for the same reason. There is simply no evidence for any of these arguments strong enough to settle the matter one way or the other; if there were, the arguments would be settled. So we are in a position where atheists are satisfied that their arguments have falsified theism; theists say much the same thing in reverse and neither side gives much ground. One is reminded of competing scientific theories where the evidence is inconclusive, but the difference here is that in the case of religion no more evidence seems to be available, at least in this life. If you already believe then the arguments are persuasive, but reason isn't going to make any converts on either side. As a result, it may be more accurate to say that the arguments are *expressions* of our beliefs rather than *reasons* for them.

The question of whether God exists or not, then, comes down to individual choice. To take just one example that we raised above, let's consider the 'God of the gaps' argument: regardless of whether you are theistic or atheistic, you cannot prove your position absolutely, so you must ultimately choose to believe, without proof, whichever of the arguments makes the most sense to you. If you are strongly inclined to believe that there is a designer with a purpose behind the

wonders of the universe, then you will continue to believe that there are things that science will never explain because they are not caused by natural forces, but by God. If, on the other hand, you are strongly inclined to believe that there is a natural explanation for everything, and that while science has not yet found all the explanations – and may never find all the explanations – you will continue to believe that there is no God, and as science learns more and more, and the gap for God gets smaller and smaller, you will point to that as your evidence.

Interestingly, both of these positions are matters of faith. Whether you put your faith in a creator god or in natural processes, you are choosing to believe in something you cannot see and which cannot be proven with evidence of the senses. Paradoxically, perhaps abandoning reason, at least momentarily, is the most rational thing to do. Martin Luther expressed it this way: '*Whoever wants to be a Christian should tear the eyes out of his Reason … Reason must be deluded, blinded and destroyed*' (Snider 46).

Faith, then, as a way of knowing, seems to be quite important, and we will consider it in more detail in Chapter 18.

56 How do you react to the rational arguments? Do you find yourself approaching them honestly and openly or do you find yourself looking to justify what you already believe?
57 What other ways of knowing are important in making (and accepting or refuting) the arguments for and against the existence of God?
58 To which of the seven dimensions of religion do these arguments pertain?
59 Consider some key questions in religions other than Christianity. Do the same problems of trying to use reason as the primary way of knowing apply?
60 What key aspects of making religious knowledge does an attempt to rely heavily or exclusively on reason leave out?

Billions of people have believed and do believe in God, and it is interesting to see why they do so. Despite what we have said here, only a minority who go through the rational arguments find them inconclusive and then make the decision to take the leap of faith. For most, the process is entirely different, and some have likened coming to God to the process of falling in love – exciting, scary and involving trust and faith. They say that 'you just know' when you are in love; that their reasons are based in emotion and intuition and it is the same with God. The leap of faith is not a leap that is consciously made; rather it is something that is felt, perhaps even lived.

61 How do you feel about faith? If you believe, to what extent is your belief based on faith and to what extent on reason?
62 Does God exist? Justify your position.

Knowledge framework:
Terminology and concepts

'Faith' is a critical concept for any religious system, and we will explore it in much more depth in a later chapter.

Other important concepts we have identified here are the seven dimensions of religion, including the precise meaning of the term 'mythology' and the term 'doctrine'.

Each religious system has its own important vocabulary, which you will need to know if you are to understand that particular system. The term 'Messiah,' in Christianity, for example, does not mean the same thing as the Jewish term 'Mashiach'. The latter refers to a human leader who will bring peace and justice (Rich).

As an illustration of the importance of the terminology and vocabulary, consider the Islamic term 'jihad'. In scripture, the word 'jihad' refers to several kinds of struggle, of which 'holy war' is just one, and one which is not usually considered to be the most important meaning. The word is more often used, in the context of the Qu'ran, to refer to the internal struggle to embody the Islamic faith, which is the duty of all Muslims. In the late twentieth and early twenty-first centuries, this important meaning of the word has been largely overlooked in the non-Muslim world, because of the widespread association of the term 'jihad' with acts of terrorism ('Jihad').

Since the language of holy texts is often not the language of the religious follower, important religious terminology is also subject to the problems of translation, so it is important for any knower to be willing to work hard for understanding.

Where have we been? Where are we going?

Given Dr Ninian Smart's definition of religion, we have seen that reason as a way of knowing cannot serve religious knowledge making on its own. A dogged reliance on reason undermines or disregards the important social and personal, experiential aspects of religious knowledge systems. Reason also ultimately fails, because, since we are dealing with a part of human experience which is, by definition, invisible to our senses, we cannot construct arguments that rest on demonstrable premises sound enough to convince others.

We use reasoning, nevertheless, to help explain and justify our own beliefs to ourselves, even if we cannot convince others. This reasoning is, essentially, *post hoc* – that is, we believe first, and then we reason to explain our beliefs. The question, then, is how do we come to believe? Our beliefs seem to be intuitive, so we will turn next to intuition as a way of knowing, and consider how it helps us to make knowledge in religious systems and other areas of knowledge.

Further reading

Check out the philosophy or religion section in any bookshop and you will be spoiled for choice; here are a few personal favourites.

- An excellent brief overview can be found in Chapter 5 of Donald Palmer's *Does the Centre Hold?* (Mayfield, 1991). C.S. Lewis' *Mere Christianity* (Harper, 2009) provides excellent insight into, and provides a rational basis for, the nature of faith among Christians.
- A very personal account of the defence of faith against the problem of evil and doubt is in Chapters 10 to 16 of Martin Gardner's *The Whys of a Philosophical Scrivener* (Oxford University Press, 1983).
- Arguments for and against the existence of God are covered very readably in Todd C. Moody's *Does God Exist?: A Dialogue* (Hackett, 1996). The challenge posed by science is well covered by Cambridge scientist and theologian John C. Polkinghorne in *Belief in God in an Age of Science* (Yale University Press, 1999).
- For a very readable introduction into religious systems other than Christianity, Karen Armstrong's *History of God* (Ballentine, 1994) is an excellent comparison of Judaism, Christianity and Islam. She has also written a history of the life of Buddha and the fundamentals of Buddhism: *Buddha* (Penguin, 2004).

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10 Intuition

Intuition is like reading a word without having to spell it out. A child can't do that because it has had so little experience. A grown-up person knows the word because they've seen it often before.

Agatha Christie

Insight is not a lightbulb that goes off inside our heads. It is a flickering candle that can easily be snuffed out.

Malcolm Gladwell

Someone responding to intuition, to chance and fortune, often can't explain himself well.

Alec Wilkinson

I believe in intuitions and inspirations ... I sometimes **feel** that I am right. I do not **know** that I am.

Albert Einstein

At times you have to leave the city of your comfort and go into the wilderness of your intuition. What you'll discover will be wonderful. What you'll discover is yourself.

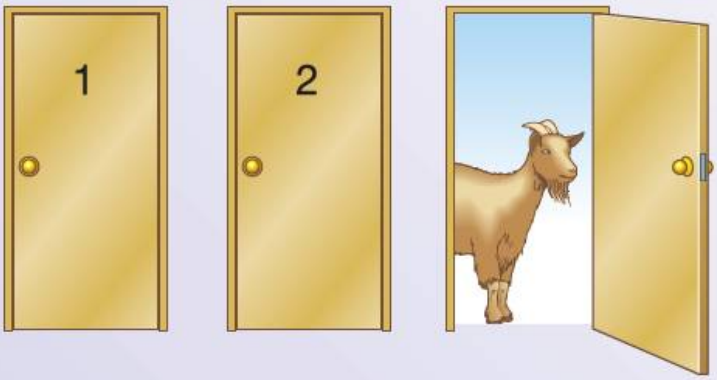
Alan Alda

What good is intuition if your heart gets in the way of hearing it?

Shannon L. Alder

A misleading perception or false belief is increasingly being perpetuated that the unconscious or the intuitive is all that really matters in any spiritual endeavor, and that the conscious, rational, logical, analytical mind is the mortal enemy of spiritual awareness and soul growth.

Anthon St Maarten



Understanding was coming so fast, it seemed to bypass thought.

J.K. Rowling

You must train your intuition.

Ingrid Bergman

It is through science that we prove, but through intuition that we discover.

Henri Poincaré

All perceiving is also thinking, all reasoning is also intuition, all observation is also invention.

Rudolf Arnheim

Intuition becomes increasingly valuable in the new information society precisely because there is so much data.

John Naisbitt

A hunch is creativity trying to tell you something.

Frank Capra

Intuition and concepts constitute . . . the elements of all our knowledge, so that neither concepts without an intuition in some way corresponding to them, nor intuition without concepts, can yield knowledge.

Immanuel Kant

Faith is a passionate intuition.

William Wordsworth

Aims

By the end of this chapter you should:

- understand what we mean when we talk about intuition
- understand the relationship between intuition and the other ways of knowing
- be able to discuss strengths and weaknesses of intuition as a way of knowing
- recognize the role that intuition plays in various areas of knowledge
- understand the ways in which intuitions can be managed for maximum efficacy.

Introduction

Intuition is sometimes hailed as some sort of sixth sense, mystical or magical in nature. We have all heard of women's intuition talked about as if it were a faculty that men do not have, and which is pretty nearly infallible. In addition, there are many self-help gurus who sing the praises of intuition as a magical force that cannot mislead you and which should be trusted if we are to lead happy, fulfilled lives. This sentiment, for example, attributed to Eileen Caddy, new-age author and co-founder of FindHorn, a utopian community in Scotland dedicated to creating a 'network of light' (Trahair 134), expresses a commonly held attitude towards intuition: '*Cease trying to work everything out with your minds. It will get you nowhere. Live by intuition and inspiration and let your whole life be Revelation*' (Sarkis). The suggestion is that intuition is superior to reason and conscious decision making, that it is, in fact, in some way divine.

This promise that we all have within us the key to truth and happiness is hugely appealing. If all we need to do is let go of reason and listen to our intuitive feelings, life could be very simple. But by now you know that we need to be careful about coming to rash conclusions prematurely. A moment's reflection will tell us that intuitions are not magic, and they are not always right. If we were, in fact, to abandon reason, analysis and evaluation, and simply act solely on intuition, we would soon find ourselves in a good deal of trouble. Maybe you have some experience with this – did you ever try to get tough questions on a test right by going with your intuitions? How often were those intuitions correct? People who have changed an answer and subsequently got it wrong sometimes say that they should have stuck with their first intuition about that particular question; but imagine that you have to take a difficult maths test for which you have not studied, and for which, therefore, you have to guess on every question. Do you think your intuition could come up with all the right answers – or even a preponderance of them? Probably not – and we don't recommend you try it!

Intuitions are not always wrong, of course. You can probably tell, intuitively, when your parents or siblings or friends are upset, and you know, intuitively, when it is time to eat; you do not have to work it out rationally by looking at a clock and comparing the time to established cultural norms for mealtimes. Intuition works for us also on more weighty matters: we talked in Chapter 9 about how, for many people, it is intuition which convinces them that God exists (or does not), and those people trust that intuition because it has helped them shape a philosophy for their lives which is successful and contributes to their happiness.

So intuition can be a powerful way of knowing, but it can also be problematic. Let's see if we can figure out when and why intuition works and when and why it fails us.

What is intuition?

Let's start with a few examples.

Case 1: Tony is a relationship counsellor. He is currently seeing Andy and Barbara who are having terrible problems. They both attend their session every week without fail, say all the right things and appear to be making progress, but Tony feels there is something wrong with Andy's approach. He doesn't know why, but he has a hunch that Andy doesn't really want to save the relationship. Tony engineers a situation to get Andy on his own for a minute and he asks him directly. Andy admits he is having an affair and is thinking of leaving Barbara.

Case 2: Igor is a physicist and has spent the last few months working with a team on the design of a complex and costly experiment. His role was minor, and he is confident that he completed his work correctly, but he has had doubts that the overall design is sound. He and his colleagues have discussed the matter, but Igor cannot pinpoint the problem, and the experiment goes ahead. Everything seems to work, but as the results come in it is clear that they are not adequate, and that some fundamental part of the design was, after all, flawed.

Case 3: Jaya is a young woman with a ten-month-old daughter, Nidhi. She spends each day looking after her, in a routine of feeding, playing, sleeping and so on. Recently, she has begun to worry about Nidhi's health, even though she seems perfectly happy and healthy. The family can see nothing wrong and thinks that Jaya is worrying about nothing. But she is sure, so she takes Nidhi to the doctor for tests. Although the doctor can find nothing wrong from an initial examination, further tests reveal a mild infection of the sinuses.

Case 4: Henri Poincaré was a mathematician working around 1900. He wrote in his diary:

For fifteen days I strove to prove that there could not be any functions like those that I have since called Fuchsian functions. I was then very ignorant; every day I seated myself at a worktable, stayed an hour or two, tried a great many combinations and reached no results. One evening, contrary to my custom, I drank black coffee and could not sleep. Ideas rose in crowds; I felt them collide until pairs interlocked, so to speak, making a stable combination. By the next morning I had established the existence of a class of Fuchsian functions, those which come from the hypergeometric series; I only had to write out the results, which took but a few hours (Christos 86).

We have all had feelings like these – feelings which can't really be justified at the time, but which are strong and, as we noted, often turn out to be correct. We will distinguish this particular feeling from others by calling it an **intuitive feeling**, or simply, **intuition**, and we ask what is the nature of this feeling and how does it generate knowledge in such an apparently magical way?

1 Recall a time when you had a powerful intuition that turned out to be right. How do you explain it?
2 Does your intuition ever mislead you?

Of course, we immediately run into a problem here, which is that the very nature of intuition means that it is partially beyond explanation – if we could explain it, it would not be intuition any more! If Jaya had noticed that Nidhi's nose was

blocked, or had Poincaré solved his problem in the usual way, then these would be familiar examples of the use of evidence and reason. By their very nature, specific incidents of intuition are inexplicable – at least at the moment we use them.

But consider what has actually happened, when an intuition has proven to be accurate: a conclusion has been reached without a conscious, logically defensible process. In other words, you seem to know something without knowing how you know it. Put like this, it does not seem so strange, but notice that this is quite radically opposed to the model of reasoning that we have seen in earlier chapters, where we carefully set up 'pyramids' of logical reasoning in order to justify a conclusion. Even if we cannot completely explain specific incidents, we may be able to make some general progress towards understanding the phenomenon, and in many cases we can, after the fact, work out what it was that led to the intuition. In Case 1 above, for example, Tony is an experienced counsellor who has worked with many couples. He has no doubt developed, over time, an ability to read body language without consciously attending to it. Probably he picked up on tiny cues – Andy's failure to make eye contact in a normal way, or his sitting just a little too far away from his wife, or a barely discernible stiffness in his posture – that he processed unconsciously and which led to his intuition. At the time, Tony would have been unaware of these cues, and after the fact, since he was right, he had no need to figure out how he knew, but we can see that there is, ultimately, a logical explanation.

Tony's intuition was also a very reasonable one in the sense that it was clearly based on his experience as a counsellor and the situation at hand. He didn't suddenly get the intuition that the important factor in Andy's attitude was the alignment of the stars or the colour of his shirts. And we would be astonished to find that Igor had an intuition about Jaya's child, or that Jaya had a flash of inspiration which helped Poincaré solve his problem. We have intuition in areas with which we are familiar. This suggests that intuition and reason may not be so far apart after all.

This is a very plausible theory for the nature of intuition: we come to a conclusion without working through a laborious, conscious process of logical induction or deduction. Those processes occur, though; they just do so unconsciously.

Intuition and instinct

Before we delve deeper into the nature of intuition as a way of knowing, we should differentiate intuition from **instinct**. Instinct is innate. Instinct tells us what to do on the level of survival – both of ourselves and of our species. We breathe, seek shelter, find food and seek a mate by instinct; we don't have to be taught to do these things. We defend ourselves – by fighting or fleeing – by instinct. We share most, if not all, of our instincts with other animals.

Intuition, on the other hand, is the result of experience. Seymour Epstein, psychologist at the University of Massachusetts, explains it this way:

… human beings process information through two systems: Just as we learn things consciously all the time – the cognitive part of the theory – we also learn things experientially, without realizing we've learned them. … Intuition is just the things we've learned without realizing we've learned them. And sometimes they're useful. Sometimes they're maladaptive (Winerman).

Epstein goes on to give the example that a person who's learnt through past experiences to like and trust other people might have very different social intuitions than someone who's learnt to fear and distrust others. This differs dramatically from instinctive mechanisms which function the same way in every healthy member of a species.

At least one hypothesis, however, suggests that we might have some innate structures of the mind which shape our intuitions. Immanuel Kant proposed that we view the world in the context of twelve *a priori* (that is, known *before* any experiences – built right into the structure of the brain) categories, including space, time and cause–effect. When we watch a billiard ball hit another billiard ball, he argued, we cannot actually see that energy transfers from one to another, so that the contact between the balls causes the second one to roll. Instead, we are pre-programmed, as it were, to assume that cause–effect relationship (*The Examined Life*). Kant's argument relates to the argument we encountered in Chapter 5 from Michael Shermer, who claimed that human minds are pattern-making machines. We can see how our intuitions would be driven by that innate capacity for making patterns.

Intuition and the other ways of knowing

Intuition only seems like a problem because we can't explain it. The real problem is not intuition, but the fact that we do not have access to certain parts of our thinking processes. If we regard our brains as information-processing devices, then perhaps intuition is nothing more or less than unconscious processes of sense perception, emotion and reason.

Of course this view is not without its own critics. Richard van de Lagemaat asks:

Why must our minds at some level be processing information? Do we really want to claim that all areas of thoughtful activity, such as scientific insight, writing poetry, and intellectual conversation, could in principle be reduced to a set of rules that we are unconsciously following? Indeed, I wonder if it even makes sense to speak of following a rule unconsciously *(24).*

There are two intriguing and related arguments that can be made here. The first is that it may be that we are in danger of having our thoughts limited by a particular modern paradigm – that of the mind as a computer. We should remember that it is a metaphor, not the literal truth, and while there may be many similarities between the two, we do not have to assume that the mind works as an information-processing computer. It's helpful to recall a metaphor (from times gone) of the mind as a hydraulic system. Under this metaphor we had blood, valves, pipes, heat and pressure regulators; and we developed metaphors such as 'venting' and 'letting off steam'. We can now see that these are mistaken, and perhaps be wary of making the same mistake ourselves.

The second point is related to this modern paradigm of information processing, and it concerns the nature of explanation itself. It may be that under this modern paradigm we are so used to thinking in a **reductionist** way that we simply cannot conceive what it might be to explain something *except by* breaking it down into component parts, because that is what we mean by an explanation! And if we think this, then any alternative to the idea of mind as information-processor seems like

magic, and is therefore dismissed. But it is possible that intuition is an irreducible form of intellectual activity; that judgement and creativity cannot be reduced to a set of rules, but that they are whole packages, ways of knowing in themselves.

In fact, a more holistic model of how the brain works has been proposed by Antonio Damasio, a renowned neuroscientist at the University of Southern California (whom we mentioned in Chapter 8). His model shows that emotion and reason work in tandem in the brain in a constant feedback loop, and that the seat of reason (the prefrontal cortex) is involved in our being able to experience and identify emotions (Damasio, pages 135–38). This suggests that our cognitive processing in general cannot be compartmentalized. We don't use just reason or just emotion. Our intuitions, therefore, are not made up of either one or the other.

3 Can you say when we should rely on intuition and when we should not? Are there clear cases when it is appropriate to use intuition and others when it is not? Or do we need intuition to answer this question?
4 You are not able to state the rules of grammar (they are not known in totality), but you obey them nearly all the time when you speak. Does this mean that your grammatical knowledge is based on intuition? If so, does the fact that we learnt our language skills mean that we also learnt our intuition?
5 If intuition is not rational, it may be irrational or non-rational. Alternatively, it may be rational after all. Which of the three options do you go for? What is the difference between the first two anyway?

Sense perception, which we will consider in depth in Chapter 14, also plays an important role in intuition. Imagine you are in a noisy room with lots of people talking – including you. You can't hear the other conversations, but suddenly you hear your name mentioned across the room. This seems very strange ... you couldn't hear the conversation, but you heard your name.

In this case, the best explanation seems to be that there are all sorts of unconscious things going on in your mind – processing, interpretation, filtering and so on – and that you become aware of things which are deemed to be 'important' (it is puzzling to ask 'deemed by whom?'), but you do not become aware of anything else. Perhaps intuition works in the same way – it is the result of a complex train of analysis of which we are only ever dimly aware (at best). In Case 1 on page 217, perhaps Tony noticed, almost subconsciously, that Andy appeared nervous when certain things were mentioned, and perhaps he had seen similar cases in the past where the man was having an affair. His subconscious mind then pieced together the evidence and hence the hunch. It wasn't that there was no empirical evidence; it was that Tony simply didn't consciously note the empirical evidence his subconscious was processing.

Interest in the question of intuition and how it works has gained a great deal of popularity among natural and human scientists in recent years, however, and – potential concerns about the computer metaphor notwithstanding – present-day researchers consider that model to be essentially accurate. In his book *Blink: The Power of Thinking Without Thinking*, Malcolm Gladwell writes:

The part of our brain that leaps to conclusions like this is called the adaptive unconscious, and the study of this kind of decision making is one of the most important new fields in psychology. The adaptive unconscious is not to be confused with the unconscious described by Sigmund Freud, which was a dark and murky place filled with desires and memories and fantasies that were too disturbing for us to think about

consciously. This new notion of the adaptive unconscious is thought of instead, as a kind of giant computer that quickly and quietly processes a lot of the data we need in order to keep functioning as human beings (11).

The computer metaphor seems to be most effective in terms of representing the kind of ongoing processing of data that brains do, similar to how computers process in ways that we do not see, and whether we are present to monitor that processing or not. Researchers do not, however, suggest that the mind, like a computer, is limited to interpreting data solely in terms of pre-programmed rules. Indeed, given some of the amazing discoveries of the past, many of which were initially vehemently rejected due to their radical departure from conventional thinking – Alfred Wegener's proposition that the continents used to be one landmass and are drifting apart, for example, or the hypothesis that the moon formed out of debris from a planetoid that crashed into the Earth ('*Where did the moon come from?*') – human creativity seems to be able to transcend any rule-limited boundaries.

In general, though, modern research findings suggest that intuition involves drawing a conclusion from some unconscious process that relies on our familiar ways of knowing – sense perception, reason and emotion. Intuition, then, exhibits many of the same kinds of strengths and problems of our other ways of knowing.

Strengths and weaknesses of intuition

There are several factors that can lead to a failure of our intuitions: lack of experience, social conditioning, and a failure of reality to conform to our expectations, to name a few. We mentioned earlier, with regard to the four case studies on page 217, that we would not expect the people in one scenario to be able to make the same effective intuitive conclusions that the people in the other scenarios were able to draw. That is because effective intuition requires significant experience in a particular context.

Experience and intuition

In Chapter 6, we mentioned that Andrew Wiles's final solution to Fermat's Last Theorem came to him in a flash of inspiration. He had initially worked on the problem for seven years, and believed he had a solution, which he presented at a conference to worldwide acclaim. During the peer review process, however, a problem was found with the proof, and Wiles had to go back to the mathematical drawing board. He worked for two years, and then, just as he was about to give up, it came to him:

And I was sitting here at this desk. It was a Monday morning, September 19, and I was trying, convincing myself that it didn't work, just seeing exactly what the problem was, when suddenly, totally unexpectedly, I had this incredible revelation. I realized what was holding me up was exactly what would resolve the problem I had had in my Iwasawa theory attempt three years earlier … It was the most – the most important moment of my working life. It was so indescribably beautiful; it was so simple and so elegant, and I just stared in disbelief for twenty minutes (The Proof).

Wiles's intuition, even though he experienced it as an 'incredible revelation', was the product of a lifetime of study of mathematics in general and of nine years of working on that problem in particular. Literally no one in the world was equally

qualified to understand that problem. Certainly neither you nor I could have a similar revelation about that problem. Wiles's brain, steeped in all the nuances of that problem, was working away on it at some unconscious level, until the solution was found and seemed to appear in Wiles's mind all at once.

You have probably had similar experiences trying to solve a maths problem, or design a science experiment, or interpret a poem, only to have the solution finally come to you all at once after you took a break. In the English language we use the expression 'Sleep on it' when someone is working on an intractable problem – personal or academic. This reflects our understanding that sometimes we need to give ourselves a break from hard, conscious work and allow our unconscious mind some time to work on the problem.

It's worth noting, however, that although Wiles was quite certain that his intuition was correct, the mathematical world did not simply take his word for it. His paper still had to pass the same rigorous process of peer review that turned up the trouble in the first place. It did, and his intuition was proved correct.

Intuition and the areas of knowledge

This kind of flash of creative intuition is not limited to the realm of mathematics, of course. We mentioned in Chapter 5 August Kekulé's flash of inspiration about the structure of the benzene molecule, and many other scientific discoveries have resulted from similar moments of intuition. These intuitions, as with the mathematical intuitions, are in some sense a starting point. They may give us the idea for an hypothesis, or they may offer us an answer to a question, but, as with Andrew Wiles's personal intuition about his proof, the intuition is not the end of scientific discovery. The scientific world will work to verify the validity of any intuition before it is accepted as shared knowledge. This is the nature of rigorous thought – even though intuitions are sometimes proven to be correct in the end, scientists and mathematicians do not ever assume more than they can reasonably justify, and rely on the peer review process to ensure that personal knowledge is thoroughly tested by the professional community.

Intuition also plays an important role in creating works of art, as you are probably aware if you've ever drawn or painted or composed music, or participated in any other creative endeavour. The arts lend themselves to the exploration of ideas that are not necessarily consciously generated. Think, for example, of a beautiful, effective metaphor from a favourite poem or novel. The author probably did not construct the metaphor by sitting down and making a list of pros and cons, or trying, through some process of induction or deduction, to identify the object best suited to conveying the idea. More likely, the writer made an intuitive leap, and then, perhaps, explored more consciously the implications of the comparison she thought of.

Failures of intuition

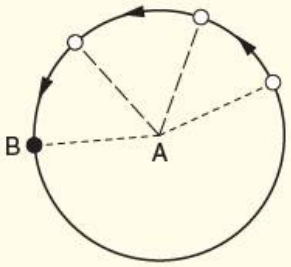
Sometimes even experience is insufficient to help us generate effective intuitions, perhaps because our minds have drawn incorrect conclusions about the experience it has taken in and processed. Answer the following problems about everyday situations. Do not analyse the problems but go with your gut reaction.

6 You are jogging along and you drop a tennis ball. Where does the ball land?
   a Directly below the point where you dropped it
   b Behind the point where you dropped it
   c Ahead of the point where you dropped it

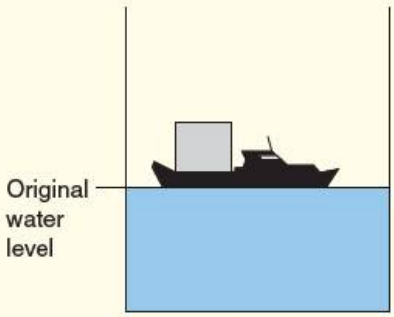
7 If you drop a solid metal ball the size of your fist from a tall building, it takes eight seconds to hit the ground. How long will a solid metal ball twice as big take?
   a 4 seconds
   b 16 seconds
   c 8 seconds

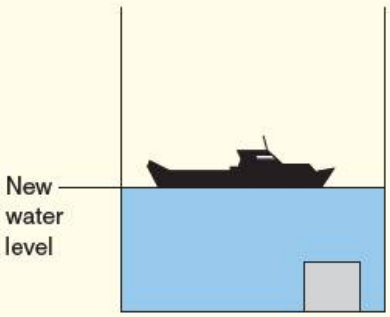
8 You go to a party where there are 40 people. How likely is it that any two of them will share the same birthday?
   a Very likely – about a 90 per cent chance
   b Quite likely – about a 50 per cent chance
   c Very unlikely – about a 10 per cent chance

9 Consider the plan view shown here. It shows, from above, a ball attached to a string being swung around a central point A. When the ball is at B, the string is cut. In what direction does the ball go?



10 Suppose you have a toy boat with a metal weight on it floating in a tank of water. You mark the water level on the side of the tank. Then you take the weight off the boat and drop it in the water. Where is the water level now?
   a Above the original water level
   b Below the original water level
   c At the same level as the original water level





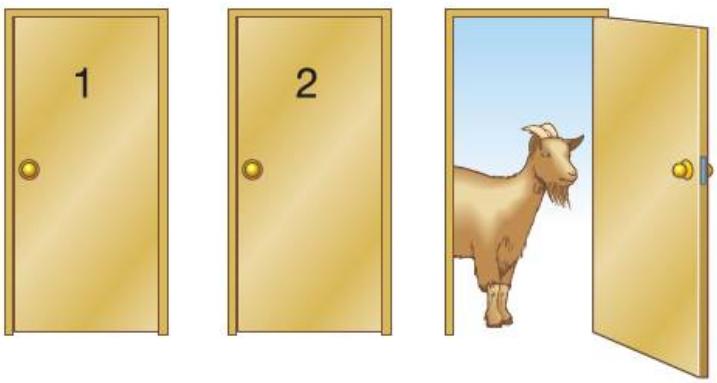
11 Although you feel fine and perfectly well, you go for a routine check-up with your doctor. After examining you, she tells you that it seems that you have a very rare disease – only one in 10 000 people suffer from it. To be sure, she administers a test. The test is not perfect – but if you have the disease, the test is 90 per cent likely to spot it, and if you do not have the disease, the test is 1 per cent likely to tell you that you do. When the test comes back, it is positive. How likely are you to have the disease?
   a Very likely (90 per cent or more)
   b Reasonably likely (50 per cent)
   c Very unlikely (1 per cent)

Now, if you have had formal training in these areas, go back and answer the problems by analysis rather than by intuition.

Although these six questions can be answered by mathematical or physical analysis, they are well within our everyday experience, and so we should find we have an intuitive idea about the answers. Surprisingly, what we find is that most people get most of the questions wrong. Problem 10 above was presented to three exceptional physicists – Robert Oppenheimer (leader of the Manhattan project to develop the atomic bomb), Felix Bloch (Nobel prize laureate) and George Gamow (a renowned quantum theorist), and they all got it wrong when doing it by intuition (Meerman).

12 What does this tell us about intuition?
13 These examples were based in a certain type of problem. Why do you think intuition seems a poor guide here when these types of problems are so familiar?
14 Are there other areas where intuition would be a better guide? How do you know? (Remember that we have a tendency to remember the times that things worked rather than when they did not; if our intuition was correct once but failed nine times then we may tell the story of the success, whereas in reality it has a 90 per cent failure rate.)
15 Have you ever had an intuition regarding a subject about which you knew very little? Was it accurate? Why or why not?

One infamously non-intuitive maths problem is the Monty Hall problem, named after the host of an American television quiz show called *Let's Make a Deal*. In this problem, imagine you are offered a choice of three doors. Behind one door is a wonderful prize, such as a car; behind the other two are bad prizes – such as goats. Once you make your choice, one door is opened revealing a goat. Now you are offered the chance either to keep the door you chose originally or to change to the other remaining closed door. Which action will give you the best odds of winning the great prize?



Before reading on, decide what you would do. Did you switch? Or did you keep your original door? Why?

Most people's intuition will tell them that since there are now two doors to choose from, the odds are 50/50 that the car is behind either door, and they will choose to stick with the door they first picked. In fact, the opening of a door does not change the original odds, as you had to choose before any doors were open. Your odds of winning the car were 1 in 3 when you first chose, and your odds are still 1 in 3. That means that there is a 2-in-3 chance that the car is behind the other closed door. (If you are not convinced, check out this YouTube video http://tinyurl.com/yleysa9 and this interactive game from *The New York Times* http://tinyurl.com/9q6x6wm.)

In 1990, Marilyn vos Savant, listed in the *Guinness Book of World Records* with the highest recorded IQ, published the answer to this problem in her regular column in *Parade* magazine. The maths world went wild. She received nearly 10 000 letters, almost all of them telling her she was wrong – sometimes in extremely rude terms. One professor told her that she should consult a textbook on probability before she tried to answer any more questions, and another suggested that she had better keep the addresses of her detractors so she could seek their help in the future on maths problems. One person said that she was obviously the goat, and another opined that she couldn't understand maths because she was a woman! (vos Savant). Many of the letter writers were professors of mathematics at famous colleges and universities.

The furore went on for some time, until vos Savant challenged the naysayers to run the experiment for themselves and collect the data. In the end, the problem was subjected to millions of trials '*… by mathematicians at the Massachusetts Institute of Technology and computer programmers at Los Alamos National Laboratory in New Mexico. … [and] tested in classes from second grade to graduate level at more than 1 ,000 schools across the country*' (Tierney), and the conclusion was inescapable: vos Savant was right. Clearly even professional mathematicians have some difficulty generating accurate intuitions when it comes to probability, and no matter how strongly we feel that they are right, our intuitions are sometimes very wrong. Reality, in the case of this problem, simply does not conform to our expectations.

Emotions (and possibly stereotypes) interfered, in the Monty Hall example, with the experts' ability to form effective intuitions, and in the end the problem was explored via scientific data collection and reasoning. There are many other instances in which a strong emotional commitment to a position has kept people from seeing the flaws in their own intuitions. We saw an example of this in Chapter 8, in the story of the Greek kouros. As Gladwell writes, in the opening to his book *Blink*, the kouros was purchased for $10 million by the Getty Museum in California. The Getty's experts vetted the statue for over a year before they made the purchase, but as soon as they did, and as soon as they started showing it off to experts who were not on the Getty's staff, those experts knew in a moment that the statue was a forgery:

They simply took a look at that statue and some part of their brain did a series of instant calculations, and before any kind of conscious thought took place, they felt something, just like the sudden prickling of sweat on the palms of the gamblers. For Thomas Hoving, it was the completely inappropriate word 'fresh' that suddenly popped into his head. In the case of Angelos Delivorrias, it was a wave of 'intuitive repulsion.' For Georgios Dontas, it felt as though there was a glass between him and the work. Did they know why they knew? Not at all. But they knew (Gladwell 11).

Why could these experts detect the fraud so intuitively, while the Getty experts, studying for over a year, could not? We don't know for sure, but a good guess is that the Getty experts had a stake in finding the statue to be authentic. To own such a piece would constitute a major coup for such a small museum; they appear to have been blinded by their wish for the statue to be real, so that they couldn't detect – or didn't listen to their intuitions – that it was fake. In this case, taking the trouble to have their work independently checked would have saved them a lot of money and even more heartache.

16 The Monty Hall problem is a good example where one's intuition tends to lead one astray. However, one might argue that is possible to 're-train' one's intuition – see the explanations at http://tinyurl.com/qfyjo3c and see if you can make the solution 'obvious'. What would this tell you about intuition?

17 Consider the way intuition works in ethical issues. Do you think we should rely on intuition in these cases?

Intuition and shared knowledge

So far we have considered the role of intuition when it comes into play for individuals trying to solve particular problems, but intuition also comes into play in much more general ways, and, even though we each intuit individually, it turns out that our intuitions are very often shaped by shared knowledge. In those cases, our intuition sometimes helps us, and it sometimes fails us because our cultural viewpoint is incorrect.

In Chapter 9, we considered, briefly, the role that intuition plays in helping people to connect to a religious knowledge system. In many cases, the acceptance of the group intuition is a very positive force in individual lives. Much of our ability to function well in our particular cultural context depends on our having developed a whole complex of intuitions about what is right and wrong, what kind of behaviour is expected, how we are to treat other people, standards for success, and so on.

Dave Kenny, a psychologist at the University of Connecticut, has run a series of studies investigating the accuracy of people's first impressions of other people. He has found that, as a generalization, people are very good at gauging certain personality traits with a high degree of accuracy in just a few seconds. He offers this caveat, however: '*People can certainly make inaccurate judgments, sometimes tragically so. … When we talk about accuracy, we're not looking at single judgments, we're looking at the average of a lot of judgments*' (Winerman).

Follow-up studies by Frank Bernieri at Oregon State University dealing with cross-cultural intuitions have, however, found that this kind of intuition sometimes leads us astray, especially when we are dealing with people outside of our usual cultural context. But research on nonverbal sensitivity has shown that people from similar cultures are better at judging each others' personalities based on nonverbal cues than people from very different cultures:

An extroverted Chinese person might look completely different than an extroverted American … But even though they might not seem loud and talkative to us, they'll be louder and more talkative than another Chinese person. The key to judging someone accurately is that you have to be able to compare within cultures, not between cultures (Winerman).

18 Intuition often seems to operate with regard to people – you just have a feeling that someone is not honest, or is upset, or whatever. Do you think these intuitions are likely to be more accurate with people you know well than with people you have only just met?

Culturally shared stereotypes can also sometimes be quite misleading. Take, for example, the historic 'knowledge' that women are irrational, overly emotional and uncontrolled. We owe this to Plato's idea (discussed in Chapter 8) that reason must control emotion, and the prevailing assumption that women are by

their nature, emotional. This is an example of past 'knowledge' which did a lot of damage for many centuries. (This would seem to be the attitude of some of Marilyn vos Savant's angry critics!) Another example is the historical belief that white people were superior to other people. This belief was, evidently, founded simply on the fact that people with dark skin – or skin of any hue other than the commonest European one – were unfamiliar to white people, did not speak their language, and worshipped differently.

'Different', in fact, seems to have been the only basis for the conclusion regarding inferiority, yet that intuition led to centuries of enslavement and other abuses. In the USA in 1900, you could shoot people of Chinese descent. They had no rights at all. They made contracts so that if they were killed, their bones would be sent back to Canton. Shipping lading notices from that era list tons of bones that were sent back for burial (James). Clearly this kind of intuitive bigotry is not a kind of intuition that we want to perpetuate! The history of thought shows that trusting intuition can be a very dangerous thing as well as a marvellous one.

In a talk he gave at the 2009 TED conference, MIT professor Dan Ariely talked about ethics and how our moral intuitions are influenced by the people around us. He ran a series of experiments testing how many people will cheat and under what circumstances, and he found that our intuitions tell us that it's all right to cheat if those close to us (that is, in our in-group) are also cheating. This is true even of people who don't cheat if they are left to their own devices:

We've learned that a lot of people can cheat. They cheat just by a little bit. When we remind people about their morality, they cheat less. When we get bigger distance from cheating, from the object of money, for example, people cheat more. And when we see cheating around us, particularly if it's a part of our in-group, cheating goes up.

Ariely also talked about medical care, and how doctors and nurses who have had extensive training and rely on the intuitions they have developed from that training are sometimes wrong about what the best treatments are. The problem is not with the fact that some cultural intuitions are wrong, however. The problem is with the fact that we don't have mechanisms for testing those intuitions to see if they are correct. '*We have very strong intuitions about all kinds of things – our own ability, how the economy works, how we should pay school teachers. But unless we start testing those intuitions, we're not going to do better*' (Ariely). Of course this immediately raises the question of how to test and improve our intuitions.

Improving our intuitions

With all these potential problems with intuition, what can we do in order to determine which of our intuitions we should listen to? How can we find out which intuitions will help us to resolve thorny problems or to create effective solutions and which intuitions will get us into trouble? The solutions lie in the kinds of problems we have seen. We have seen that intuitions lead us astray if we don't have sufficient expertise, if we are too invested in a particular position, and if our cultural expectations are inappropriate. For the first two kinds of problems, conscious awareness that our intuitions might mislead us is the key: if we *know* that our intuitions could be ineffective, we can take the time to check them, whenever possible, to see if the flash of insight has given us a solid idea. To address the latter kind of problem, we can learn to be aware of the situations in which we are likely to make poor judgements based on cognitive biases, and then we can compensate for them as part of our decision-making process.

One final example from *Blink* will illustrate this: Gladwell tells the stories of two women musicians who were not taken seriously because they played instruments (trombone and trumpet) which were considered to be men's instruments. Gradually the music world came to understand that the auditions were biased against women, because the sight of the woman was outweighing the sound of her playing. Auditions are now routinely done with the player behind a screen, where she – or he – cannot be seen by those making the hiring decisions. The number of women hired for symphony orchestras has skyrocketed (Gladwell 245–54). The screen allows for the relevant intuition – the one about sound – to take precedence over the irrelevant one – the one about sight. So it's certainly possible to develop ways and means of countering (and perhaps even re-training?) what may be our most inaccurate intuitions.

Where have we been? Where are we going?

We have seen that intuition is a way of knowing that gives us instant decisions or insights without our being able to identify or explain where they came from. We have seen that intuition involves many – if not all – of the other ways of knowing, and that it can result in spectacularly creative solutions to problems and break new ground in all the various areas of knowledge.

We have also seen, however, that the strength of our intuitions depends largely upon the depth of our experience with the subject at hand. Perhaps most importantly we have seen that because our intuitions do sometimes fail us, it is important for us not to simply take for granted that they can be trusted. Professionals share their knowledge and rely on peer review to check the accuracy of their intuitive answers, and we might take a page from their book and check our personal ones, as well! If we take the time and care to do so, we will be better able to know which of our intuitions open up new possibilities for us.

In the next chapter, we will continue the consideration of how good a job our intuition does for us in helping us to know what is right and what is wrong as we undertake an investigation into ethics as an area of knowledge.

Further study

- ★ Robin Hogarth's *Educating Intuition* (University of Chicago Press, 2001) is a beautifully written and wide-ranging overview of current thinking on the topic of intuition; for a concrete context you could try *Reading People* by Jo-Ellen Dimitrius and Mark Mazzarella (Vermilion, 1999).
- ★ Malcolm Gladwell's *Blink: The Power of Thinking Without Thinking* (Little, Brown, and Company, 2005) is a very readable investigation into intuition, both its strengths and its weaknesses, and it provides an explanation of what makes the difference between those two outcomes.

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11 Ethics

Ethics is a code of values which guide our choices and actions and determine the purpose and course of our lives.

Ayn Rand

A man without ethics is a wild beast loosed upon this world.

Manley Hall

Morality, when formal, devours.

Albert Camus

That which is beautiful is moral. That is all, nothing more.

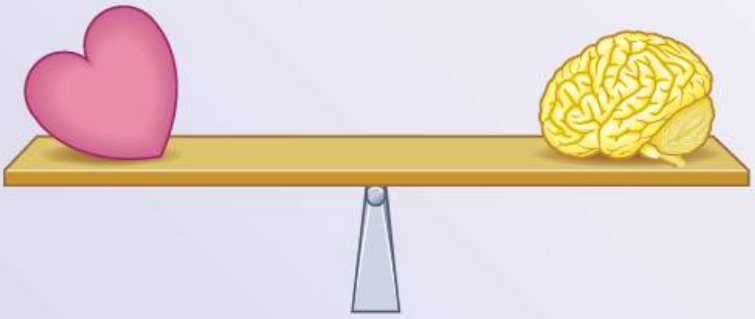
Gustave Flaubert

Pity is not natural to man. Children are always cruel. Savages are always cruel. Pity is acquired and improved only by the cultivation of reason.

Samuel Johnson

Morality is the best of all devices for leading mankind by the nose.

Friedrich Nietzsche



People who believe absurdities will commit atrocities.

Voltaire

Because the human race is as much part of the Universe as atoms and galaxies, moral laws are as independent of you and me, and of whatever cultures helped shape our character and ethical convictions, as the laws of truth and beauty.

Martin Gardner

In law, a man is guilty when he violates the rights of another. In ethics he is guilty if he only thinks of doing so.

Immanuel Kant

Morality is suspecting other people of not being legally married.

George Bernard Shaw

The foundation of morality is to have done, once and for all, with lying.

Thomas Henry Huxley

What is morality in any given time or place? It is what the majority then and there happen to like – and immorality is what they dislike.

Alfred North Whitehead

A moral being is one who is capable of comparing his past and future actions or motives, and of approving or disapproving of them.

Charles Darwin

Aims

By the end of this chapter you should:

- appreciate the meaning of the concept of 'ethics'
- appreciate the difference in meaning between 'morals' and 'ethics'
- understand the traditional role of reasoning in ethics
- understand the strengths and weaknesses of some common approaches to ethics
- understand the possible role(s) of emotion in ethics
- understand the possible role(s) of imagination in ethics
- understand the inherent limitations of theory in determining action
- understand how the concept of choice applies in ethics.

Introduction: what are ethics?

Imagine that you find yourself in this, fairly common, situation: your best friend has been dating a charming young man with whom she is completely enamoured. He can do no wrong in her eyes. You, unfortunately, are out one night at a restaurant, and you see the young man with a different young lady. They are quite cosy, sitting close to each other, heads bent, creating quite an intimate atmosphere. You find yourself making up a lot of excuses about how this scene could be something other than it looks, but shortly you see that they are kissing each other. Through no fault of your own, you now have a dilemma. Do you tell your best friend what you have seen or not? If you tell her, certainly she is going to be devastated – and quite possibly angry with you – but if you don't, and she later finds out that you knew what was going on, she will be equally devastated, and she will feel betrayed not only by the young man, but also by you, her best friend. How do you know what is the right thing to do?

If **ethics** is an area of knowledge, can we rely on the same skills and processes that help us know what to do in other areas of knowledge? If you are particularly good at, say, history, then you are likely to be able to analyse sources intelligently, reconcile conflicting evidence, and convincingly analyse cause and effect with regard to the events of the past. If, in addition to your talent, you enjoy studying the subject then you may go on to study it at higher and higher levels, perhaps eventually becoming a professional historian. The same is true of many areas of knowledge.

The study of ethics, on the other hand, concerned as it is with questions such as 'How should we act?' and 'What is right and what is wrong?' seems very different. Only a few philosophers study it as a subject in its own right; we probably couldn't say if anyone was 'good' at it, and, other than a very few positions in university philosophy departments (how many ethicists does any one department need?), it does not offer a career! Despite this, we all have a sense of 'correct' behaviour, though it may differ from person to person, and we all say things like 'He shouldn't have done that' or 'She did the right thing'. Certainly we all have to make ethical choices on a regular basis.

Ethics is, in fact, an important area of knowledge not only for individuals in their private lives, but also for people working in a wide range of professions, and unethical behaviour can have vast ramifications, as we have all seen in the past few years through scandals in such wide-ranging areas as politics, sports and economics. So what do we mean by 'ethics' as an area of knowledge?

Knowledge framework:
Scope and application

Ethics is an area of knowledge with wide-ranging application. Since it is the study of what it means to do right or wrong, or to act in a good or bad manner, it is an area of knowledge that overlaps all other areas of knowledge. It is also an important consideration in our everyday personal lives.

We take ethics seriously because of the extreme consequences that can result from unethical decisions and immoral behaviour. Vast sums of money, important relationships, and even lives can be lost if we act immorally or fail to consider, ethically, the ramifications of our choices and actions.

This is true both in the arena of personal knowledge and in the arena of shared knowledge.

For those who believe in God, the problem may seem to have an obvious answer – to act ethically is to act in accordance with God's wishes. But many believers feel that God's wishes are far from clear, and that the holy books do not give adequate guidance in many cases (for example, does loving your neighbour mean defending him by going to war against others?). So there is a need for a way of deciding what God's will actually is in a practical sense. For many believers, attuning oneself to God's words through prayer and reflection is the answer – but few would say it is easy, or that they are always absolutely certain.

Atheists, of course, need to look elsewhere completely. Some might say that ethics is a set of behaviours which have been subject to the process of natural selection, and as a result maximize evolutionary fitness in a scientifically defined sense. If this is true then we might be able to use scientific modelling to explore ethics, and psychology to detail how and why we have certain ethical beliefs and dispositions. Perhaps the most radical view is that of ethics as nothing but a totally arbitrary system of rules and conventions imposed on a gullible community by those in political power. According to this way of thinking, we are all responding to social conditioning. If this is the case, the need to step back and examine our principles is even more pressing.

Ethics and morals

Knowledge framework:
Concepts and language

This section deals with two of the most critical terms pertaining to ethics as an area of knowledge: **ethics** and **morality**. You will notice, though, as you work through the chapter, that there are a number of other key concepts, including:

- **ethical egoism**
- **utilitarianism**
- **virtue ethics**.

These three ethical systems are representative of standard types of ethical systems as delineated by philosophers: **deontological systems** (those which, like ethical egoism, concern themselves with the rightness or wrongness of the *intentions* of the person who is acting) and **teleological systems** (those, which, like utilitarianism, concern themselves with the rightness or wrongness of the *consequences* of whatever action was taken).

The important thing to understand about these vocabulary terms is that they reveal the complexity of ethical knowledge. There are no simple answers, in ethics, because there are many aspects to each ethical problem. The various different types of systems have arisen as a means of trying to identify the various components of ethical decision making and behaviour, and to determine which component is the most important when it comes to knowing what is right and what is wrong.

The terms 'ethics' and 'morals' are often used more or less interchangeably, but before we get too much further into our investigation, we ought to decide whether that is a satisfactory approach or whether we ought to differentiate between the two concepts. In general, despite acknowledging that there is overlap between ethics and morals as concepts, there is general agreement that 'morals' refers to behaviour and values, while 'ethics' refers, in a more formal, academic way, to the conscious study of our moral values and behaviour.

Dr Charles Bidwell from the University of Alberta writes:

The distinction is best illustrated by the contexts in which these terms are used. When we disparage someone's behavior, we say that person has 'low morals'; we would never say that a drug dealer has 'bad ethics.' **Ethics** *as a branch of philosophy is studied in universities and theological seminaries. We have an Office of Government Ethics and*

write articles about political and judicial ethics. Think of it as a hierarchy of detail: when we talk about personal **ethics**, *we are using the primary meaning of 'a set of moral principles'. We say that children are taught good moral principles, or* **morals**, *if they don't lie, cheat, or steal, and if they respect other people. Moral principles such as 'Respect others' are further broken down into* **rules** *such as 'Don't stick out your tongue at your sister (1).*

Professor Martha Highfield, from the California State University at Northridge, has a similar definition: '*The difference between ethics and morality is similar to the difference between musicology and music. Ethics is a conscious stepping back and reflecting on morality, just as musicology is a conscious reflection on music.*' In the example with which we opened the chapter, then, we would say that you had an ethical dilemma, because you were consciously trying to work out the appropriate method by which to do the right thing. That ethical dilemma, however, was based in a situation in which the wayward young man was behaving in an immoral fashion. Probably everyone around you would agree about the moral values in the situation – loyalty, faithfulness, betrayal, dishonesty, friendship – but there might be quite a lot of disagreement about the ethical course of action.

There is quite a lot of overlap between the concepts of 'ethics' and 'morals' but, for this chapter, we will use the two terms as described here. We will talk about 'morals' when we mean the values and behaviour that reflect what people believe is right and wrong, and we will talk about 'ethics' when we mean the conscious, systematic effort to know what is right and wrong.

1 Writer Ian Welsh offers a slightly different explanation of the difference between ethics and morals at http://tinyurl.com/qbkosj4. Do you think this definition is compatible with the one we have offered here?

Moral laws

We all have an intuitive feel for moral laws or standards (perhaps as opposed to legal or physical laws) and, surprisingly, as we have already begun to notice, there is often a good deal of agreement on these standards. Appeals to moral laws are commonplace. For example, we have all heard people arguing – they may insult each other and become abusive, but more often than not they make statements such as:

- Leave him alone – he isn't hurting anyone.
- There is a queue here – you can't just push in.
- Give me some of your chocolate – I gave you some of my juice.
- Hey, I was sitting there – that's my place.
- But you said you would help me!

These comments are interesting because they all assume something – they all appeal to some (unstated) standard of behaviour. In these cases there seems to be some notion of 'fairness' that is assumed by both sides of the argument. What is even more interesting is that the other person very rarely says, 'I don't care about the standards to which you appeal.' Instead they try to make some special excuse ('I have to push in because I have a really important meeting to go to' or 'Yes, but you had lots of juice and I only have a little chocolate') to justify their behaviour.

In other words, it seems that even people who are arguing are not arguing about the standards to which they should conform – they are arguing about how

to apply those standards to a particular situation. They seem to agree on some sort of moral code; we all seem to have a sense of what this code is. The writer C.S. Lewis said that there must be '… *some sense of agreement as to what Right and Wrong are; just as there would be no sense in saying that a footballer had committed a foul unless there was some agreement about the rules of football*' (1947: 1).

2 Can you make any links between the Lewis quote about 'rules' and the notions of different systems that we saw when we looked at mathematics (pages 116–20)? If so, what does this tell us about ethics?
3 Consider the following statements:
- You should hold your fork in your left hand.
- You should not waste your time.
- You should not lie.
- You should not use illegal drugs.
- You should take the first left to get to the theatre.
- You should control the money supply so as to bring down inflation.
- You should not jump a red traffic light, even if it is safe to do so.
- You should speak respectfully to teachers and parents.
- You should not drive a car recklessly.
- You should not use drugs.
- You should not engage in sexual relationships outside marriage.
- You should not steal.
- Your teachers and parents should speak respectfully to you.

4 Which of the above are moral statements and which are pure conventions?
5 Which of them should be made into legal requirements? Why?
6 What do we mean by a 'moral law'?

At some points in the past, this rule about right and wrong would have been called a 'law of nature' because it seems that nobody needs to be taught laws like this – everybody naturally understands them. In his book *The Abolition of Man*, C.S. Lewis argues that, despite differences, many moral standards are shared. He asks us to imagine what a completely different morality might mean, and whether or not such a thing would be possible. Can we find a society where people are proud of cheating on their romantic partners or where it is considered good to steal from the poor? It is hard to imagine. Differences may occur when different societies consider whom they should treat well, but they always agree that pure selfishness is a bad thing. Men have differed as to whether you should have one wife or four, but they have always agreed that you must not simply have any woman you like.

Lewis claims that this simple observation means that moral laws exist in the same way as physical laws (2009: 3–8). He notes that whenever you find somebody who says that there is no such thing as a moral law, only arbitrary social conventions, you will find that they go back on this claim whenever it suits them. If these people, he says, break a promise to you then they may justify that behaviour by asserting that they are not violating any moral law, but if you break your promise to them then you'll likely find them complaining that it isn't fair. This means that they *are* appealing to certain standards of fairness which they expect everyone to agree on – otherwise what is the difference between a fair and an unfair behaviour?

Because of arguments such as these, some people, like Lewis, have claimed that there are laws of human nature, that we all know them, and that morality is absolute, unchanging and constant.

Lewis is probably correct that you are more likely to hear an argument about how to apply moral codes than an argument about the code itself, but this may

be because we are generally arguing with people who share a similar cultural background. Things may be different when we are talking to people who are from very different cultures. For most of us, our ethical beliefs are in the first instance almost entirely determined by our parents, teachers, religious leaders and the whole culture we grow up in. This is inevitable; young children cannot consider these complex issues, but as adults we have a responsibility to see if the reasons that we have for believing our ethical codes are good ones.

7 Suppose a teenager is arguing with his parents about staying out late in the evening. Is it more likely that the argument is about:
   - what is a reasonable time to return
   - whether or not the parent has any right to insist on a reasonable return time?

8 Suppose that you come across someone about to take your watch from your desk. Which is it more likely that the person will say?
   - That they just wanted to borrow the watch
   - That they dispute your right to own the watch

9 How do the examples in Questions 7 and 8 relate to the idea of 'moral rules'?

10 Think about the last time you had a disagreement with somebody about right and wrong. Were you arguing about how to apply moral rules or the rules themselves?

11 Do you think that Lewis is right when he claims that these rules are universal and unchanging?

The role of reason in ethics

Even when there is general agreement regarding moral rules or laws, there may be significant disagreement about the correct rules to follow in order to *uphold* those moral laws. This is the difference between morals and ethics. Suppose your country is at war. All citizens need to decide if they will fight, and possibly kill, for their country. Needless to say, there are strong disagreements about the morality of war, and arguments between pacifists and non-pacifists are common. For our purposes, we are interested in the types of disagreement between the two sides, and we find that there are at least two apparently separate reasons for disagreement – two separate sets of ethics – and these are based in *fact* and in *principle*.

It may be that both sides have the aim of minimizing the amount of overall suffering (shared moral belief), but disagree as to how best to achieve this goal (conflicting views on moral behaviour). The non-pacifist may argue that the war will actually prevent more suffering than it causes; the pacifist may say that the war will increase the overall amount of suffering. The disagreement is about 'facts' and is open to settlement by evidence (although the evidence may be very difficult to obtain and interpret). On the other hand, it may be that the pacifist's main concern is not about the overall suffering: perhaps he believes in the overriding sanctity of life and thinks that killing is wrong under any circumstances, even when it reduces suffering. If we ask him why he believes this he says, 'For the same reason as the non-pacifist wants to minimize suffering – I just think it is right.' This disagreement is of a different type; it is one based in principle, and it is hard to imagine that evidence will solve the dispute.

This distinction is very important, because *arguments of principle* and *arguments about evidence* are solved differently.

Logically speaking, if an argument is about facts, there is at least a chance we can verify the facts and solve the dispute that way. If, on the other hand, the argument is not about facts but rather about which moral value we should

uphold, morality would appear to come down to personal opinion. If this is true, then the prospects for us finding the 'correct' form of morality are bleak, and trying to persuade someone that one course of action is 'morally better' than another is like trying to persuade them that oranges taste better than apples.

But surely we can try to make some progress with these problems? In cases where we need evidence, the problems are those of the social sciences. (Are unwanted babies more likely to be abused than babies whose parents wanted them? Are the mothers of unwanted babies made more unhappy by their children than they would have been if they had had an abortion? Are adopted babies less likely to be happy than babies who live with their biological parents? Does poverty result in higher levels of familial dysfunction?) To be sure, these are difficult questions, but perhaps not insoluble. Human scientists can do studies and identify patterns in the correlations between the various factors identified in the questions. This could give us some facts which might guide us in making moral judgements and determine ethical courses of behaviour.

In the case of disputes of principle, we might ask for minimal standards of logical consistency. For example, what do we make of the pacifist in the previous case who is pro-euthanasia? Presumably, unless he is willing to change his mind on this issue, we can dismiss his argument for the sanctity of life as an inadequate defence of his principles. Similarly, if someone condemns homosexual acts on the grounds that 'they are not natural', then we can see that the consistent application of this principle would make flying or driving (or indeed chastity or contraception) immoral. On these grounds, we would not accept this principle as a reasonable one and we would seek an alternative justification for the belief.

12 If the disagreement in the country-at-war scenario on page 236 is factual in nature, what facts, if they could be proven, would be likely to swing the argument in favour of:
- the pacifist
- the non-pacifist?

13 If the argument were between a pro-abortionist and an anti-abortionist, both with the stated aim of reducing overall suffering, what facts, if proven, would be likely to swing the argument one way or the other?

14 In either the pacifist/non-pacifist or the pro-/anti-abortion case, if the disagreement was one of principle, what evidence might help resolve the conflict?

In other words, when we think we have a justification for a course of action, we should look to see if:

1 there is any evidence we can collect to decide the case
2 if any general principles suggested would lead us to moral conclusions which are either:
   - morally repellent
   - inconsistent with our other beliefs.

If either 1 or 2 is the case, then we need to either modify our principle or accept what we initially thought was an unpalatable conclusion. Consider, for example, the question of whether having an abortion is a moral behaviour. If the general moral principle is that life is sacrosanct, then a person who opposed abortion should also oppose the death penalty, war, and any other behaviour which predictably results in someone's premature death. Otherwise, his beliefs contradict each other.

15 In each of these cases, decide if the argument can be supported/refuted by empirical enquiry (finding and looking at evidence).
   a Counsellors should keep confidentiality – otherwise no one will go to them for help.
   b Counsellors should keep confidentiality – it's a matter of respecting people's privacy.
   c We should tax the wealthy more than the poor – they are better able to afford it.
   d We should tax the wealthy more than the poor – it is the best way of generating substantial government revenue.
   e Euthanasia should not be allowed – families will be pressurizing elderly and inconvenient relatives to opt for it when they would rather not.
   f Euthanasia should not be allowed – the taking of life is wrong, even if it is your own.
   g Euthanasia should be allowed – we have the right to do what we want with our own bodies.
   h Euthanasia should be allowed – it is better to die than to live in misery.
   i Genetic engineering is immoral – we are not meant to tamper with the basic machinery of life.
   j Genetic engineering is immoral – we would save far more lives by spending the billions currently spent on research on saving starving children in Africa.
   k Genetic engineering is moral – God put us here to understand and marvel at His creation.
   l Genetic engineering is moral – we can increase the quality of billions of lives in the future.

16 Take the arguments that are based on principle rather than evidence. In pairs, one person should defend the principle, while the other should attempt to show that it leads to unacceptable consequences and that it should therefore be abandoned.

17 It was suggested on page 237 that we can 'test' a moral principle by seeing if it leads to moral conclusions that are morally repellent. Explain why it could be argued that this is a circular argument, and decide for yourself if it is therefore possible to 'test' a moral principle or not.

We have now seen that we can, and do, use reason to attempt to 'refute' an ethical argument. Let us look at this in more detail. Suppose we feel that abortion on demand (when there is no medical risk to the mother) is wrong, and that we wish to collect relevant evidence and test our principles to see if our belief is reasonable. One way of justifying our belief would be to suggest that

1 abortion is wrong because
2 abortion is murder, and
3 murder is wrong.

Of course, now we need to demonstrate the truth of (2) and (3), so we suggest that (2) is true because

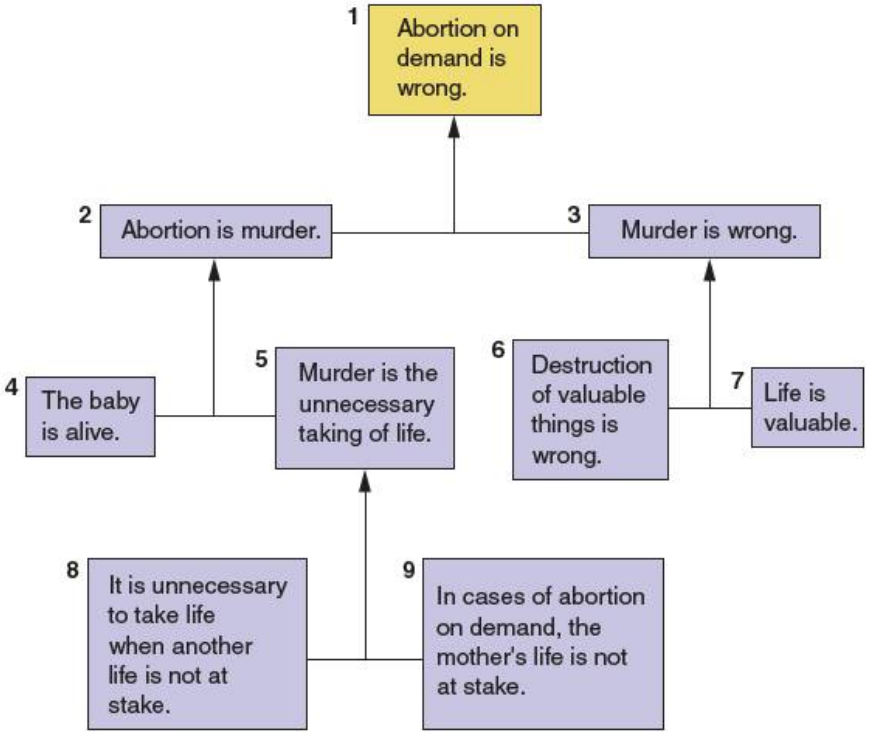
4 the baby is alive and
5 murder occurs when a life is taken unnecessarily.

We suggest (3) is true because

6 destruction of valuable things is wrong, and
7 life is valuable.

We might then also try to justify (4), (5), (6) and (7).

The argument can be shown diagrammatically, with the horizontal lines indicating that the statements are used in conjunction and the arrowed lines indicating supporting reasons.



Knowledge framework:
Methodology (1)

One method for making knowledge in ethics is **deductive reasoning**, as we see in this section. This is the same kind of reasoning that mathematicians use in developing rigorous proofs, and, since mathematics has little to do with ethics, it may seem quite surprising that we can use the same methodology in both areas of knowledge.

There is an important difference, however; in mathematics, we are dealing with mental constructs and ideal forms whose definitions are under our control, and so it is much easier to begin with premises that are absolutely certain. In ethics, we are dealing with real people in real situations, over which we often have no control. We cannot establish boundaries in ethics the same way that we can in mathematics, and so ethical reasoning is not likely to rest upon unquestionable axioms.

We cannot expect certainty, so we aim for other standards: *coherence* and *'reasonableness'* being two important features of a good ethical argument. A third important feature might be *completeness* – that is, our ethical theory should cover all moral situations. We should not have to invent separate principles to cover new or different situations.

You will recall from Chapter 7 that the premises of any argument are the foundation on which the whole thing rests. In this case we have:

4 The baby is alive.
8 It is unnecessary to take life when another life is not at stake.
9 In cases of abortion on demand, the mother's life is not at stake.
6 Destruction of valuable things is wrong.
7 Life is valuable.

In order for an argument to be true, the premises must be true. Are these premises true? Underlying (4) and (7) is the notion of life as a uniform quantity, but it could be argued that there is more to it than that – that an adult is 'more alive' than a baby, or that the life of an adult is more valuable than the life of a baby. This would need development to become a viable theory, but it does not seem to be out of the question – many who would

otherwise oppose abortion do not do so when a pregnancy is sure to kill the mother. Premise (7) seems to equate animal life to that of humans – it might therefore need modification (but why are we more valuable than other animals?). Even if so modified, is there a reason we think life is valuable? Is it something to do with consciousness, or the ability to suffer, or the ability to reason? If so, perhaps we can take this premise a step further. Premise (6) is highly contentious – what if the destruction of the valuable thing saved the destruction of other more valuable things?

It seems that these premises are not unequivocally true. We could keep going; we could attempt to justify (4), (8), (9), (6) and (7) by going 'down' another layer and then another, and then another. But this would never end, and we have to stop somewhere. That somewhere is when we have reached the point where we believe the reasons no longer need justification – when they are 'self-evident'. So are these 'obvious'? Can we take them as a reasonable platform on which to build our argument? Well, that depends on your point of view. Some may find them reasonable; others may find reason to disagree.

It may be that the anti-abortionist will examine the axioms and be content, or make minor modifications, or it may be that the argument will be seen to be flawed for empirical or theoretical reasons. If this is the case, then it may be possible to construct another argument to support (1) in a reasonable manner, or it may not. If the latter, then it would be unreasonable to hold the original belief, and further thought would be required.

It should be fairly clear that our choice of premises will largely determine what sorts of things we think are right and wrong. Alternatively, we might say that we choose our premises carefully, so as to justify exactly the things we already think are right and wrong and thus to provide some coherency to our belief system.

In both cases, the foundations of our ethical arguments are our premises. It follows that the choice of premises is a crucial part of any ethical theory.

18 Analyse the flowchart in the abortion case on page 239.
- Is the argument reasonable?
- Do you agree with the premises? Explain your reasons.

19 Construct a flowchart to suggest that abortion is not wrong.

20 In the argument above, we have started from some/all of statements (2)–(9) and hence deduced the conclusion. Is this realistic? Is this actually how people derive ethical conclusions? Might it be more accurate to say that we have an emotional leaning towards/against abortion and we try to justify our (intuitively held?) beliefs by starting from (1) and actually arguing downwards? If this is the case, is this an adequate way to argue?

21 Construct flowchart arguments to suggest that the following are morally wrong and then construct arguments to suggest they are morally acceptable:
- murder
- suicide
- animal experimentation
- torture
- corporal punishment
- war
- promiscuity
- capital punishment
- racism.

22 Defend your argument against someone who disagrees with you. In the arguments you have constructed, do you find any premises occurring again and again? What does this suggest to you?

Choice of premises: ethical egoism and altruism

We have made a vital distinction between principle and evidence. Now we might usefully look at the evidence to see what principles are most common in directly ethical actions. Consider your own personal experiences. What principles seem to guide the way people behave?

It is immediately striking that people act in their own self-interest and they do things in pursuit of their own personal goals. In (what at least seem to be) non-moral matters, this is absolutely clear and not controversial – people earn money for their own benefit and spend it on food they enjoy, clothes they like to wear and on entertainment for themselves. In matters that certainly should be moral this seems to be the case, too. We say we should tell the truth but we are probably quick to excuse ourselves a 'white lie' when the need arises because we feel it is in our own interests to lie when we want to. We would probably say that we have a moral duty to save lives if we can – yet in practice we spend money on frivolous things or leave it in the bank rather than donate it to famine relief.

We might develop these observations into a theory that suggests that, based on the principle that it is our own long-term happiness that is important, we should behave in a way which turns out best for us in the long run. This is the theory of **ethical egoism** (notice that 'egotist' is an insult but 'egoist' is a theory of motivation). Ayn Rand was a famous proponent of this theory, and she expressed its fundamental value this way:

Accept the fact that the achievement of your happiness is the only moral purpose of your life, and that happiness – not pain or mindless self-indulgence – is the proof of your moral integrity, since it is the proof and the result of your loyalty to the achievement of your values (Pojman and Tramel 77).

Some argue that this is a deeply immoral position, and one that can be used to justify terrible behaviour, but this is not necessarily the case. The philosopher Plato pointed out that stealing, cheating and dishonesty are not moral behaviours, because these things wouldn't make you happier in the long term. By behaving selfishly, you will suffer fear of being caught and possibly punished, and even in the unlikely event you achieve your goals in this way, you will enjoy the achievement far less than someone who made it there the hard way. Selfish actions will rebound on you, and in the long term you would have been better off by avoiding selfish behaviour.

American philosopher James Rachels offered this argument against ethical egoism:

We should care about the interests of other people for the very same reason we care about our own interests: for their needs and desires are comparable to our own. Consider, one last time, the starving people we could feed by giving up some of our luxuries. Why should we care about them? We care about ourselves, of course – if we were starving, we would go to almost any lengths to get food. But what is the difference between them and us? Does hunger affect them any less? Are they somehow less deserving than we? If we can find no relevant difference between us and them, then we must admit that if our needs should be met, so should theirs. It is this realization, that we are on a par with one another, that is the deepest reason why our morality must include some recognition of the needs of others, and why, then, Ethical Egoism fails as a moral theory (Shafer-Landau 199).

23 According to ethical egoism, it is long-term happiness that is important. Do you agree with this idea?
24 Is ethical egoism a practical theory in terms of daily behaviour, that is, does it actually provide a guide for behaviour?

We can contrast the ideas of ethical egoism with those of **altruism**, which is based on the notion that we ought to sacrifice our own interests to those of others. Ethical egoism suggests that altruistic actions simply do not happen, but this seems to fly in the face of our everyday experience. The fact of the matter is that many people do sacrifice their own interests to help others. Don't we regard altruism, not egoism, as the highest good? Consider the case of the soldier, safe in his trench, who spots a wounded colleague in distant enemy territory. The situation is such that any rescue attempt is very dangerous, and almost certain to fail, but he goes to help in spite of the risk. He succeeds and rescues the soldier, but suffers terrible, lasting wounds in the process. Is this not an altruistic act if ever there was one?

To answer this, let us consider the possible reasons that the brave soldier might give when asked why he went to rescue his colleague:

1 It was my duty.
2 It would have been awful to let him die.
3 He's my friend.
4 He once did the same for me.
5 I would have felt guilty if I hadn't.
6 I wouldn't want anyone thinking I was too scared to do it.
7 I thought it would be a good way to make my name.
8 I wanted to be in the running for a bravery medal.
9 I thought, on balance, that the potential gain outweighed the risk.
10 I wanted to achieve a benefit for myself.

Which of these would you regard as the most moral reason for acting? The ethical egoist would suggest that it doesn't matter; 1 to 9 are merely versions of 10. In 2, for example, the 'hero' is acting out of a desire to avoid the perceived 'awful' consequences of not acting; in 4 he is acting out of a desire to clear a debt. Similarly, we can suggest that all reasons ultimately boil down to 10.

Let's go one stage further and consider the most extreme case, where someone knowingly sacrifices their life for those of others. Let's return to our altruistic soldier. He is sitting around the fire with his fellow soldiers when a grenade lands in their midst. Without hesitation, the hero throws himself on the grenade, saving the lives of the others at the cost of his own. Surely this is altruism? Not according to the ethical egoist, who argues that the soldier had nothing to lose – he was going to die anyway, and in this way he ensured that he would be remembered as a hero. So his sacrifice was in his interests. Alternatively, maybe the soldier was so desperately unhappy that the opportunity to limit his future suffering was a wonderful opportunity. Ethical egoism can explain it. However, now we are in a position to see why this theory is fatally flawed – it accounts for *absolutely anything*! This may appear to be a strength, but it is not. If our soldier had pushed his neighbour onto the grenade, or run away, or done anything at all, we could say that he was acting in what he thought were his own interests. The theory does not exclude anything, and it therefore cannot be said to explain anything.

25 Is it possible for someone to act against their own interests?
26 Consider the rich person who gives large sums of money to charity, but says that she does so because it gives her business a good image, and so is in her long-term interests. Is this moral behaviour?
27 Consider the example of the soldier. Is there any action which could possibly prove that ethical egoism is incorrect? Pick any other situation – can ethical egoism tell you the correct course of action?
28 Think back to what you know about science and the concept of falsifiability (Chapter 3). How does this apply here?

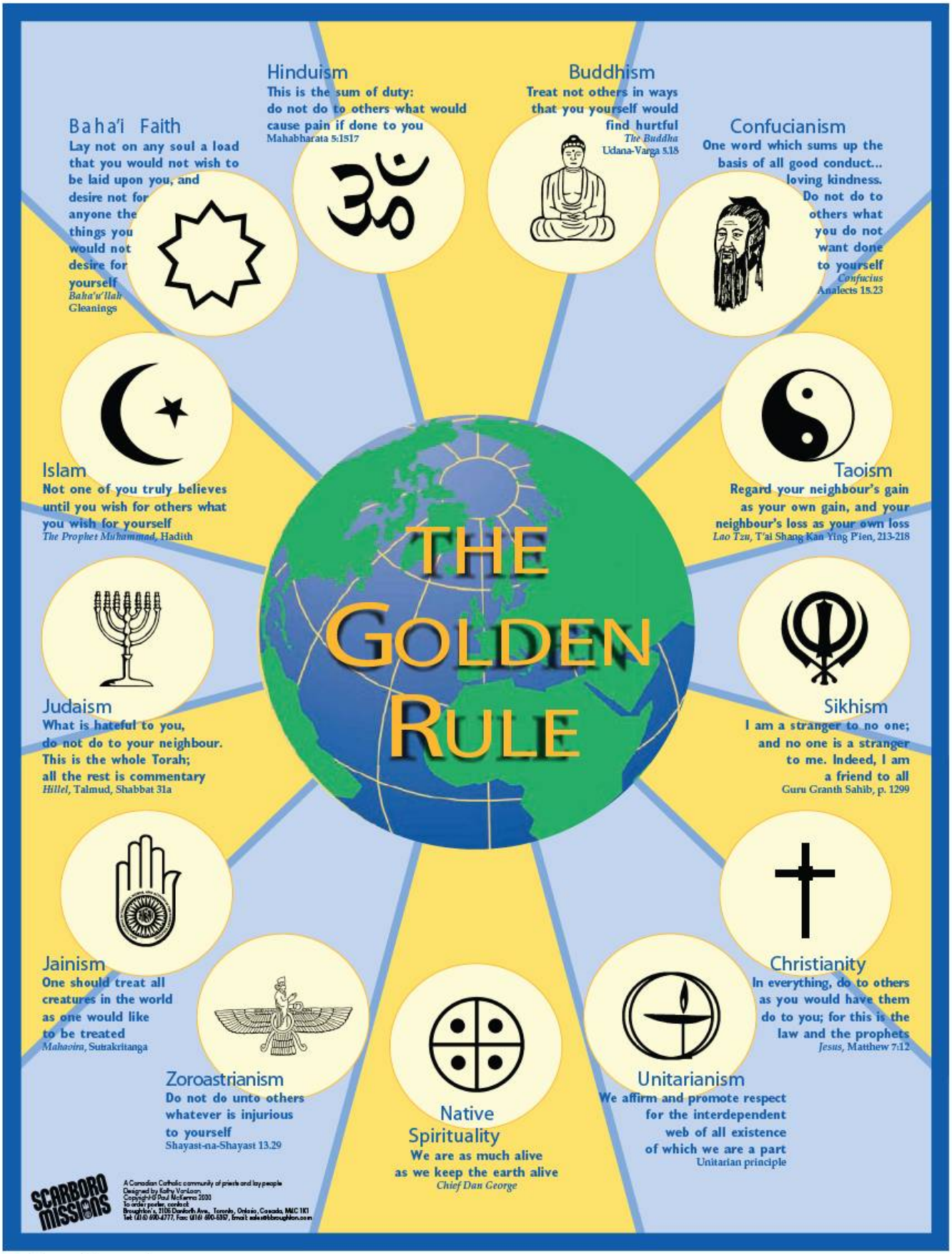
The root of the problem is that if we see altruism as an excellent thing then we can be egoistic by being altruistic. We can, perhaps paradoxically, sacrifice our own interests if we perceive this to be in our own interests, and this covers any conceivable course of action. In other words, it can provide no guide to action – and so seems of little use as a moral theory.

If we reject the extreme of ethical egoism, where does that leave us with regard to altruism? Although we would certainly want to take others' welfare into account, it does not seem reasonable to live totally for others. So we need to find a way of balancing our needs with those of others.

Choice of premises: utilitarianism

Even though the extremes of egoism and altruism need to be moderated, they are both based on the principle of benefit, whether for self or for others. The concept of benefit is to be broadly interpreted, and should take into account as many factors as possible; in this context we often refer to benefit as **utility**. So both altruists and egoists attempt to maximize someone's utility, and perhaps the obvious compromise is to try to maximize overall benefit, for oneself and for others to achieve the greatest good for the greatest number. This is, in a nutshell, the theory of **utilitarianism**. It seems like a common-sense approach, and is perhaps only a small step from the commonly held notion that we should be free to do what we want, as long as we do not harm anyone else. The problem with this, and one which utilitarianism seeks to address, is how we weigh up harm to others and benefit to ourselves.

Underlying utilitarianism is a very appealing notion of fairness (some have even said that it is a democratic theory of ethics). Utilitarianism states that we are all equally valuable – that all utility is equal; mine counts for no more than yours and it is sheer prejudice to take one's own point of view as the standard of judgement. (Note how this idea resonates with James Rachels' denunciation of egoism.) It suggests that we should transcend our egocentric predicament and consider the welfare of everyone else as if it were our own. This is an idea which is important in human experience, and is at the root of many religious tenets. Perhaps you are familiar with the common form of the Bible's injunction to treat others well: '*Do unto others as you would have them do unto you*'. Christianity, however, is by no means the only religion to rely on this rule; as you can see from the 'Golden Rule' image (there is an interactive version here: http://tinyurl.com/y89xtvw); many other religious texts from cultures around the world have statements which are variations of the same idea. Happiness is still the ultimate goal (so if you objected to this earlier, you may well still be unhappy with utilitarianism), but it is to be sought socially, not individually.



■ The Golden Rule

So how do we go about this? According to the eighteenth-century philosopher Jeremy Bentham, we can actually treat the problem as a type of mathematical calculus. He suggested that, faced with a number of choices, we calculate the net utility of each one and choose the option with the biggest gain. It is simple in theory. Imagine we can measure happiness on a simple scale, with units of utils, so that 11 utils is a small pleasure and 250 utils gives extreme delight. Suppose, for example, that I am thinking of spending my money either on going to the cinema or on giving it to a homeless person. If I go to the cinema I get a score of 15; by giving the money to the homeless person I get some satisfaction, say 13, and the homeless person also gets a score of 14.

- The egoist would go to the cinema; 15 is better than 13; the 14 is irrelevant.
- The altruist would give the money; 14 is the only important feature.
- The utilitarian would give the money; the 13 and 14 together outweigh the 15.

29 In the example above, the utilitarian acts in the same way as the altruist. How would the util scores have to change so that the utilitarian would side with the egoist?

30 Suppose this example was a real choice. How would you go about determining the number of utils to assign to each action?

31 If I gave you $50, how many utils would this be worth to you? Compare your answers with a partner. If your partner gave a different score to you and I want to give away $50, then who should I give it to? Does this make sense?

32 Which is the better distribution of utility between five people: 20, 20, 20, 20, 20 or 1, 1, 3, 5, 90? What would the perfect utilitarian say? Might there be reasons to disagree with the pure utilitarian analysis? If so, what are they?

33 The notion that everybody's utility is equally valid sounds like an excellent principle, but is it really the case?

As soon as we begin to ask questions like these we see that the foundation of utilitarianism is not as straightforward as it seems. To make it work I need to be able to give a value to actions, and to place them in some sort of rank scale. But is this always possible? Even if I can do this, combining and comparing values introduces a whole host of difficult problems. Even if I were to give my trip to the cinema and the hungry beggar's meal the same score, would they really be of the same value? How could I possibly know what the hungry beggar's meal would mean to him? Can I go and ask him: 'Would having a meal give you as much pleasure as going to a really good film would give me?'

For one thing, such a system does not seem to match what we do in real life – we don't carry around charts and assign numbers to represent values and compare. For another, it seems pretty obvious that the amount of pleasure someone gets from any given event is highly personal. And pleasures related to something like a meal which helps someone survive seem more *important* than pleasures related to passing entertainment, no matter how much we love a particular movie. There may be valid ways of eliciting what decision theorists call a **value function** – a meaningful ordering of alternatives – but there may not. If there is not, then we may have to retreat from a detailed calculus of utility to a broader, more general approach.

34 Consider the fictitious 'case of Sam'. Sam is an average, normal human being. He has a few friends, but no one close, and he is unmarried. He has no living relatives. One day when he is in hospital for a regular medical check-up, it happens there are several medical emergencies occurring, and five people are going to die unless two kidneys, a liver, a heart and 5 litres of blood can be found immediately. The people are all much loved, with large families. What is the obvious utilitarian solution? Is it morally just? Explain your answer.

35 Now imagine that one of the people threatened with death is likely to find a cure for cancer; another is central to the peace process in a war-ravaged part of the world; another is an actor whose work touches the lives of millions. Is it possible to find circumstances whereby Sam's life should not, according to utilitarian principles, be forfeit? Would Sam's death in this case be morally just or injust?

36 Make up an example of your own where it seems that utilitarianism leads to a terrible and unjust action. See how extreme an action you can justify via strict utilitarian principles.

Most people feel that such examples show that utilitarianism, as we have so far defined it, is flawed, running as it does against all our feelings of natural justice. This is a powerful objection and, unless one is prepared to allow Sam to be sacrificed, simple utilitarianism needs modification. One attempt to rescue the theory from these absurdities has been to require moral agents to look at the wider consequences of killing Sam and to **universalize** – that is, to consider what would happen if everyone did such actions. Perhaps doing such a thing would lead to a community where everybody lived in fear and terror. Under these circumstances, utility would not be maximized, and so killing Sam would not be the right thing to do.

37 Look at the example you just made up in which utilitarianism seems to go against what we feel is natural justice. Can you reconcile your example to the theory by universalizing in this way?

38 How wide a view should we take? Should we consider our immediate friends, the nearby community, the state or the world, and how far into the future should we look? What are the obvious problems here?

39 If we begin to take an extremely wide view, what implications does that have for our lifestyle compared with, say, those who have little to eat? What would the utilitarian suggest is the right thing for us to do? Is this a problem with utilitarianism or our lifestyles?

40 Is utilitarianism compatible with principles of natural justice?

It may well have struck you that utilitarianism rather misses the whole point of ethics. We have been arguing in terms of the outcome of the actions – and so whether or not we kill Sam depends on the effect killing him has. But not killing Sam purely because it doesn't do any good overall hardly seems like a moral position! Arguably it means that we are resisting murder not because we value Sam, or place a value on his life, but only because we can't find a way of making it worthwhile to kill him. For many, this is a fundamental and irresolvable flaw with the whole theory.

The root of this problem is at the heart of utilitarianism. Utilitarianism is what ethicists would call a **consequentialist theory**. This means that for the strict utilitarian, the means by which an outcome is achieved is not important in determining the morality of the outcome. All that matters is the result. Saying, however, that no act is good or bad in itself, that it all depends on the outcome of the action, is to deny the importance not only of the action (killing Sam, for example), but also of intention. Consider these two cases:

- I am about to get on a train when I am mugged, and my wallet is stolen. Instead of getting on the train I go to the police, who manage to catch the mugger, and I am about to press charges when I am told that the train crashed and I would have been injured or killed. That is, the mugger actually did me a favour by mugging me. Does this make the mugging a morally correct action?
- I see a sick man lying in the street in a deserted part of town. His condition is disgusting and repellent, but I feel it is my duty to help, and I take him to hospital. On the way, we are in a car accident and he is killed. Is my action therefore immoral?

41 What would the strict utilitarian say about the two cases above? What do you think?
42 Can we modify utilitarianism to cope with the problem?

So what do we make of utilitarianism as a theory? One strength is that it recognizes the need to view the world from the point of view of others. Another strength is that by basing itself on outcomes it attempts to offer clear guidelines for action. However, there are practical and logical difficulties in implementing anything like a strict utilitarian approach, and it is certainly worth considering other possible approaches which address some of the weaknesses.

Knowledge framework:
Historical development

We have seen that questions pertaining to ethics and morals extend back far into the human past. This chapter considers ideas from philosophers ranging from Plato, in the fourth to fifth century BCE, to Immanuel Kant and Jeremy Bentham in the eighteenth and early nineteenth centuries, to Ayn Rand in the twentieth century, to James Rachels, Philippa Foot and Daniel Dennett in the late twentieth and early twenty-first centuries.

The important ethical theories that we have explored – utilitarianism, ethical egoism and virtue ethics – may have been developed long ago, but they remain part of the working scope of ethics as an area of knowledge today. None of these theories has proven to be wholly satisfactory, but neither has any proven to be so flawed that it has been dismissed from consideration altogether.

Some concepts have changed over time: one significant example is the different attitude we hold towards emotion as a way of knowing in ethics today. Plato gave us a model in which emotion had to be controlled by reason; by the late eighteenth century, David Hume had turned that idea around and proposed that it is reason which must be tempered by emotion.

Choice of premises: moral duty

Based as it is on happiness, utilitarianism is founded on the importance of our desires. For some, this is not a likely path to moral behaviour, as our desires are often impulsive, selfish and unreasonable. Many of the problems in the world are a result of people paying too much attention to their desires and not enough to other factors.

A strong contender for inclusion in any moral theory is the concept of **intention**. Simple utilitarianism makes no mention of it, but we instinctively take a rather dim moral view of someone who tries to do great evil but fails, even though there are no bad consequences. The murderer who is caught before she commits the actual murder is still tried in a court of law for *attempted murder*; we do not simply let her walk away scot free. It seems that outcome alone is insufficient grounds for judging an action; the intention of the participants is key. (Interestingly, this is reflected in many legal systems where a *mens rea* ('guilty mind') is required in addition to an *actus reus* ('guilty action') for a crime to have been committed. The presence of the *mens rea* distinguishes between, for example, murder and manslaughter.)

The idea of intention seems rooted in common sense. Suppose, for example, that I offer to lend a friend my car. If I do so in the hope of reward, then you would not say that I was acting morally. A harder case to judge is the one where I lend the car because I like my friend. Is this a moral action? It certainly seems friendly and 'nice', but then so is smiling at your neighbour, and that is hardly a moral action! It has been argued, most famously by the philosopher Immanuel Kant, that any action which is based solely in personal emotions cannot be moral (Harris). If we accept that principle, then lending my car to a friend in this way is not a moral action. If I wanted to do it, if it was my desire to do so, then I was acting purely in my own interests, and (ethical egoists aside) few of us would want to say that such an action is moral.

This straightforward notion leads us to the idea of **moral duty** as a legitimate motive for action. There are times when we know what we should do and, irrespective of our feelings one way or another, the ethical action is clear. Suppose, for example, that my elderly parents need me to give them a large part of my salary each month so that they can afford to live reasonably comfortably. If I am paid enough so that I am not going to go hungry (and perhaps even then), then surely I have a moral duty to provide for them? I may not find it a very appealing prospect, and I may be reluctant to give up holidays or other things I value, but my duty is clear. Of course, I may actually be very enthusiastic about repaying my debt to my parents, but that is irrelevant. The point is whether or not I follow my sense of duty.

43 Think of some situations where you would argue that intention is more important than outcome, or vice versa. Must intention play an important part in ethical theory?
44 What do you think about Kant's rejection of desire as a basis of morality? Justify your answer carefully, giving examples where relevant.
45 Kant claims that helping our friend because we like him is not a moral action. Do you agree?
46 What would Kant say about the person who, seeing a sick person, was overcome with pity and went over to help them?

The idea of moral duty may sound very noble, but it needs to be scrutinized carefully. Sometimes phrases such as 'Do your duty', in the mouths of the unscrupulous, really means 'Do as I tell you without question.' The concept of duty is a useless one unless it clarifies the way we should act. So what are our moral duties? Where do these impulses come from? Are they universal and unchanging, as C.S. Lewis argued earlier? Or do they change from culture to culture, and from time to time?

The danger here is that we answer these questions with reference to other schools of ethical thought. This is dangerous because we may end up following these schools of thought rather than trying to develop fully the duty theory. For example, if we say that our duty is to cause the greatest good for the greatest number then we are really just being utilitarian, and so we have gained nothing from the idea of moral duties. In order to clarify the idea, we need to avoid all other schools of ethical thought (which seems like a tall order!).

One philosopher who did manage to answer the question about what our duties are was Kant. In order to judge an act, he asks us to consider what principle governs the act, and then to imagine what would happen if everybody obeyed the principle. So far so good, but then Kant says that we judge if the action is good not by seeing if good effects are produced overall (this would be the same as utilitarianism) but by seeing if a **consistent world** is produced. To make it clear, consider the friend who asks if he can borrow my car. If I lend the car then the

principle might be 'it is good to help friends when they ask', and it is perfectly easy to imagine everyone in the world obeying this (notice I am not appealing to 'good' outcomes at all). So Kant would not forbid the lending of the car on moral grounds. On the other hand, suppose I have the urge to kill or lie or steal. If I generalize the principle 'you should kill/steal', then, in the case of killing, after a brief period there will be no one left to carry it out; in the case of lying, it is impossible to even state the law morally (since you should lie all the time). Thus it is unreasonable to generalize the principles governing your actions, and thus the actions are immoral. Kant called this notion the **categorical imperative**, and he stated it thus: '*Act only according to that maxim by which you can at the same time will that it should become a universal law*' (Brown).

47 Think of a few cases where the concept of moral duty makes the moral course of action clear.
48 Are there situations where the concept of moral duty is of no help?
49 Try to apply Kant's reasoning to abortion, euthanasia, war, promiscuity, suicide and racism. Does his method come up with answers with which you feel comfortable?
50 Explain Kant's thoughts on duty. What do you think about the insistence on a consistent world? What role does this give reason in ethics? Do you agree?
51 Kant uses the idea of *intention* in an interesting way – he says that an action cannot be moral if you want to do it. This would mean that acting out of compassion for another human being, or out of love and desire to help someone, would not be ethical actions. Do you agree?

Reason reappraised

In this chapter so far we have placed a high premium on reason as the appropriate way of knowing; this seems appropriate if we are to engage in a critical evaluation of theories of 'the good life'. It could be argued, however, that placing reason absolutely centre stage and subordinating everything to rational consistency, as Kant did in the previous section, is getting rather extreme. It may be time to reassess the role of reason in general.

Let's leave the theories for a moment and get back to basics by looking at an everyday case study. Consider a simple but very common question. Should I tell someone (Pat) something that I have found out about someone else (Alex): for example, that Alex is having arguments with his partner, or has been reprimanded at work? This is an ethical decision and there are a number of factors to consider:

- My relationship with Pat (it is quite different if Pat is a friend, colleague, relative, spouse ...)
- My relationship with Alex
- The relationship between Pat and Alex
- The exact nature of the information I have
- What I think Pat's wishes might be (and how confident I am that I have got this right)
- What I think Alex's wishes might be (and how confident I am that I have got this right)
- My assessment of what Pat might do with the information
- How I came by the information (was I sworn to secrecy, or told it on the assumption that I would stay quiet?)
- My motives (do I want to help or hurt Pat and/or Alex?)

- The likely consequences of my telling (will Pat tell other people? Will he tell them that I told him? Will Alex suffer if the information is public? Will I suffer if it is known that I talk about these things?)
- Alex's expectation about my behaviour
- Alex's right to privacy
- The prevailing cultural attitudes towards relationships, privacy and gossip

This collection of factors is complex. The individual concerns are all densely intertwined and contingent on each other. For example, if Pat or Alex are strangers, spouses, relatives or colleagues, the whole tone of the issue changes. I also somehow have to take into account the probability that I might be wrong to a greater or lesser degree in my judgements, and the likely outcomes if I am indeed wrong. Given these complications, you can see why reducing morals to simple deductive arguments or general principles might not be a helpful approach; things are just too difficult for such a simple method. On the other hand, another way to look at it is that exactly *because ethics can be complicated* there is all the more need to seek guiding principles.

52 Consider the cases below and list all the factors that might come into play:
- **a** You see a young woman shoplifting in a supermarket. You are considering taking some action.
- **b** In a group of friends some racist, sexist or homophobic jokes are made; you could confront them.
- **c** An elderly man is in a coma and kept alive by a life-support machine. His family are considering whether to turn the machine off.
- **d** A 16-year-old is pregnant and is considering having an abortion.

53 In each case, how would you balance all the factors to come to the 'correct' conclusion?

54 The physical world is an enormously complex place, but physicists make a great deal of progress by adopting certain simplifying assumptions like ignoring air resistance, pretending that surfaces are smooth, that gravity does not depend on height and so on. If such simplifications are possible in the natural sciences, why not in ethics?

Aristotle wrote about the matter in terms of **phronesis** or 'practical wisdom', by which he meant the ability to exercise moral intelligence at an intuitive level or to negotiate complex problems remarkably quickly. We might compare it to the ability to, say, see in a split second the path of a ball that has been thrown for us to catch. In neither case do we get it right every time, but nor are we ever too far wrong. And, referring back to the first section in this chapter, it is interesting to

see that we do expect everyone to exercise a basic level of 'moral competence', regardless of their background, education or intelligence.

Of course intuition is not without its problems, as we have seen, and we should not just accept it at face value, but it would be foolish to deny that it does play a role. Philosopher Stephen Toulmin takes this to suggest that the rational theories are not going to give us the answers we want, and we should stick with individual cases. He cites the case of the US National Commission for the Protection of Human Research Subjects in the 1970s. The Commission had 'near-total agreement' about practical action in particular cases, while its members could not achieve consensus about the moral principles on which their specific recommendations were supposedly based. This is quite remarkable – there was near-total agreement on what to do, but not on why to do it! Toulmin argues that this points to a fundamental flaw in the approach we have so far taken, which he characterizes as a 'theory-driven' approach which seeks to establish general principles and then to apply them to particular circumstances. He suggests we discard this in favour of a 'case study' approach, whereby we discuss particular situations and consider our actions (perhaps informed by certain virtues or feelings such as intuition or compassion) and *then* form general conclusions (Toulmin 133–47).

55 What do you think are the strengths and weaknesses of the 'theory-driven' and 'case study' approaches?

56 We might argue that the theory-driven approach mirrors *deductive* logic and the case study approach mirrors *inductive* logic. What does this tell us about the strengths and weaknesses of each?

57 Toulmin argues that the case-study approach is preferable to the theory-driven one. Do you agree?

Of course we do not have to choose either approach (it's a logical fallacy to think there can only ever be two options), and some philosophers have argued for a 'reflective equilibrium' which involves constantly balancing judgements and principles with the demands made by new circumstances (Daniels). Reflective equilibrium means we recognize that our rules are likely to be limited and that we may need to modify them in the face of a moral dilemma (we have seen this before, when examining maths and the sciences). New situations may demand new answers and new theories. This approach is attractive to many who suggest we abandon the search for absolute, final and inviolable 'rules' and recognize that advances in, for example, medical sciences have far outstripped our ethical capacities to deal with them. Perhaps cloning, genetic modification, abortion and euthanasia all pose such difficult problems because they simply do not fit into the ethical categories that we have developed over the ages. Proponents of this view argue that we will need a great deal of time and this process of 'reflective equilibrium' to come to any conclusions.

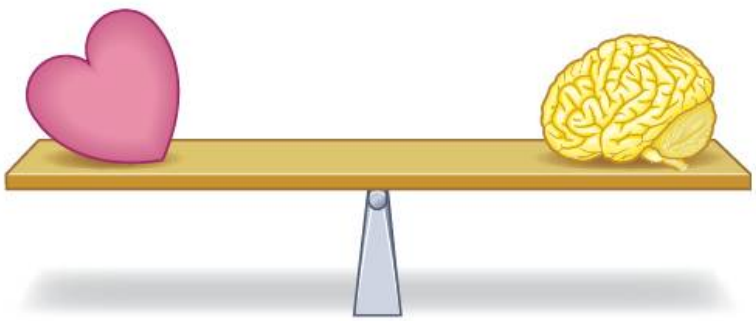
There is another, perhaps deeper, problem too: one that we have seen before. In using a reasoned approach to ethics, we have to acknowledge that reason alone can never motivate action. Put in the terms of the approach in this chapter and in Chapter 7, we need to start with some premises, but these, by definition, are unsupported by reason. David Hume famously pointed out the problem in the seventeenth century when he wrote "*'Tis not contrary to reason to prefer the destruction of the whole world to the scratching of my finger*' (Setiya). What he means is not that the destruction of the whole world would be a good thing, but that the reasons for his belief that it would be a bad thing are at root emotional rather than rational, because at some point in his chain of reasoning

he appeals to emotion to justify his premises. And, he argues, this is no bad thing. In a much-misquoted sentence he says '*Reason is, and ought only to be the slave of the passions, and can never pretend to any other office than to serve and obey them*' (Hume), and he is pointing to the need to base reason on emotion at some point. This is the opposite position to that proposed by Plato, as we saw in Chapter 8!

So in this section we have seen two important problems with any reasoned approach to ethics. Whether or not you agree with either the idea of abandoning the search for general theories, or the inability of reason to motivate ethics, it is intriguing that people can agree how to act in specific cases while having no agreement on principles. This certainly suggests that we have so far missed something in our search for ethical 'truth'; and perhaps we need to widen the terms of our search.

The role of emotion in ethics

Philosopher Philippa Foot tells a disturbing true story. During the Second World War a Norwegian couple took in a Jewish child who had been sent from Prague to Norway in order to escape the Nazis (Foot 66–80). She presumes that the couple was trying to do 'the right thing' in taking this child as their own, and asks what motives we can ascribe to them. Perhaps as good utilitarians they weighed up all the possible costs and benefits and decided that there would be a net gain of happiness; or perhaps they were following their moral duty; they didn't really want to take the child but felt that they should. Foot argues that both of these scenarios simply miss the point about moral decisions; that these reasoned and calculated approaches do not factor in what happens in real life, where the really *moral* decision would be based in sheer compassion for the child; that is, in raw emotion. This is forcefully illustrated by the chilling conclusion to the story; when the Germans invaded Norway they ordered that all Jews were turned over to them. The couple thought long and hard and decided that their *moral duty* was to obey the authorities; they therefore handed over the child, who later died in a concentration camp. Foot argues the couple had let their sense of moral duty overcome their sense of compassion; they had thought too hard and let reason get in the way when a basic human response would have been a better one.



Once the issue has been made as vividly real as this, the motivation for a different approach is clear. Historically, philosophers have tended to concentrate on theories of right *action* and on abstractions such as 'duty', 'justice', 'fairness' and 'equality', but perhaps these need to be replaced, or at least complemented by, an emphasis on *character* or *virtue* and on more *emotional* ideas such as 'compassion', 'love' and 'empathy'. Recently, feminist philosophers (who have not all been

Knowledge framework:
Methodology (2)

By now we have considered a number of different methods of making knowledge in the area of ethics. We have considered approaching ethical problems from the perspective of consequences, from the perspective of intentions, and from the perspective of developing virtues in individuals.

We have also considered various ways of knowing that are important, and we have seen that no one way of knowing dominates. Reason, emotion and intuition all seem to be important. If you think about it, imagination is equally important: we use imagination in order to project the potential consequences of our actions, and we use imagination to foster our ability to empathize with others.

female) have suggested that most of the 'historical' philosophers have been men, hence perhaps the 'male' predisposition to action and abstraction. Women, it has been argued, tend to think more in terms of character, empathy and emotional engagement, and a feminist approach might move away from a rather sterile reason-based ethics to a more fertile, dynamic approach grounded, at least to some extent, in human psychology. Whether or not this is true it is certainly a fruitful avenue to explore.

58 We can characterize the two approaches as concerned with either 'What makes an action good?' or 'What kind of character is it good to have?' Are the two approaches distinct? If so, which question is more fundamental?
59 Does or should gender play any role here?

Virtue ethics

The notion that character (rather than outcome or duty) can matter seems to be reflected in the idea of intention as an important factor in moral decisions, and this **virtue ethics** approach is an old one. Virtue ethics can be defined as a set of philosophies that hold that the moral life should be concerned with cultivating a virtuous character, as opposed to following rules of action. That means that a decision can be moral even if the outcome is a 'bad' one, and irrespective of ideas such as 'duty'. Virtue theorists believe that moral judgements are emotional responses to the world around us, and suggest that we should focus on the virtues which lead to what Aristotle called **eudaimonia** – which translates as, roughly, 'flourishing spirit' ('Eudaimonia'). This may sound suspiciously like utilitarianism – as if eudaimonia is simply utility in another guise. But this is missing the point; virtue theorists stress that thinking, feeling and acting should be *harmoniously* merged, so the successful virtue ethicist does not calculate utility, but does what he wants, because for him there is no distinction between 'I want to ...' and 'I ought to ...'. This echoes modern psychotherapeutic approaches that focus on resolving inner conflicts and on producing a balanced and integrated person.

Collapsing 'I ought to …' into 'I want to …' and seeking eudaimonia and individual states of mind may sound very subjective but, even though virtue ethics is concerned with emotions, it still retains a claim to objectivity. For example, a sick drug addict looking for his next fix may claim to be happy and argue (perhaps correctly) that only he can be the judge of his own happiness, but we can still say that he is not 'flourishing', in that he is not healthy, not 'really' happy and not likely to live a 'complete' and 'truly satisfying' life. Quote marks are used here because there are obvious problems with these value-laden words, but we can probably sometimes stand by such judgements without too much worry. For example, we really can talk about a dog which is flourishing – shiny coat, good teeth, responsive, active, interested in its surroundings, well fed and so on. It is flourishing, in a canine sense, compared with a hungry, flea-ridden, anti-social, sick dog that only wants to lie down and sleep. Now if the same can be said of humans – that there really is a good life, a flourishing life – then what would it be? Whatever it is, it is the sort of life we should be living, and we can define our ethical values in accordance with this eudaimonia – what leads to it is good; what leads away from it is bad.

60 The suggestion is that virtues such as kindness, trustworthiness, courage, temperance and charity are likely to lead to eudaimonia. Go back to the cases in Question 52 on page 250 and see if these virtues can be used to help find a moral action.
61 Is eudaimonia an emotion? What is the relationship between the two concepts?
62 Do you think the idea of eudaimonia is a valid one? If so, does it hold across different cultures and different ages? Or can there be significantly different types of eudaimonia?
63 What sorts of characteristics do you think might lead to eudaimonia?

The final question above is the real challenge for the virtue ethicist; what virtues are the ones that are valuable and likely to lead to eudaimonia? Aristotle listed things like kindness, trustworthiness, courage, temperance and charity, and we can see that these stress doing the right thing for the right reasons and having one's heart in the right place – that is, they imply the need to respond appropriately at an emotional level. Hume and others have stressed the underlying virtues of sympathy and empathy – whereby we put ourselves in the position of others and imagine or feel what they feel. This is an interesting approach, and the idea that we start with some recognition and appreciation of the feelings of others is an attractive one echoed in many ethical systems, as we saw with the many variations on the Golden Rule. We have seen the same idea in the guise of emotional intelligence, and perhaps there is no better recommendation for an idea than that it turns up so positively in many different contexts, cultures and eras.

Albert Schweitzer said that '*The first step in the evolution of ethics is a sense of solidarity with other human beings*' (Clark 33). This sums up the basis of the virtue ethics approach very well, and it is hard to imagine that people who carry out atrocities could do so if their empathic facilities were not lacking. Could anyone torture someone for whom they felt any virtuous emotional connection? Could genocide be imaginable except when one race or group has been de-humanized in some way? We could even argue that all immoral actions are simply failures of imagination. In his novel *In the Company of Cheerful Ladies*, Alexander McCall Smith's heroine Mma Ramotswe muses on this very issue:

It was difficult for Mma Ramotswe to imagine how anyone could steal from another, or do any of the things which one read about in the Botswana Daily News *court reports. The only explanation was that people who did that sort of thing had no understanding of what others felt; they simply did not understand. If you knew what it was like to be another person, then how could you possibly do something which would cause pain? (Smith 9).*

If this is correct, and compassion and empathy are vital, we can see why great art may have a moral dimension; a play, novel or poem might lead us to feel the concerns of someone from a different time, place or culture as if they were our own. In this sense perhaps the arts give us the most important knowledge of all. Philosopher Martha Nussbaum's view, which we have seen earlier, is worth repeating here:

Broad as our education may be, compassion remains narrow and unreliable. We have never lived enough. Our experience is, without fiction, too confined and too parochial. Literature extends it, makes us reflect and feel about what might otherwise be too distant for feeling. The importance for morals and politics cannot be underestimated (47).

64 It has been suggested that the following may be virtues in that they are likely to lead to eudaimonia: kindness, trustworthiness, courage, temperance, charity, sympathy and empathy. Is this correct? And are these emotions?
65 How should emotion and feeling affect one's moral reasoning and ethical reflection?
66 Can the arts help one lead a moral life by stimulating the compassionate emotions?

Knowledge framework:
Links to personal knowledge

Ethics is an area of knowledge in which the nature of the individual knower plays a large role in determining whether the outcome in any situation is ethical or not. As we have seen in this section, one large part of ethics is the virtue of the individual knower, and this still applies in the arena of shared knowledge, where the character of the practitioners, working alone or in groups, will determine the accuracy of the evidence, analysis, theories and publications.

With regard to ethical knowledge, it is not merely that individuals often make the decisions that determine whether they themselves act in a moral fashion; it is also true that the emotional, psychological, moral nature of the individuals shapes that behaviour.

We saw in Chapter 3 some examples of professionals who were caught falsifying their findings; in such cases it is the individuals who are censured, but the whole area of knowledge is tarnished, as all of their past individual contributions must be re-examined before they can be accepted as trustworthy.

A contrasting view of virtue ethics

We have seen that virtue ethics looks at the *sort of person* that it is 'good' to be, and that a popular vision is one of treating others as we would like to be treated ourselves, turning the other cheek, pity for the less fortunate and so on. You might notice that these are virtues that are closely related to religious viewpoints but that these virtues are by no means limited to religious believers; many non-believers would espouse the same values. Now you might take this broad appeal as evidence of the truth, or at least the wisdom, of religion – but alternatively you could instead ask why non-believers should go along with the ethics of a religion in which they don't believe. This is precisely what Friedrich Nietzsche meant when he asked '*If God is dead, how should we live?*'

Nietzsche's answer to this question is a radical version of virtue ethics, one that rejects solidarity with others and actually despises many of the traditional virtues such as pity and compassion; it sees them as worthy of contempt – as vices, in fact. In his famous book *Also Spracht Zarathrustra*, Nietzsche argues for strength, self-reliance and indifference to the needs of others. An analogy helps us to understand this approach to ethics; imagine a lion out in the savannah, living according to its ability – hunting and killing to eat, or going hungry if it cannot. It does as it will; it fights when angry, sleeps when tired. Now imagine the same lion caught, taken to the zoo and, over a period of years, tamed. Somehow it is taught not to kill but to wait for the food from the keepers. It knows it will be punished if it shows aggression, so it is passive; and it sleeps according to the artificial lights in the zoo – which is convenient for the visitors to the zoo, even if the lion doesn't realize it.

Now admittedly this is a loaded analogy, but you can see the point. Nietzsche argues that humans have the potential for greatness, glory, exuberance and vitality, but that most of us are caged by social convention and by our own pettiness. We are pale shadows of what we could be and, worst of all, for the most part we aren't even aware that we have this latent strength and power, but live out our lives following some artificial, false and worthless set of socially imposed values. He claims that we have caged ourselves, often by pretending that we 'have to' do things, that we 'have duties' and so on – that is, by appealing to conventional moral systems, which are simply societies' ways of maintaining traditional power structures. Nietzsche's ultimate moral heroes – the famous *Übermensch* or supermen – see beyond these restrictions and refuse to accept them; they reject conventional morality and in this sense live 'beyond good and evil'. Like the free lions, they live uninhibited and powerful lives. They are indifferent to the needs of the weak, and in the pursuit of glory would not hesitate to sweep them away if the need arose; and they would be 'right' to do so (at least to the extent that the term would apply to them, which might not be very much). These supermen are figures of exuberant *puissance* and rare individuality, who have 'overcome' their own weaknesses, who are no longer slaves to reason, pity or other people, and whose *will to power* (Nietzsche's term) is all consuming.

This sounds to some like a complete lack of morality, and Nietzsche has certainly been interpreted as advocating a 'might is right' approach. Others find much to admire in the uncompromising and relentless determination to be as much as one can be without being seduced by the transitory values of one's time. Perhaps what is most attractive is the emphasis on 'largeness of soul' and 'nobility', on the cultivating of an *élan vital*. If you wanted to stress the similarities with the familiar, you might focus on magnanimity, honesty with oneself,

good-naturedness, gift-giving generosity, tolerance and joy. Nevertheless, the superman's blend of contempt, indifference, pride and egoism also make him an unusual object of moral theory.

67 What do you think Nietzsche would have made of Mma Ramotswe's sentiment quoted on page 254?
68 Compare Nietzsche's view of eudaimonia with Aristotle's. Which appeals more and on what grounds?
69 Nietzsche did not make the lion analogy presented above. Would you say it is persuasive?
70 The superman is 'above' reason, passion, pity and other people. What does this leave him in making judgements?
71 Are there historical or contemporary figures you admire? Do you think they are like Nietzsche's superman?

Does this help us make moral decisions?

We have seen utilitarian, duty-based and virtue-based theories of ethics; these rely on reason and emotion to differing degrees. Each system seems to have problems and, despite the reams of profound books to which we could turn, we might have the sneaking suspicion that any system will present severe difficulties, and that a totally compelling theory may be extremely difficult to find. To be fair, some people find that one theory or another is powerful enough for them, but this is not an area where thinkers tend to converge, and there are some problems facing all the traditional ethical systems. So is any one system adequate?

Philosopher Daniel Dennett has suggested that it may be helpful to think in terms of a 'moral first aid kit'. Just as a medical first aid kit contains bandages, pills and plasters, so we can draw on various moral medicines when we need them. Thus if we are interested in how to deal with keeping or breaking promises, and issues like adultery, we might pick a Kantian duty-based remedy, but we might turn to utilitarianism when we have to decide how best to allocate finite resources. Of course the analogy cannot be taken too far – no doctor would prescribe a bandage for a sore throat; it's the wrong remedy – but by picking one moral theory over another we may be guilty of doing exactly that in the ethical arena. How can we know that one theory is more appropriate than another for a specific case? What grounds can we have for choosing one theory over another? The danger is that we simply choose the theory that gives us the answer we want to hear – but there's something rather dishonest about this. We might try to develop a higher-level theory that tells us which of the three approaches to take under different circumstances; but you can imagine that we might find a number of such higher-level theories and that we would then face the same problem one step further removed from the practical issue.

72 Consider the cases in Question 52 on page 250. Which of the three theories of ethics (utilitarian, duty-based and virtue-based) seems to be most applicable to you in each situation?
73 On what grounds do you justify your answers to the previous question?

The influential twentieth-century French philosopher John-Paul Sartre explained a closely related problem with regard to the real case of a young man during the German occupation of France. The young man wanted to leave for England and

join the French Resistance but did not want to leave his mother alone. How is he to make his choice? Sartre points out that virtue ethicists have a difficult decision because the young man must trade off kindness to his mother with courage in fighting for his country (Warburton). Utilitarians cannot decide – for how can the young man weigh up the specific and tangible benefit to his mother if he stays against the vague and abstract benefit to France if he goes? And Kant's categorical imperative is no guide – either universalized principle ('everyone should leave to fight in the Resistance' or 'everyone should look after his or her parents') seems consistent and plausible.

When Sartre said '*No general ethics can show you what is to be done; there are no omens in the world*' (Raffoul 140), he meant that when we have a moral conflict no moral theory will provide a reliable guide to behaviour.

74 What would you do under the circumstances Sartre describes? How would you justify your decision? How would you counter someone who argues that you made the wrong decision?
75 Is it possible to resolve the case of the young man in Sartre's example?
76 Is Sartre right? Is it impossible to find a moral theory that will tell us what is the right thing to do under all circumstances?
77 If Sartre is correct, where does this leave us in a search for moral guidance?

This critique of ethical systems focuses on our uniqueness as human individuals and the complexity of circumstances in which we can find ourselves. It stresses the primacy of **freedom**; we are free to choose, and unless we are dishonest with ourselves (when Sartre would say we are 'acting in bad faith') we are forced to acknowledge that brute fact. This way of thinking makes up part of the group of philosophies termed **existentialism**, and provides a radically different approach to living and being in the world. Existentialism stresses the fact that we have to make choices, but that we have no ultimate rational or emotional guidelines on which to make them. At this point there are two options; the religious existentialists such as Kierkegaard look to prayer for guidance, while others look to themselves. In both cases the choices are difficult ones – and Kierkegaard's seminal work *Fear and Trembling* movingly and vividly describes how he feels in his prayer. It is important to note that existentialism does not equate freedom with a licence to do as we please; Sartre is very clear that with our overriding freedom comes an overriding responsibility to act freely and morally ('Existentialism is a humanism').

78 Choose a case from Question 52 on page 250. Imagine a debate between a utilitarian, a duty-based ethicist and a virtue theorist:
- Utilitarian: We should do what will cause the greatest net good.
- Duty-based ethicist: We should follow our duty.
- Virtue theorist: We should cultivate the virtues and follow their guidance.

How would a neutral observer arbitrate between the theories?
79 If we are free to choose our actions, what responsibility does this place on us?
80 Some may see the freedom as liberating, others as extremely scary. Sartre himself says that we find that we are free, but that we have no choice about it – he writes that '*the truth is like finding you are free but free in a prison*' and about the '*anxiety*' of freedom. What do you think he meant when he said that we are '*condemned to be free*'?

Where does this leave us? Adrift in the universe without a moral compass? Some have felt so, and perhaps those thinkers would describe their prevailing attitude as **absurdism**, whereby there is no moral basis for passing judgement.

This position is called **moral relativism**, and it asserts that there is no external source or validation for morality, but that, rather, all morality and ethics are dependent entirely upon the time and place in the universe where the questions arise. In some ways, that might seem to be a logical position, given the difficulty we have encountered in trying to find the 'right' way to know what is right. On the other hand, moral relativism is also a fairly counter-intuitive position. Some things seem to be inherently, universally wrong. Murder, for example, is always wrong (sometimes we have difficulty determining whether an act is murder, and sometimes the killing of another human being is sanctioned under terms other than murder – in times of war, for instance, or in self defence – but if the act is determined to be a murder, then it is pretty universally considered to be immoral). The famous philosopher Bertrand Russell put it this way: '*I cannot see how to refute the arguments for the subjectivity of ethical values, but I find myself incapable of believing that all that is wrong with wanton cruelty is that I don't like it*' (Pidgin). We imagine it might be quite difficult for you to disagree!

Perhaps, since so much seems out of our control, and since an ultimate authority is so hard to find, we should just sit back and enjoy the show. But, on the other hand, perhaps it is asking too much of any moral theory that it provide us with certainties. Maybe Sartre was right when he said that a theory never makes moral judgements, only humans do – and maybe to get hung up on theories is to misunderstand the role they play in our lives. Theories are there as guidebooks, not rule books; they can tell us the direction but we must choose the path. Rather than seek to construct an axiomatic system, we should be looking for a way to construct meaning for ourselves. Whether we do this by turning to God or to philosophy, as long as we do not expect it to be too easy, we will not be disappointed.

81 Write the previous paragraph in your own words.
82 What should we look for in a moral system? What roles should reason, emotion, imagination and intuition play?
83 How should we live?

Ethics and the areas of knowledge

So far, we have been considering ethics mainly from the perspective of personal knowledge, but ethics play a large role in shared knowledge. Botanists, psychologists, historians, mathematicians and other professional makers of knowledge have a particular responsibility because the knowledge that they are making is not merely personal; it is destined to become part of cultural and global memory, as we saw in Chapter 2. The facts, theories and arguments put forth by these experts will form the basis for the understanding not only of their contemporaries, but also for generations to come. As we have noted, knowledge is not always absolutely certain, and we have to be ready to revise our models when new information and understanding come to light, but we should only have to do that because of incomplete facts or faulty understanding, not because of dishonesty or malfeasance.

Professionals in all areas take their responsibility to the future very seriously, and many professions have formal codes of ethics by which practitioners are expected to abide. If people do not, then they are typically censured, and all of their past work comes into question until it can be re-verified by someone who has not been branded unethical. Perhaps the most famous of these codes is the Hippocratic oath taken by medical practitioners, but many organizations have

written codes of ethics. You can view a few here (the QR codes are listed in the margin in the same order, left to right, top to bottom):

- The Hippocratic oath (here is one example): http://tinyurl.com/pm6fezx
- ISACA – a global organization for information systems: http://tinyurl.com/6vx8jwq
- IFLA – the International Federation of Library Associations: http://tinyurl.com/a57lm9y
- AIIC: an international association of conference interpreters: http://tinyurl.com/nmw2lez
- AMS: the American Mathematical Society http://tinyurl.com/qdpe9pk
- IBMS: the Institute of Biomedical Scientists http://tinyurl.com/or5phu4
- The American Historical Association: http://tinyurl.com/yh55qa

This is clearly an issue of major concern to practitioners in a wide variety of fields. If you type 'professional code of ethics' into a search engine, you will get more than 3 million hits.

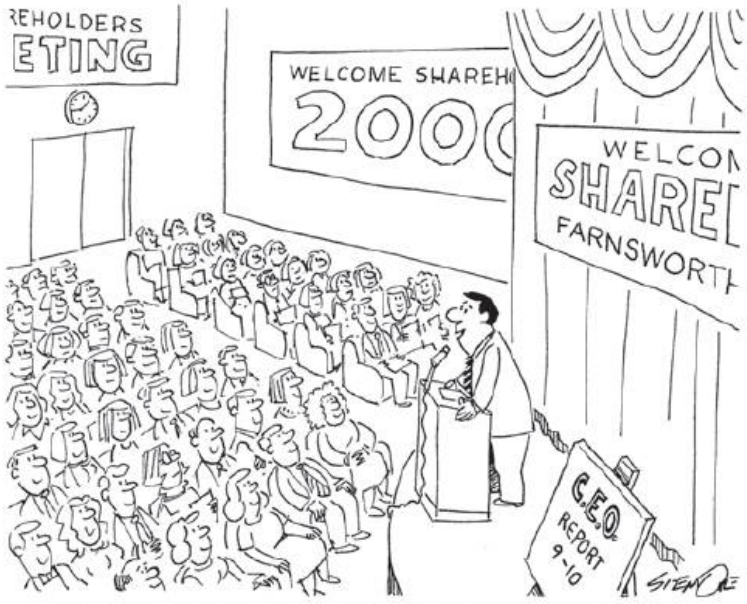
As you might imagine, most of these codes feature honesty as a primary value to be upheld, and this is accompanied by a dedication to presenting evidence factually – not hiding facts which might seem to contradict hypotheses, for example. In 2007, Sir David King, the primary science advisor to the British government, set out a universal code of ethics for scientists (Ghosh). The code lays out the following seven principles:

Sir David King's universal code of ethics for scientists

- Act with skill and care, keep skills up to date.
- Prevent corrupt practice and declare conflicts of interest.
- Respect and acknowledge the work of other scientists.
- Ensure that research is justified and lawful.
- Minimize impacts on people, animals and the environment.
- Discuss the issues science raises for society.
- Do not mislead; present evidence honestly.

These principles might seem obvious to you, and it also seems a bit odd that it took until 2007 for someone to write these down and propose them as a universal standard; however, the standard codifies principles that were previously taken for granted in an effort to strengthen the relationship between scientists and the public. This has become desirable in a world in which business money funds much scientific research and so conflicts of interest might arise when profits are threatened by scientific truths. The fact that scientists take these standards very seriously is reflected in this statement by Dr Evan Harris: '*The seven points in this code are part of what separate researchers from charlatans*' (Ghosh).

It is sometimes tempting to think, when we realize how much it is possible for our various ways of knowing to mislead us in our quest for personal knowledge, that the professional researcher must be victim to the most erratic tendencies of ungoverned reason, emotion, imagination, or other way of knowing. It is, therefore, quite important for us to realize that the values, standards and methods of the various areas of knowledge are deliberately fashioned to counter those potential problems. Not only do the various areas of knowledge have codes of ethical behaviour grounded in such moral principles as honesty, transparency and responsibility, but they also have formal mechanisms for checking knowledge to help ensure ethical practice and to eliminate mistakes.



"According to our research only ten-percent of what we do is reprehensible, but it accounts for one-hundred-percent of our profits."

Cartoon from www.cartoonstock.com

Natural and human scientists, mathematicians and historians, for example, all submit their work to (usually anonymous) peer review. Replication is an important requirement for work done in both natural and human sciences before findings are accepted by the community at large. Historians must reveal their sources, and contradictory perspectives are regularly published so that people can make their own judgements about the quality of the logic used to develop conclusions based on evidence. All of these areas of knowledge are subject to regular review, should new evidence come to light that might enhance, expand or contravene existing models.

The arts might seem to be an area of knowledge which has no code of ethics. We saw, in Chapter 4, how artworks can often challenge moral principles and raise ethical questions about both content and media. Art is often subject to censorship because it conflicts with – or appears to conflict with – cultural norms. Holy texts such as the Bible and the Qu'ran have been banned in many places, including in the Soviet Union during Stalin's rule. You may be familiar with the controversy surrounding Salman Rushdie's novel *The Satanic Verses*: it was so reviled in Iran that the Ayatollah Khomeini issued a fatwa against Rushdie, calling for Muslims to kill him, and, as of September 2012, a state-linked foundation was still offering a $3.3 million reward for doing so ('Iran increases price'). British cartoonist Gerald Scarfe has had several political cartoons banned, including one of Princess Diana being raped by the media, which has never been published ('Scarfe's political cartoons').

Despite these passionate disputes, based in disagreement over moral principles, there are many official codes of ethics pertaining to art and artists. Here is just a small sample (the QR codes are listed in this order):

- The College Art Association has a code of ethics pertaining to such issues as the safe use of materials, copyright and fair dealing with buyers: http://tinyurl.com/o3sa7sx
- The American Association of Museums has a code of ethics for museum curators: http://tinyurl.com/pzalc86


- The Association of Art Museum Directors has a code of ethics governing the behaviour of those entrusted with public display of art: http://tinyurl.com/pwnfylf
- And many individual museums have codes of ethics, such as this one from the Museum of Modern Art in New York: http://tinyurl.com/ox2hfes

So we have seen that the various areas of knowledge have standards for ethical behaviour based in moral principles; we should remember, also, that some areas of knowledge have ethics as part of their content. We have mentioned the arts as a source of understanding of ethics and morals, as well as a medium by which we can increase our ability to empathize with others and thus develop the kind of character that is needed for ethical behaviour. History, too, is an area of knowledge which directly considers questions pertaining to what constitutes moral beliefs and ethical systems, as, obviously, do religious and indigenous knowledge systems. As you study the various areas of knowledge, then, be aware of the ways in which moral principles shape the decisions and behaviours of the practitioners of those areas of knowledge, and notice how the methods of each area of knowledge are designed to help ensure adherence to the underlying values.

84 Review some of the codes of ethics referred to here. Do they have any particular moral values in common?
85 Which areas of knowledge require the most forceful codes of ethics? Why?
86 Which areas of knowledge reveal the most about the nature of moral values and ethical codes?

Where have we been? Where are we going?

The issues we have considered have been largely to do with individuals' moral choices. In this sense we are studying how people behave, and we might usefully expand our focus to encompass not just moral but also other aspects of human behaviour. In each case we find that we can distinguish between how people *do* behave and how we think they *should* behave; thus as we turn to the human sciences we find an interesting mix of natural sciences and values.

Further study

- ★ The University of Illinois has a wonderful website on the censorship of art through history and in various nations. The online exhibit is available here: http://tinyurl.com/p72kfs3.
- ★ Introductions to philosophy tend to have good sections on ethics, though the going can quickly get very tough. Recommended introductions are Thomas Nagel's *What Does It All Mean?* (Oxford University Press, 1987) Chapter 7, or John Hosper's *Introduction to Philosophical Analysis* (Prentice Hall, 1953) Chapter 8, or Donald Palmer's *Does the Centre Hold?* (Mayfield, 1991) Chapters 7 and 8.
- ★ For a more detailed look, J.L. Mackie's *Ethics: Inventing Right and Wrong* (Penguin, 1977) is comprehensive but rather laborious.

- ★ For a move away from reasoning, you could try Stephen Toulmin's *Return to Reason* (Harvard University Press, 2001) or Philippa Foot's *Virtue and Vices* (Clarendon Press, 2002). Would-be existentialists (and indeed anyone wanting a gripping read) can find the best bits of Kierkegaard's fabulous *Fear and Trembling* at http://tinyurl.com/yg3feay.
- ★ Excellent studies are Jonathan Glover's *Causing Death and Saving Lives* (Pelican, 1977) and John Harris' *The Value of Life* (Routledge and Kegan Paul, 1985) and *Violence and Responsibility* (Routledge and Kegan Paul, 1988). Tom L. Beauchamp and James F. Childress' classic *Principles of Biomedical Ethics* (Oxford University Press, 2001) is excellent – but perhaps not for the casual reader.

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12 The human sciences

The social sciences are good at accounting for disasters once they have taken place.

Claude T. Bissell

Ask five economists and you'll get five different answers (six if one went to Harvard).

Edgar R. Fiedler

Capitalism is the astounding belief that the most wickedest of men will do the most wickedest of things for the greatest good of everyone.

J.M. Keynes

Trying to define yourself is like trying to bite your own teeth.

Alan Watts

To say that a farm boy knows how to milk a cow is to say that we can send him out to the barn with an empty pail and expect him to return with milk. To say that a criminologist understands crime is not to say that we can send him out with a grant or a law and expect him to return with a lower crime rate. He is more likely to return with a report on why he has not succeeded yet, and including the inevitable need for more money, a larger staff, more sweeping powers, etc.

Thomas Sowell

Wall Street indices predicted nine out of the last five recessions!

Paul A. Samuelson

Those who have knowledge, don't predict. Those who predict, don't have knowledge.

Lao Tzu

A large part of the popularity and persuasiveness of psychology comes from its being a sublimate spiritualism: a secular, ostensibly scientific way of affirming the primacy of 'spirit' over matter.

Susan Sontag

Economics is extremely useful as a form of employment for economists.

John Kenneth Galbraith

Physicists have a subject matter, but sociologists study only methods.

Henri Poincaré

Psychiatry's chief contribution to philosophy is the discovery that the toilet is the seat of the soul.

Alexander Chase

An economist is an expert who will know tomorrow why the things he predicted yesterday didn't happen today.

Laurence J. Peter

I can calculate the movement of the stars but not the madness of men.

Isaac Newton

Aims

By the end of this chapter you should:

- understand how the human sciences differ from and resemble other areas of knowledge, especially the natural sciences
- understand the role played by various ways of knowing in the human sciences
- understand some of the experimental issues which arise in the human sciences
- understand the position of ethics within the context of the human sciences
- appreciate the difficulties with concepts such as explanation and cause and effect in the humanities
- understand some of the underlying dilemmas in dealing with humans, such as the issues of free will, reductionism and the nature/nurture debate.

Knowledge framework:
Scope and applications

Where natural scientists study the physical properties of the universe – including the physical properties of human beings – human scientists study the workings of the human mind (as opposed to the brain) and how they are manifested in human interactions, institutions, ceremonies and other cultural practices, both formal and informal. This endeavour covers a lot of territory. Here is a partial list of the disciplines that come under the heading of human sciences:

- Anthropology
- Archaeology
- Economics
- Industrial psychology
- Law
- Linguistics
- Philosophy
- Political science
- Psychology
- Sociology

Some of these are debatable. We might argue, for instance, that archaeology is a natural science, since it focuses on physical objects rather than on mind and motivation. Some people also include history and theology on a list of human sciences; for Theory of Knowledge and the IB Diploma Programme, however, they are considered separate disciplines, and, as you study them, you should pay attention to the features – such as methodology – that justify counting them as their own independent areas of knowledge.

Introduction

In the last chapter, we considered the importance of moral decisions and moral behaviour. We suggested that everyone develops an intuitive sense of what is right and wrong. This implies that everyone knows, at least to some degree, how to behave; yet every day we encounter people who behave badly – who lie, cheat, steal and abuse each other, who even commit murder. What explains this paradox? If the natural sciences investigate and describe the function of nature, then perhaps the human sciences can do the same for human behaviour.

Natural scientists observe all aspects of nature – from rocks to oceans to stars – and induce correlations and causes to answer questions about how things work. Given that fact, the term 'human science' suggests that practitioners in this area of knowledge can use the same approach to describe how humans work. We would expect human scientists to draw conclusions, based on observable correlations and causes, about why people do what they do. Given the variability of human behaviour, however, based as it is in feelings, emotions and values that sometimes result in incredible, bizarre and unpredictable ways, it might seem that we can never fully explain human nature; surely there is something about humans as a whole and about individuals as unique people which will forever escape theories and laws. Certainly it cannot be denied that the study of humans has a fundamental element that is not present in the natural sciences: the study of humans involves the study of conscious creatures, who choose, in a way that animals do not seem to, what they will do at any given moment. That fact seems to defy any effort to make reliable statements about universal patterns.

Despite this, fields of study which might once have called themselves 'humanities' are increasingly going by the name of 'human sciences', and we might ask why this is. Perhaps it is because, in the early twenty-first century, the natural sciences set the standards for certainty and reliable knowledge, and so modelling psychology, linguistics, sociology, anthropology, economics and political theory on them may not be such a bad idea. Just as the goal of natural scientists is a deep understanding of nature, so human scientists seek explanation, order and underlying pattern in aspects of human behaviour. Since humans are, after all, a part of nature, we might not be too surprised to see that both natural and human sciences can share a common approach, but we must be alert to possible differences, too.

1 Here are some statements of the kind made by human scientists. Identify why we might be suspicious of the hypotheses and potential problems with determining the truth.
   - First-born children tend to be more successful in their careers.
   - Hierarchical relationships are inevitable in human societies.
   - High inflation causes unemployment.
   - There is more social mobility in the USA than in the UK.
   - The concept of 'social status' underlies different greeting rituals in different cultures.
   - Most boys have a subconscious sexual attraction to their mothers and feel jealous of their fathers.
   - Distinct patterns can be observed in urban land use.
   - The higher the price of a good, the lower the demand for that good.
   - In any country, the second biggest city will be half the size of the biggest one; the third biggest city will be one-third of the size of the biggest one, and so on.
   - Class is the determining factor in educational success.
2 With what degree of certainty can these claims ever be known?
3 Are they suitable for testing to determine their validity? If so, how?
4 What is the difference between these 'laws' of human science and physical 'laws', such as 'water boils at 100.8°C' or '$E=mc^2$'?
5 Is it possible that the human sciences will ever produce statements of the same mathematical accuracy as the natural sciences? If so, give a possible example. If not, explain carefully why not.
6 Individuals behave very strangely at times, and no scientist can accurately and reliably predict an individual's behaviour. However, in large numbers, humans seem to behave fairly predictably, which is why we can say that more people will go to the beach in warm weather than in cold. Although no scientist can predict quite who will be involved in car accidents in any given year, they can come very close to predicting the total number of accidents. Is there an analogy here with molecules within a gas and the pressure exerted by the gas?

What are the human sciences?

Here is one definition of the human sciences, from the Max Planck Institute in Berlin:

The human sciences are systematic inquiries into the conduct and creations of human beings. … Like all sciences, the human sciences aim to produce knowledge that goes beyond the immediate and the local: they seek patterns, regularities, generalizations, and explanations. And like all sciences, the human sciences are constantly and intensely concerned with questions of evidence: what kinds, how much, and in what combination do conclusions require? The standards for, say, economics and linguistics are as different from one another as those for astronomy and biology. Finally, like all sciences, the human sciences must solve the problem of which objects will reward sustained inquiry and which not (Daston and Vidal).

This description points out the wide variety of academic undertaking represented by the different branches of the human sciences. We will not be able to deal in depth with all of the various disciplines here, so we will try to illustrate features that many have in common with each other, or which could be considered characteristic of the endeavour as a whole. We might first consider just what it is that the human sciences are trying to accomplish.

In trying to describe the nature of the human sciences, MIT professor Bruce Mazlish imagines a Martian come to investigate humans the way humans would investigate ants.

How good a scientist would our Martian be? He would observe dispassionately all that was external, he could record data, he might even run experiments forbidden to human scientists, for he would have no human moral scruples (of course, he might have his

Knowledge framework:
Historical development

The human sciences date back as far as any attempt to make knowledge. The ancient Romans studied law and political science, as well as linguistics, for example. Since human scientists are interested in all human interactions, however, the various disciplines have to expand to keep up with changing human culture. Present-day inquiry now includes such topics as women in business, homosexuality, and social networking – topics that did not exist, or were not considered of importance – 100 years ago. What do you think human scientists of the future will concern themselves with?

In addition to content change, the human sciences have changed in purpose and methodology over time. In the nineteenth century, there was a strict division between the human and natural sciences, which led to a devaluing of the human sciences (Daston and Vidal). From the twentieth century on, however, the human sciences have gained more respect. The line between the two kinds of sciences is less rigid now; many human scientists rely on natural science as part of their work. Consider, for example, the importance of brain science for psychology.

own, just as ours might interfere with what we do with ants). He would observe humans engaging in economic activities, practicing science, and making wars. On a more private scale, he could study their mating customs and sexual mores and their child-rearing habits.

He would also see buildings and art objects; he would observe humans reading books and would read them himself. And it is somewhere near this point that the question of meaning, inherent in all the human activities and practices cited above, would come front and center. How would our Martian know what all these activities 'mean'? How could he understand what the Earthlings were saying hypocritically or ironically, with humor or with malice?

This imagined scenario is a useful one to help us understand how the role of the human scientist differs from the role of the natural scientist. The Martian in the story approaches the study of humans in the same way that a natural scientist would do. He gathers data, creates and tests hypotheses and finally draws conclusions about what he observes. Unlike the natural scientist, however, the Martian runs into the problem of *meaning*. Where the natural scientist can explain 'why' things happen, in the sense that he can identify processes and forces of nature that exist and are predictable, the human scientist wishes to explain 'why' things happen in a different sense. He wishes to know what motivates people to behave in the ways they behave. Ideally, if we knew why people do what they do, we could improve our cultures, societies and relationships of all sorts by identifying causes of problems and sources of success; but knowing 'why' is a different form of knowledge to knowing 'what'; and perhaps one that cannot be found by observing and describing.

The goal of the human sciences, therefore, includes, but must also go beyond, the descriptive.

Positive and normative statements

The dual purpose of the human sciences means that they have both a descriptive or **positive** aspect and a prescriptive or **normative** aspect. This is an important distinction: *positive* statements are statements of fact; *normative* statements go beyond this and are statements of *value*. For example:

➜ Appraising staff takes around 60 hours a year.	POSITIVE
➜ This is an important task for middle managers.	NORMATIVE
➜ Men are generally more aggressive than women.	POSITIVE
➜ Aggression is a good trait in business.	NORMATIVE
➜ Crime costs insurance companies $12 billion a year.	POSITIVE
➜ We should always lock up criminals after one offence.	NORMATIVE
➜ Increasing the money supply leads to short-term unemployment.	POSITIVE
➜ Medium levels of unemployment are a price worth paying for a growing economy.	NORMATIVE

The positive statements are either right or wrong. They can be tested and, like all good theories, can potentially be confirmed or falsified by looking at the evidence. Human scientists can do this sort of study if they can be precise enough about what they mean. The normative statements, on the other hand, cannot be tested in the same way. No evidence will tell you whether or not something is important or worth it because you cannot measure importance

or worth by looking at evidence. A **value judgement** must be made, and this cannot be done from within the framework of the human sciences. The values come from outside the disciplines, and in many cases they boil down to ethics. Is it right to foster a very competitive environment in a workplace if it leads to unhappiness but greater profits? Is it right to sack people while the managing director gets a huge pay rise if the analysis shows that such action will push the share price up? If men and women are equally valuable, is it right to have different retirement ages?

These questions cannot be answered by sticking to a purely positive footing – that is, by conducting experiments and looking at the data. Any human science finding must be combined with an ethical attitude before it can be turned into a decision or policy. Conversely, any ethical or political decision pertaining to human relations must be based in the evidence provided by the human sciences before it can be said to be an informed decision. So we begin to see that the human sciences are an essential and vital part of modern society, but they must be complemented by a broader philosophical position on social justice and individual rights.

7 Examine some economic policy from a recent issue of *The Economist* or *Newsweek*. Identify the positive and normative aspects of the policy.
8 Do the natural sciences contain both positive and normative statements, or does one type of statement dominate? Why might the natural sciences be different to the human sciences in this respect?

The question of free will

Underlying the venture of the human sciences is an important assumption, and that is that humans have **free will** – that is, that at any given time we can choose what actions we do or do not undertake. This may seem to be blindingly obvious to you (you could, could you not, lift your left foot now, or say 'hello', or indeed take all your clothes off and dance on the nearest table … couldn't you?). We certainly have strong intuitions that we do indeed possess free will. But once you start asking what free will is, and why we have it in a brain made of the same atoms as a tree is made of, it becomes rather hard to explain.

9 Do you feel that you can choose what to do, that is, that you have free will? What is this feeling based on? Reason? Evidence? Intuition?

10 Do you choose your favourite colour of your own free will? That is, could you decide that your favourite colour is something else? You can certainly say the words, 'Now I no longer like blue best; green is my favourite' and stop wearing blue clothes in favour of green. But can you really make yourself prefer green to blue?

11 When we say that we have free will, we usually mean that in any given situation we could have done something other than what we actually did. Let us examine that a little more carefully. What evidence might there be for such a position? Could we ever find a case where we did something other than we actually did? Explain your answer carefully.

If we have free will, in other words, the fact that human responses are unpredictable and widely varied makes sense; if we don't, if our actions are determined by genetics or a god or gods, or other forces of the universe (a belief called **determinism**), then we need to rethink the approach to human science and try to find a larger system in which the array of responses makes sense.

The question of whether or not we actually have free will is a problem that has been of interest to philosophers for centuries. The complexities of that problem – though quite interesting – are not strictly relevant to TOK; however, there are important implications for the human sciences. As we shall see over the course of this chapter, many problems arise for researchers trying to make predictions in the various disciplines of human science. This is because we *assume* that people have free will, and thus they respond to stimuli in a range of ways that depend on individual experience, desires and intentions, rather than on unconscious and predetermined patterns. If we have free will, in other words, the fact that human responses are unpredictable and widely varied makes sense; if we don't, then we need to rethink the approach to human science and try to find a larger system in which the array of responses makes sense. The *assumption* of free will is, then, rather like some other assumptions we make – such as the existence of other minds and the assumption that the universe really exists outside our minds – that we will discuss in more detail in Chapter 14. It's hard to imagine what evidence we could collect to investigate these properly, so, as they seem to work, it seems very reasonable to simply assume them and go with them. And so that's what we do; but it is always worth being aware that they are indeed assumptions, not facts. Who knows, one day we may confirm or falsify them!

If we have free will, furthermore, then the idea that we can use the knowledge we develop in the human sciences as a means of bettering our conditions is a viable one. If we don't have free will, then there is presumably no way to change the human condition, as what we do and what happens is all a matter of irrevocable predestination. If we have free will, then the Martian can pursue his questions of meaning; if we don't, then the answer to that question would be very different – and attributed to some force other than humans themselves.

That assumption acknowledged, we can pursue the question of how we go about developing knowledge in the human sciences.

12 Do you believe that you have free will? How do you know?
13 If it were one day to be established that we do not have free will, do you think it would be worthwhile to continue the pursuit of knowledge in the various human sciences? Why or why not?
14 If determinism is true, then we have no choice as to what happens. So why worry about it? Watching a film does not become pointless when we know the ending, because we can enjoy the experience. We should sit back and enjoy the ride. Is this a possible solution to the problem or would a determined life be deeply unsatisfying?
15 The question of free will has implications for some of the other areas of knowledge. Consider those we have already examined – the natural sciences, the arts, mathematics, religion and ethics. How does free will affect our inquiry in those areas?

Some experimental issues

Any science must have a good body of empirical evidence on which to base conclusions, but accurate and informative experimentation is always difficult, and the human sciences present their own particular problems. Not least among these is the sheer breadth of the scope of the human sciences. The techniques and problems found in psychology are very different to those found in economics, which themselves differ from those found in human geography, anthropology or philosophy. Each of these disciplines faces its own set of difficulties in gathering evidence and drawing valid conclusions. We cannot fully cover all the issues here, but the following examples show that experimentation in the human sciences raises difficulties of a different nature to those found in the natural sciences.

The first two examples have to do with using surveys to gather data. In two similar surveys during the Second World War, people were asked about their opinion regarding post-war planning. The following results were obtained:

		In favour of planning for peace	Opposed to planning for peace	No opinion
Survey 1	Do you think we ought to start thinking now about the kind of peace we want after the war?	81% (yes)	14% (no)	4%
Survey 2	Which of these seems better to you: for us to win the war first and then think about peace, or to start thinking now about the kind of peace we want after the war?	41% (start thinking about peace)	55% (win the war first	4%

Source: National Opinion Research Centre, September 1942

The difference in results between the two surveys is clearly related to the nature of the questions asked. We might think that it would be easy to fix this – just ask the same question all the time. But which question is better? Perhaps the surveys were not really about eliciting opinions, but more about creating them. The people interviewed may never have thought about the issue before, but the

Knowledge framework:
Methodology (1)

We see in this section that the human sciences rely on various methodologies – some of them common to the natural sciences. Both **observational** and **controlled** experiments are employed, with humans as the subjects of both, rather than ants, butterflies, elements, rocks, stars, atoms and other natural objects. The fact that humans, with their changeability and will to choose, are the subjects means that human science experiments have a particular set of problems to be overcome – both in experimental design and in data analysis. This includes a strong set of ethical considerations. The entomologist can collect a moth, kill it and put it on a pin in a museum for further study; clearly this option is not open to the human scientist!

The use of **surveys** as data collection instruments is a mechanism not available to natural scientists. As we see here, though, it is quite difficult to develop questions which do not force particular answers, and it is equally difficult to accurately interpret the significance of the answers given.

nature of the questions made one of the answers very much more likely than the other. So we might conclude that we should stick to neutral questions, but which question is more neutral?

In another case, a house-to-house survey was carried out with the aim of studying magazine readership. One of the questions was: 'What magazines does your household read?' This question seems neutral enough, but when the results were analysed most people seemed to read 'intelligent' magazines and very few seemed to read 'common' magazines. These findings were totally at odds with the publishers' data, which indicated the reverse. One logical explanation would be that the surveys had been concentrated in a particular part of one town, perhaps in the area of a university. But in fact the survey had been nationwide and had a very broad sample. This leaves us with the conclusion that people lied about their habits (Huff and Geis 16). Perhaps, in hindsight, this was not surprising. We all want to appear intelligent and sophisticated, especially in front of strangers asking questions about our personal lives.

Another, even more bizarre example of this kind of irrational result, comes from an observational experiment in the 1920s at the Hawthorne plant of the Western Electric Company (Mifflin). The experiment involved monitoring the effect of changes in lighting on the rate of work of women assembling items. The experimenters measured a base rate, and then dimmed the lighting. They were pleased to find that efficiency improved, so they dimmed it some more, and efficiency improved again. More dimming yielded still further improvements, even though it was actually getting dark in the test room. Wondering what was going on, the experimenters began to turn the lights back up again and, incredibly, the efficiency of the workers continued to rise! It appears that the overriding factor was the fact that the workers were the subject of an experiment; that someone was interested in what they were doing had very positive effects on their production level ('Mind Changers').

There is another strange and unexpected finding in human science experiments, and that is the **placebo effect**. In 1955, researcher Henry K. Beecher published a paper in which he announced that 35 per cent of participants in a medical trial improved after being administered a placebo – that is, a fake medication, usually sugar pills (Keinle and Keine). Since then, numerous experiments have been run replicating the findings. The placebo effect poses a problem for researchers, as it implies that our beliefs – our thoughts – can have a profound influence on our physical condition. If thoughts can actually affect the body, what effect might they have on our other thoughts, beliefs and decisions? The problem is aggravated by the fact that recent studies, and the re-examination of Henry Beecher's data, have suggested that the placebo effect is not real – that there are, in fact, other explanations for the improvements that have been attributed to placebos (Keinle and Keine). The controversy surrounding the viability of the placebo effect is a good example of the difficulty human scientists have in determining the causes of various effects – a topic we take up in detail later in this chapter.

These results serve as a vivid reminder that we are dealing with humans, whose almost unlimited range of motivations make it extremely difficult to develop an hypothesis limited enough that an effective, narrowly focused and reliable experiment can be designed.

16 How would you find an answer to the post-war planning issue in the example on page 271?
17 How would you find out what magazines people read? What would you do if you wanted to know, accurately, how many people in each house read each magazine?
18 Take a controversial issue, such as abortion or euthanasia.
- Design a questionnaire to which you believe most people would respond positively (e.g. pro-euthanasia).
- Design a questionnaire to which you believe most people would respond negatively (e.g. anti-euthanasia).
- Design a neutral questionnaire which you believe will elicit people's 'true' opinion.

19 Design an experiment or questionnaire to determine what proportion of people married to an ex-convict are aware of their partner's past. You must consider the ethics of your research techniques. How much confidence would you have in your results?

Despite the problems that can be encountered with regard to experimentation in the human sciences, it is also worth mentioning the tremendous ingenuity that has gone into designing meaningful experiments. Psychology, in particular, is full of such examples, often because psychologists are trying to measure things like thoughts!

Imagine that in a criminal case the defendant says that he can't read, and that the whole case rests on finding out whether or not he is telling the truth. Remember that the defendant may be a very ingenious and convincing liar, capable of excellent bluffing, so you can't just give a reading test. Perhaps the best approach is to use a technique which has been developed over the last 65 years – the so-called Stroop technique – whereby the subject is shown words which name colours written in ink of different colours. Subjects might get the word 'red' written in purple, the word 'yellow' written in blue and the word 'purple' written in orange, and so on. The subject is required to state the colour of the words. Now if the subject cannot read then the task is very easy – he just sees colours and says what he sees. But if he can read, then the task is a little more difficult, as the meaning of the words contradicts the colours in which they are written, and the task takes a significantly longer time (Tam). Only those who can read suffer the interference between meaning and colour, and so it is easy to distinguish between the two cases. You can try an online version of the Stroop test for yourself at this site from the University of North Texas: http://tinyurl.com/9gqux9j.

Still more ingenious is a series of experiments from developmental psychology, which aims to show what a baby understands. Given that the baby cannot speak, this might seem like an impossible task, but it has been done. The basis of many of the experiments is a simple one: that babies look for longer at things in which they are interested.

Suppose, for example, we wish to see if a baby has the concept of number and simple addition. We could use this technique, developed by Dr Nancy Wynn, a psychologist at the University of Arizona, and used with babies five months old:

To present the babies with math problems, Dr. Wynn used four-inch-high figurines of Mickey Mouse. For the problem one plus one, for example, she showed the infants one figurine, then put up a small screen that hid it. Then, in full view of the infant, a hand placed another figurine behind the screen. Finally, the screen was pulled away to reveal both figurines. Video monitors recorded how long the baby looked at the two Mickey Mouse figurines (Goleman).

Now this is the clever bit – sometimes the psychologist presented the babies with wrong answers – that is, they placed two Mickey Mouse figurines behind

the screen, but then revealed one, or three. In these cases, the babies consistently looked far longer at the revealed figures. The study has been duplicated many times, and the best interpretation seems to be that the baby knows something is strange and worthy of attention. For similar reasons, infants stare for a long time at an object seeming to hover in mid-air, but the same object on the floor gets hardly a second look; and from these cleverly designed experiments we can therefore deduce that even young babies have an intuitive (though inarticulate) grasp of physical regularities, and perhaps even physical laws.

A whole range of similar experiments have shown that even very young babies are sensitive to an enormous range of events, perhaps rather surprising those philosophers who believed in the infant as a *tabula rasa* or blank slate, waiting to be filled by myriad experiences. It appears that infants come into the world with a well-developed sense of how things should behave.

We should perhaps remember that experimental difficulties may appear to be overwhelming, but that in fact they are not always insurmountable. Creativity, imagination and a willingness to try new ideas all play a large part in successful experimentation.

20 How certain can we be of the conclusion that the babies in the study recognize differences in quantities? Why?
21 Would it be possible to design an experiment to see whether blind babies have a similar feel for numbers?
22 How might you determine whether or not newborn babies are more sensitive to the language that their parents spoke during pregnancy than to other languages?
23 Would the same techniques work for telling if a child could recognize music that the mother heard often during pregnancy?

The reduction of social data to numerical form

Once human scientists have developed an experiment that pinpoints the data they want to gather, they still have to work out how to interpret that data. In the search for accurate theories and predictions, the human sciences are

increasingly turning to the language of the natural sciences: mathematics. However, we can quickly run into problems when we generate statistical data, especially when it relates to human activity. We may be aware of Mark Twain's famous phrase '*lies, damned lies and statistics*', but it is not always clear exactly how devious statistics can be. Of course, unscrupulous tricksters can 'fiddle' information, and there may be little we can do about that. If we are told that GDP grew by 2 per cent then it may be hard for us, as non-experts, to know whether this is true or not. We shall not be concerned with simple, deliberate, falsehoods here. Rather we shall show that sometimes even honest and well-meaning reporting of 'facts' can contain some very questionable assumptions, and indeed suggest results which, while not objectively 'false', are certainly not objectively 'true'.

Let us look back to the Olympic Games in London, 2012. This far after the event, one might imagine that there is nothing of interest to debate – the races have been run, the medals awarded, the athletes have long gone and we know who won each event and who broke which record. But which country did best? Here are the results from the top 20 total medal-winning countries from those Olympics, ordered by the number of gold medals won by each country.

■ **Medal data from Olympic Games 2012, countries ordered by numbers of gold medals**

Rank	Country	Gold	Silver	Bronze	Total medals
1	United States	46	29	29	104
2	China	38	27	23	88
3	Great Britain & N. Ireland	29	17	19	65
4	Russian Federation	24	26	32	82
5	South Korea	13	8	7	28
6	Germany	11	19	14	44
7	France	11	11	12	34
8	Italy	8	9	11	28
9	Hungary	8	4	5	17
10	Australia	7	16	12	35
11	Japan	7	14	17	38
12	Kazakhstan	7	1	5	13
13	Netherlands	6	6	8	20
14	Ukraine	6	5	9	20
15	New Zealand	6	2	5	13
16	Cuba	5	3	6	14
17	Iran	4	5	3	12
18	Jamaica	4	4	4	12
19	Czech Republic	4	3	3	10
20	North Korea	4	0	2	6

Source: www.bbc.com/sport/olympics/2012/medals/countries

24 Which country did best? How do you know? Do you have any reasons to doubt the truth of your answer?

If we recalculate based on the idea that gold medals are worth more than silver medals and silver medals are worth more than bronze, we get a slightly different ranking:

■ **Olympic Games 2012, points scored based on weighted value of medals (gold = 3, silver = 2, bronze = 1)**

Rank	Country	Gold	Silver	Bronze	Total points scored
1	United States	46	29	29	225
2	China	38	27	23	191
3	Russian Federation	24	26	32	156
4	Great Britain & N. Ireland	29	17	19	140
5	Germany	11	19	14	85
6	France	11	11	12	67
7	Japan	7	14	17	66
8	Australia	7	16	12	65
9	South Korea	13	8	7	62
10	Italy	8	9	11	53
11	Netherlands	6	6	8	38
12	Hungary	8	4	5	37
13	Ukraine	6	5	9	37
14	Kazakhstan	7	1	5	28
15	New Zealand	6	2	5	27
16	Cuba	5	3	6	27
17	Iran	4	5	3	25
18	Jamaica	4	4	4	24
19	Czech Republic	4	3	3	21
20	North Korea	4	0	2	14

25 The table was calculated on the basis of three points for a gold medal, two for a silver and one for a bronze. So three silvers = two golds (both worth 6 points) and three bronzes = one gold (both worth 3 points).
Would you prefer three silvers or two golds? Three bronzes or one gold? What do you think an Olympic athlete would say?

26 We would hazard a guess that most Olympic athletes would rather have one gold to five silvers or ten bronzes. So how should we allocate points to accurately reflect the feelings of the athletes? How many silvers should equal one gold? How do you know?

There are other factors to consider, too. In the Olympics, some countries have a natural advantage. In China, the size of population provides a huge pool of talent. In other tiny states, even sending a team to the Olympics can seem fanciful. So here is an adjusted table; the points have been scaled to reflect different population sizes. The ranking is based on the total number of medals divided by the number of million people in that country.

■ **Olympic Games 2012, total medals per million population**

Rank	Country	Gold	Silver	Bronze	Total medals	Total medals/ Million
1	Grenada	1	0	0	1	9.1734
2	Jamaica	4	4	4	12	4.1534
3	Trinidad & Tobago	1	0	3	4	3.2616
4	Bahamas	1	0	0	1	3.1627
5	New Zealand	6	2	5	13	3.0037
6	Slovenia	1	1	2	4	2.0034
7	Hungary	8	4	5	17	1.7071
8	Denmark	2	4	3	9	1.6235
9	Australia	7	16	12	35	1.5898
10	Mongolia	0	2	3	5	1.5723
11	Estonia	0	1	1	2	1.5690
12	Georgia	1	3	3	7	1.5314
13	Montenegro	0	1	0	1	1.5212
14	Lithuania	2	1	2	5	1.4181
15	Croatia	3	1	2	6	1.3393
16	Cuba	5	3	6	14	1.2641
17	Belarus	2	5	5	12	1.2575
18	Netherlands	6	6	8	20	1.1954
19	Ireland	1	1	3	5	1.0589
20	Azerbaijan	2	2	6	10	1.0533
28	United States	46	29	29	104	0.1466
47	China	38	27	23	88	0.0283

Source: http://simon.forsyth.net/olympics.html

27 Which country did best? How do you know?
28 Do you have any reasons to doubt the truth of your answer?
29 Is this a better method of calculating points than the first one?

There might be still other factors we should take into account, if we want to be 'fair' (note the quotes – they are there for a reason!). Some countries are wealthier than others, and so the population of these countries can devote more time to sports. Perhaps we should therefore measure the GDP of each country and then scale the results in a similar way to the population scaling. But then measuring GDP is hardly straightforward … and if we go down this route then we'll next be asking to take the *altitude* of the countries into account (after all, training at altitude is better training). And of course each country has a range of altitudes to take into account … The absurdity becomes clear. The trouble is that our *prescriptive* sense of fairness means that *descriptive* raw totals seem so limited; but alternatives perhaps even more so. Perhaps the point here is that while we know who won the 100-metre sprint, we are *creating* the winning country by our choice; perhaps there is actually no truth of the matter at all.


30 Analyse the data on these sites. Is there a best method for determining which country 'won' the Olympics?
- https://tinyurl.com/lq7x9lg
- https://tinyurl.com/6lbavn

Of course, the Olympics provide us with data which is almost as simple as it could be. In any given event, we have unequivocal numbers to work with, and we are merely trying to aggregate the scores. But, even so, we still come across some rather difficult problems. Imagine, then, the problems in trying to describe human behaviour when we have more complex data such as anecdotal data from case studies or descriptive data from observational experiments – or even statistical data documenting the buying and selling of stocks on the New York Stock Exchange for a six-month period! It is not difficult to see that people might be sceptical about claims that human behaviour can be reduced to underlying laws and structures.

31 You will be awarded a score, maximum 45, for your IB Diploma. What factors might you need to consider when calculating the significance of your score, or the average score for students in your school?
32 Which factors are the important ones? How do you know?
33 Identify another example where language or data presentation hides values and judgements behind a facade of fact.

Trying to interpret findings

Before we decide to abandon the endeavour, though, it's worth considering that the physical world also seems irreducibly complex to the untrained eye. It has taken thousands of years to discover that everything is made up of some hundred-odd naturally occurring elements, and that they, in turn, are all made up of identical protons, neutrons and electrons and other sub-atomic particles. We should not assume without good evidence that the same possibility for progress does not exist for the human sciences. When we look at the evidence, we find that the jury is very much out. Sociology, for instance, which investigates social systems ranging from political structures to education to sexual mores, to culture, media and social networking, seems to generate little consensus of opinion. The discipline is largely descriptive; it may look scientific but in fact the theories have, as yet, little explanatory power. Two famous experiments can serve as examples.

In 1971, Stanford professor Philip Zimbardo set up an experiment in which some students took on the role of prisoners and some took on the role of guards. The experiment quickly got out of hand and was called off when the participants lost sight of the fact that this was an experiment and ventured into real cruelty and aggression (Leithead). In a YouTube video (http://tinyurl.com/bo8ural), Dr Zimbardo talks about the experiment and its implications. The experiment did reveal some potential insight into the relationships of people in prisons, but due to its ethical problems, it could never be repeated, and no firm conclusions could be drawn. Whether it revealed anything true that could be generalized to all prisons remains unclear.

A second experiment also explored the relationship between people in authority and people in positions of submission. The Milgram experiments in the early 1960s involved placing subjects in a position in which they thought they were administering shocks to other participants every time they could not answer

questions. The people who were ostensibly being shocked were out of sight, and were, in fact, actors, trained to scream in pain as the 'shocks' got stronger and stronger. An authority figure stood with the person administering the shock and gave instructions to continue if the participant balked. There is a video about the Milgrim experiments available here: http://vimeo.com/15348932. As it turned out, a quite surprising number of participants gave shocks up to levels they were led to believe were fatal (Encina). Milgram concluded that this revealed a strong tendency to comply with authority.

Replications of the Milgram experiments, however, have revealed contradictory findings. One experimenter, for *Scientific American*, had this to say:

Contrary to Milgram's conclusion that people blindly obey authorities to the point of committing evil deeds because we are so susceptible to environmental conditions, I saw in our subjects a great behavioral reluctance and moral disquietude every step of the way. Our first subject, Emily, quit the moment she was told the protocol. 'This isn't really my thing,' she said with a nervous laugh. When our second subject, Julie, got to 75 volts and heard Tyler groan, she protested: 'I don't think I want to keep doing this.' Jeremy insisted: 'You really have no other choice. I need you to continue until the end of the test.' Despite our actor's stone-cold authoritative commands, Julie held her moral ground: 'No. I'm sorry. I can just see where this is going, and I just – I don't – I think I'm good. I think I'm good to go.' When the show's host Chris Hansen asked what was going through her mind, Julie offered this moral insight on the resistance to authority: 'I didn't want to hurt Tyler. And then I just wanted to get out. And I'm mad that I let it even go five [wrong answers]. I'm sorry, Tyler' (Shermer).

Perhaps these results suggest that Milgram's findings were misinterpreted. Perhaps they reflect a change in cultural attitude that has occurred in the 50 years since the first series of experiments. Perhaps it simply reflects an anomaly arising from this particular set of experimental participants. It is very difficult to know; but a particularly interesting point, and one that is totally different to the natural sciences, is that *if you know about the experiment, it might change what you would do.* Knowing that people might obey when they should not *might* make you more likely to refuse. This could not happen in an experiment involving rocks, or chemicals, or trees.

Knowledge framework:
Methodology (2) – ways of knowing

We see, through the examples in this section, that reason plays an important role in making knowledge because it is critical for the interpretation of data. Other ways of knowing are equally important, however.

Emotion comes up frequently both as content under study and as a factor in how participants in experiments react. An understanding of the ways in which emotion works, and a high EQ, are helpful tools to the human scientist.

Intuition and imagination can also be very important ways of knowing – both for interpretation of results and for the design of experiments. Think of the experiments with babies: scientists have to work very imaginatively in order to develop effective experiments, and a certain amount of intuition and faith, in the form of confidence, are required for understanding the results.

34 Does the issue of replicability constitute a significant difference between natural and human sciences?

35 If we cannot repeat experiments, for the reasons given, does this undermine the scientific approach?

In other areas, however, such as linguistics, the progress made since the 1950s has been explosive, and questions that once seemed to be total mysteries are now being investigated in highly focused, analytical and predictive ways. In a manner reminiscent of the convergence of thermodynamics and mechanics (where the former turned out to be the latter when looked at in the right way), linguistics is finding that it is consistent with dominant paradigms in other areas such as molecular genetics, information theory, neuroscience and Darwinian evolution. In many instances, the tools of the natural sciences have been brought to bear on linguistic questions and can help us learn things like how our brain structure and chemistry affect our behaviour. This TED talk illustrates how brain development influences the learning of languages and the retention of languages which are dying out: http://tinyurl.com/4scu8x2.

Linguist Stephen Pinker writes about how cross-disciplinary work can help develop knowledge of verbal inflection:

Regular and irregular inflection has long been mulled over by novelists and poets, dictionary writers and editors, philologists and linguists. Now this topic straight out of the humanities is being probed with the cutting-edge tools of molecular genetics and imaging of the brain. Some people fear this kind of development as crass 'reductionism' that will marginalize the humanities and plough under the richness of their subject matter, but it is far from that. Without an understanding of the contents of the mind from psychology, linguistics, and all the other disciplines that they touch, neuroscientists would not know where to begin studying the human brain, and their technologies would all be expensive toys. Ultimately all knowledge is connected, and an insight into a phenomenon can come from any direction (1999: 268).

The story is a truly fascinating one, and seems to suggest that certain areas in the human sciences may be amenable to rigorous mathematical analysis. This is not to say that numerical analysis will be, in the final instance, the ultimate arbiter of human truth. There is a big difference between information and wisdom, and some argue that, while mathematical tools of analysis may take us far, they will not really tell us everything important about ourselves in a concrete and immediate way. Noam Chomsky writes: '*It is quite possible – overwhelmingly probable, one might guess – that we will always learn more about human life and human personality from novels than from scientific psychology*' (Lehrer).

36 What does Pinker mean when he speaks of a 'crass reductionism'?
37 Does reductionism have to be crass?
38 Do you think a rigorous mathematization of the human sciences is possible? If not, why not? If so, is it desirable?
39 Chomsky suggests that the arts may provide a vehicle for certain types of knowledge which the sciences (human or natural) cannot match. What types of knowledge do you think he means? Do you agree?

A final important concept relating to experimentation in the human sciences is the *nature* of the data that is collected. We saw some instances, with the Olympics, for example, in which the data was numerical. This is called **quantitative data** (for obvious reasons). Many different studies in the human sciences rely on this kind of data, because many human institutions and relationships can be reflected in data. We can track the number of people who marry and by which age, we can calculate percentages of the self-identified races enrolled in colleges, we can track the number of stocks sold in a given month, we can chart the ages at which a large number of children begin to walk, and so on.

Many other studies, however, rely on a different kind of data: descriptive data, called **qualitative data**. If we want to study, for instance, how children react to temptation, as Walter Mischel did in his famous experiment that involved tempting children with marshmallows, we write detailed descriptions of how the children reacted when left alone in the room with the treats. (This experiment had surprising results – you can read about it and watch a video here: http://tinyurl.com/n9c3h5v.)

Very often a human sciences study involves both kinds of data. Imagine a study about why high school students cheat. We might gather a lot of quantitative data about the number of students who cheated and in which subject and by what means, and we might also want qualitative data in the form of interviews with students about why they did what they did.

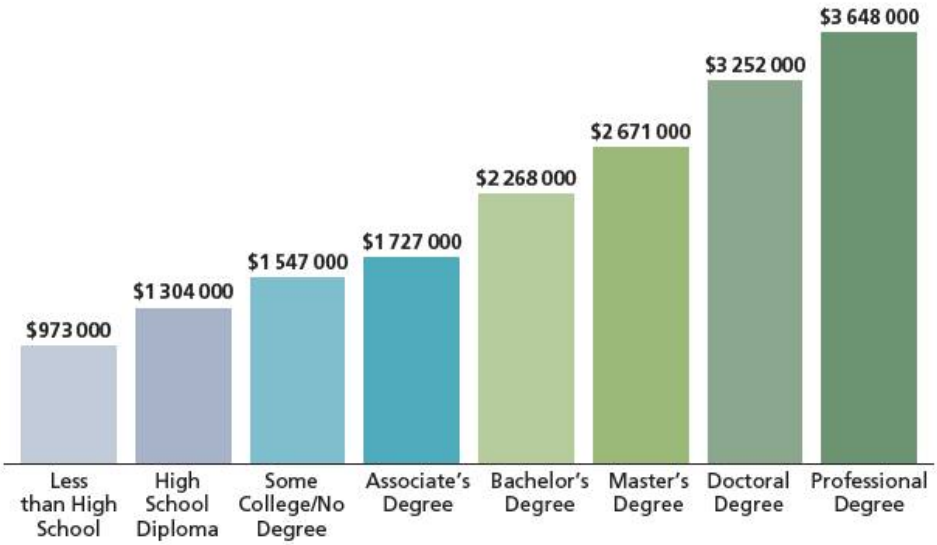
40 What are the relative strengths and weaknesses of qualitative and quantitative data?

Causation and correlation

We like to think that it would be enormously useful if we could use all the different disciplines of the human sciences to positively identify the causes of our social problems. We might then be able to tackle them effectively and efficiently. This ideal, however, might be more difficult to achieve than we think. Take crime as an example. Suppose we find that crimes are generally committed by poor people. Do we then say that poverty *causes* crime? This step is a very difficult step to take (why?). Should we then say that to tackle crime we must attack poverty? So what are the causes of poverty? Again, we can't be sure of them and, even if we could, we would have to ask what caused them, and so on.

Of course, in this example we are asking an extremely difficult question. But what about a question about the cause of an event which is related to one single person? Normally the human sciences do not attempt such a difficult task – they look at much larger quantities of data and derive their theories from more statistically valid samples.

However, there is another extremely easy mistake to make, which is especially common when the sample is larger. Consider these statistics, from a study at Georgetown University, describing average lifetime earnings of people with different levels of education.



■ **Median lifetime earnings by highest educational attainment, 2009 US$**

Data from The College Payoff: www9.georgetown.edu/grad/gppi/hpi/cew/pdfs/collegepayoff-complete.pdf

The obvious conclusion, or at least the one often drawn by colleges in their recruitment drives, is that if you get a bachelor's or master's degree then you are more likely to earn far more than if you don't. Of course, we can find numerous exceptions – after all, it's not an exact science – but the general rule is clear: the higher the degree, the higher the income.

But this is wrong, all wrong! We need to look carefully to see a huge danger in dealing with this sort of data. There is a hidden assumption here that college-educated people earn more money, therefore it must be *because* they went to college. But that is far from clear – the high earners may have made just as much money, or even more, had they left the education system earlier. The type of students who enter academic education tend to be either bright or rich, and having either of these characteristics is often enough to command a high

Knowledge framework:
Language and concepts

Each of the different disciplines in the human sciences has its own set of technical vocabulary, which is important to learn if you are working in that particular field. If you are taking IB Psychology or IB Philosophy, you will be familiar already with the language that identifies and defines important concepts in those two fields.

In this chapter, we identify several key concepts that apply to human sciences in general:

- Causation and correlation
- Normative vs positive statements
- Observational experiment
- Controlled experiment
- Nature and nurture
- Qualitative data vs quantitative data

income in later life. So *correlation does not prove cause*. The belief that because things occur together, one must cause the other is such a common error, or logical fallacy, that it has actually been given a name – *post hoc ergo propter hoc* – meaning 'after this, therefore because of this' (see also Chapter 7, page 149).

41 One can imagine that crime is caused by poverty, poverty by unemployment, unemployment by high wage costs, high wage costs by crime, and so on. So what is the cause of crime?

42 Are there any equivalent problems in the natural sciences?

43 A man has a heart attack while jogging. The following pieces of information are available. Which would you accept as a cause of his heart attack?

- He was given a new pair of jogging shoes for his birthday and wanted to try them.
- He had eaten far, far too much the previous week.
- He had always loved chocolate cake and had been unable to resist it for years.
- As a child he had associated his mother's chocolate cake with approval, since she rewarded him with extra pieces if he had done well.
- He loved his mother.
- Poor jogging shoes had, in the past, made his shins ache.
- He liked a sporty image.
- He would have liked his wife to think of him as a thwarted athlete.
- He was pleased that his wife gave him a sporty present.
- The road on which he was jogging was hilly.
- He is over 60 years old.
- Although basically fit, he hadn't been jogging for six weeks.
- His mother admired athletic prowess.
- He was born.
- He had jogged 15 km when he had the heart attack.
- He decided to go jogging at that moment because his wife and son were arguing.

Without any one of these factors, the man would not have had a heart attack. So what do we mean by *cause* in this case?

In the human sciences, there are several alternatives to simple causation. Sometimes it is very difficult to tell which is the cause and which is the effect. (Do you own more shares because you are rich? Or are you rich because you own more shares?) Sometimes there is genuine chance involved in two events that correlate. Take, for example, this strange correlation:

The stock market will plunge next year, take it from the National Oceanic and Atmospheric Administration. How do we know? Because New York City received below-average rainfall this summer, and even Hurricane Sandy couldn't make up the deficit. True fact: There is a surprisingly strong correlation between rainfall in New York and the performance of the stock market, according to NOAA data assembled by Lakewood, Wash.-based analyst Tom McClellan (Gay).

Of course, there is no cause–effect relationship between rainfall and the stock market, and even the correlation is random and meaningless. This kind of spurious finding occurs where computers can rapidly examine huge amounts of data. Sometimes there is a genuine correlation which, on inspection, appears to be the result of some underlying variable (in the college education example, the underlying variable is the type of student who goes to college).

Just because the correlation does not prove the cause, this does not mean that there cannot be a causal relationship, but you have to look fairly hard to be sure. In the college education example, an alternative explanation may be, for example, that getting a qualification, which most people do at college, is the reason that many people earn a lot of money over their lifetimes. Or it may not. This is an empirical question, which cannot be resolved from the correlation alone.

In some cases, a true causal link is denied! That there is a very good correlation between smoking and lung cancer is beyond dispute, but the tobacco companies' claim in years gone by that there is no causal link (often citing this very fallacy) is cynical and manipulative. There is a causal link – doctors have shown that the chemicals in cigarette smoke cause cancerous cells to develop. So do not always reject correlations as meaningless, but do treat them with caution.

44 Here are some data which have been found to be closely correlated. For each case, find at least two explanations for the correlation. Explain whether or not you think it is likely that there is a genuine causal relationship. If there is, suggest the nature of the causal link. If not, explain why the correlation occurs.
- The number of cigarettes smoked is well correlated with poor school grades.
- Increases in UFO sightings are well correlated with increases in confectionery prices.
- The distance you run is well correlated with the time you spend running.
- Cancers are increasingly frequent in Switzerland, where a lot of milk is consumed, but relatively low in Sri Lanka, where very little milk is consumed.
- Profits of casinos are well correlated with teachers' salaries in Macau, China.
- Rises in profits of a particular company are well correlated with rises in workers' salaries.

45 Find some examples from newspapers or magazines of correlations, and decide if there is any genuine causal relationship. Is a causal relationship suggested? Are the problems acknowledged?

46 Are there problems of causation in the natural sciences? Give examples to illustrate your answer.

The nature/nurture debate

One question about causation and correlation which is of extreme interest to human sciences in many different disciplines is the question of whether we become what we were born to be or whether we are born as blank slates and become something that is the outcome of our experiences. The issue is easily stated: is my intelligence, personality, character or other aspect of myself that makes me who I am due to my intrinsic biological nature or due to my upbringing and environment? **Genetic determinism** and **environmental determinism** are the two extreme positions. In the former, nature is proposed as the cause of all our qualities. In the latter, nurture is said to be the sole cause.

Many books and articles have been written supporting both extremes and all intermediate positions. Of course, debates in scientific circles are hardly rare – indeed they are the very lifeblood of any academic subject – so why is this

particular one worthy of special consideration? The reason is that the nature/nurture debate is central to social policy, especially with regard to issues such as race and sexual orientation. For example, if characteristics are genetically determined, then group A may be less intelligent than average, group B more lazy, and group C downright immoral. If one or all of these groups is at the bottom of the socio-economic ladder, it could then be said that is where they deserve to be – they are naturally less able! Why waste money trying to fight nature? In such a case, someone could make the argument that all those social welfare programmes are a waste of time and the money should be redirected elsewhere. (It is not hard to guess which social group would benefit from this line of thinking.) In other words, verification that our character and abilities are determined by 'nature' rather than 'nurture' could reinforce and serve as a justification for bigotry.

The opposite argument is that genetic determinism is nonsense; that all humans are created equal in ability, and that with similar experiences of family, education, healthcare and opportunity, all racial groups can succeed in any walk of life. This position suggests that we can change in fundamental ways, and that as a culture, therefore, we *should* do all we can to ensure that everyone gets the same opportunities. This further implies that the racial divisions in most societies are the legacy of the past, that they are ongoing prejudices, and that they can be fought by social programmes. In 1925, James Watson wrote:

Give me a dozen healthy infants, well-formed, and my own specified world to bring them up in, and I'll guarantee to take anyone at random and train him to become any type of specialist I might select – doctor, lawyer, artist, merchant-chief, and yes, even beggar-man and thief, regardless of his talents, penchants, tendencies, abilities, vocations and race of his ancestors (Kaufman).

Watson clearly supports the nurture side of the debate. We should note, however, that if, like many physical characteristics, those which seem to depend on the functioning of the brain – intelligence, musical ability, hand-to-eye-coordination, manual dexterity, ability to run fast, ability to reason, empathy, creativity and so on – are genetically determined, then some or all of these characteristics are inherited. The linguist Noam Chomsky takes this position:

No one would take seriously the proposal that the human organism learns through experience to have arms rather than wings, or that the basic structure of practical organs results from accidental exposure. Rather it is taken for granted that the physical structure of the organism is genetically determined, though of course variation … will depend in part on external factors.

The development of personality, behaviour patterns and cognitive structures in higher organisms has often been approached in a very different way. It is generally assumed that in these domains, social environment is the dominant factor. The structures of mind that develop over time are taken to be arbitrary and accidental; there is no 'human nature' apart from what develops as a specific historical product.

But human cognitive systems, when seriously investigated, turn out to be no less marvellous and intricate than the physical structures that develop in the life of an organism. Why, then, should we not study the acquisition of a cognitive structure such as language more or less as we study some complex bodily organ? (Pinker 1994: 22)

47 Choose any personality trait – intelligence, friendliness, aggression, happiness. Do you think it is nature or nurture that forms this characteristic in people? Justify your answer carefully. Are the reasons you give based in evidence, intuition, reason or faith?

Chomsky's position implies that there could be some genetic abilities linked to race; however, since the mapping of the human genome in 2000 (a great example of how natural science can help inform our understanding in the human sciences!), there is significant evidence to suggest that there is no scientific basis for differentiating human beings on the basis of race. In a widely celebrated joint press release, British prime minister Tony Blair and US president Bill Clinton, along with several of the scientists who worked on the genome project, announced that:

All of us are created equal, entitled to equal treatment under the law. After all, I believe one of the great truths to emerge from this triumphant expedition inside the human genome is that in genetic terms, all human beings, regardless of race, are more than 99.9 percent the same.

They asserted further that:

We have sequenced the genome of three females and two males, who have identified themselves as Hispanic, Asian, Caucasian, or African-American. We did this sampling not in an exclusionary way, but out of respect for the diversity that is America, and to help illustrate that the concept of race has no genetic or scientific basis (Clinton et al).

You can read the entire fascinating press release, with its discussion of the implications for science and social policy, here: http://tinyurl.com/oyt9o3a.

This was a landmark announcement and a landmark discovery. Since then, the easy availability of personal DNA testing kits has revealed that most people contain genetic markers for several – if not many – different races, often to the surprise of those who sent in the kits. Few, if any of us, it turns out, have a genetic make-up that supports the idea that we are members of clearly separate races.

The idea of race persists, however, and anecdotal evidence sometimes seems to support it. Think of some common stereotypes: Africans are the greatest long-distance runners in the world. Asians are better at mathematics than other races. This kind of generalization provides motivation for human scientists to continue to try to settle the matter of whether nature or nurture is more important in determining any individual's eventual success.

Still, the notion of a potentially fixed biological hierarchy is a scary idea which smacks of Hitler's master race. It is a view which is unlikely to be favourable to anybody who wouldn't be near the top of the pecking order in a genetically determined society, and the belief that some people or races are superior to others has been, and continues to be, put to violent and ugly use all over the world. Small wonder that many feel moral outrage at the idea that our capacities are innate and fixed genetically. However, at this point we should feel a little uneasy for at least two reasons.

- We might feel moral outrage at a theory, but we need to distinguish very carefully between our moral beliefs and our beliefs about facts. We may be morally outraged at the American intervention in Iraq, or by the destruction of the World Trade Center, but we cannot therefore deny that these things actually happened. Similarly, we may be morally outraged if we one day find that our capacities are innate, but as seekers of reliable knowledge we should not shy away from the search. If it is true, then we may be left with difficult ethical issues, but burying our heads in the sand and ignoring the problem is not a responsible way forward.

■ Even if we were to discover one day that all our traits are genetically determined, that does not mean that we can draw any moral conclusion whatsoever. We do not make moral judgements about tall people as opposed to short people, although height is, to be sure, strongly determined by genetics. Why should we feel differently about intelligence? Even if it were to turn out that one race is less intelligent than another, that would be no justification for treating one race as better than another. The distinction between positive and normative human science is absolutely clear here. What *is* is not the same thing as what *should* be.

48 Would you want to know if there was a biological hierarchy of intelligence?
49 Do you think it would be good for society to know if there was such a hierarchy?
50 Suppose some group in such a hierarchy turns out to be the least intelligent. Construct arguments to suggest that the group gets more, less and the same amount of education. Which argument is 'best'? On w hat principles do you base your argument? Are they positive or normative principles?
51 How does this problem relate to the discussion of moral values and ethical principles that we undertook in Chapter 11?

You have probably already thought that nature and nurture interact, and that both extremes are obviously wrong. Perhaps the way forward is to determine the relative importance of each factor? Is it 40 per cent nature and 60 per cent nurture? Or precisely equal at 50:50? Clearly, this is a totally meaningless undertaking. If we do not have both nature *and* nurture in our lives, nothing happens. Nature and nurture in humans do not lie at opposite ends of a spectrum as competing forces. Nature is 100 per cent important and nurture is 100 per cent important. Contrasting them by assigning each some sort of limited role is an artificial and outdated notion.

The linguist Stephen Pinker asks us to imagine the most sophisticated computer available – it has the fastest processor, gigabytes of RAM, terabytes of disc storage, a 3D virtual reality display, speech recognition and output, wireless internet access, and hundreds of built-in software modules. In other words, it has a very, very complex nature. Does that mean that, whatever we type into it, it will always respond in the same way, that the environment is unimportant? Of course not! In fact, the very reverse is true – the built-in complexity allows the machine to respond in complex ways, and the more complex the built-in machinery, the more complex the reaction to inputs.

The analogy with humans could not be clearer. Nature and nurture cannot be separated in any meaningful way. Without at least the innate capacity to learn, the environment could not have any effect. If we had no innate capacities we would be inanimate. We couldn't even breathe. Let's leave the last words to another scientist, Stephen Jay Gould, who has written extensively on the

subject. '*Of all the baleful false dichotomies that stymie our understanding of the world's complexity, nature vs. nurture must rank among the top two or three (a phoney division only enhanced by the euphony of these names)*' (33–34).

Can we use a scientific approach with humans?

Now that we have seen several of the issues and problems, let us list and summarize the objections to the application of the 'scientific method' in the human sciences, and see whether or not they are good grounds for making vital distinctions.

1 **All humans are unique individuals; there can be no laws that apply to them all.** This is a common objection, but a little thought shows that it is far from certain. For example, in everyday life we tend to find that men and women behave differently and we treat people differently according to their gender. We can discuss whether or not it is right to make gender distinctions, and argue about nature or nurture (as we have done), but the brute fact remains that there are characteristics common to large classes of humans. Virtually all human beings love and fall in love. Most human beings respond emotionally to music. The majority of human beings affiliate themselves with one religion or another. These are not dehumanizing things. Underlying unities do not necessarily undermine our uniqueness as individuals. We can study photosynthesis without demanding that all plants be the same. Why then should laws describing human behaviour require that all humans be identical?

2 **Human sciences can never make accurate predictions with which to test theories.** It is certainly true that predictions in human sciences are extremely difficult to make, whereas physicists can sometimes predict results to ten decimal places. This is, however, a difference of degree and not kind. Any sociologist would feel justified in predicting that no openly homosexual man will be elected to be governor of the American state of Kansas any time soon, and no physicist would care to predict the path of a cork floating down a river. It may be that the human sciences are in their infancy, and that we will see extremely accurate predictions in the future. Again, this is a matter for open-minded scientific investigation.

3 **In the human sciences you cannot generate laws because the objects are always moving – there are no constants.** This is in marked contrast to the natural sciences where there are universal and unchanging (as far as we know) constants of nature (such as the speed of light in a vacuum). It is true that human scientists have no such bedrock of stability, but as explained in point 1, that is not to say that there are no constants in human nature. Cultures and traditions may differ, but there may be deep underlying features. In the same way that rocks, trees, the sea and the air are superficially different, but are all made of molecules, all cultures and traditions might exhibit structural similarities, and it is the job of the human scientist to look for them.

4 **You cannot measure social data in numerical form as you can in the natural sciences.** This is certainly true at the moment – it is not possible to quantify things such as 'respect for elders' and 'social harmony'. Even numerical quantities, such as IQ and economic data, are often rather dubious measures. Nevertheless, human scientists can use numerical data from large studies to draw conclusions that are accurate for groups, but not for individuals. It is

well established by now, for example, that children of divorced parents are less likely to form trusting adult romantic relationships and more likely to divorce themselves than children of parents who did not divorce. There have been numerous studies on this topic; to cite just one: '*The wide differences in the incidence of marriage and divorce between the children of divorce and the children of intact families are in line with national data. … By the end of our study, 60% of the divorced group had married, as compared with 80% of the comparison group and 84% of the national sample*' (Wallerstein and Lewis). Statistical data like this is useful when it is corroborated by other studies and when it is applied to groups in general. We can reliably say that, in general, children of divorce are less likely to marry than other children, but we cannot point to any individual child and say that she is one who will never marry. This is an admittedly significant difference from the natural sciences, but it does not negate the usefulness of the knowledge we gained in human psychology.

5 **In the human sciences, an experimenter can change the thing he is trying to investigate; there is an unavoidable interaction between subject and scientist.** There are clearly cases where this is true – imagine an expert economist predicting a massive fall in the stock market, or that certain social groups are less likely to be successful at work. In both cases, the statements may become self-fulfilling (it is also possible to imagine self-defeating predictions). The problem is that of a conscious and freely-acting subject who can decide to do exactly what he is not supposed to. As we have seen, this is in marked contrast to all the natural sciences – an astronomer's prediction of the next sighting of Halley's comet will hardly speed or delay its return! So there is some truth in this problem, but there are similar issues in the natural sciences – for example, to measure the speed of a particle requires interaction of some sort, and hence a change in the speed of the particle. In quantum mechanics, this principle is fundamentally limiting. In any case, in sophisticated social theory we can imagine taking all these interactions into account – so again, this is no reason to assume that human sciences will fail. Remember that useful findings came out of the Hawthorne studies (see page 272), and modern businesses now deliberately incorporate strategies for recognizing contributions of employees and providing them with the kind of attention that proved to be so motivating in those studies. Valuable knowledge resulted despite the Hawthorne effect.

6 **Social issues cannot be studied like sciences because you cannot control variables or repeat experiments; whole areas are inherently irreducible.** There certainly are problems here. If we want to investigate inflation and its link to unemployment, we cannot hold manufacturing output, exchange rates, wage increases, money supply and other relevant variables constant while we carry out our investigation. In fact, we probably couldn't even identify all the relevant variables in many cases, and even if we could control them that would (arguably) invalidate the whole experiment! So the *ceteris paribus* assumption (the assumption that we can keep all things the same except one variable) is simply unrealistic in economics, and things in, say, psychology, are still more complicated. But this is also a little unfair. Experiments in meteorology, geology and astronomy can also be difficult or in many cases impossible – imagine, for example, trying to run an experiment to test the accuracy of a proposed model for what happens after a star goes supernova! Scientists in both disciplines have to make simplifying models and to deduce what they can,

recognizing that the model is just that, and extrapolating its results with great care. There may or may not be ways to overcome experimental problems, but we won't find solutions by assuming that there are none.

7 **The human sciences are permeated with values in a way that the natural sciences are not; they are normative as well as positive.** That the human sciences can be normative is indisputable, but surely the same can be said of the physical sciences as well, though perhaps to a lesser degree. In studying the reaction of organic acids with plastics, there may be few obvious questions of value, but that is not to say that all natural sciences are purely objective and value free. When a new drug is being developed we must ask what risks we are prepared to put up with, and for what benefit. A drug that cures cancer but induces early arthritis would be popular; one which cures headaches but with the same side effect would never reach the market. In building a bridge, it may be possible to spend a hundred times as much money to ensure that the risk of collapse falls from one in a million to one in 10 million. Should the extra expense be laid out? There are issues of the value of human life involved here, in addition to the science. In the big picture we can see that, for example, Darwin's science of evolution is changing our values radically – as are the implications from the human genome project. So the human sciences are not alone in dealing with issues of value, and we can perhaps even make a case that natural scientists have a long history of abdication from responsibility for the moral implications of their work. Along with all their benefits, scientific advances have been partially responsible for physical, chemical, biological and nuclear weapons; the depletion of the ozone layer; Chernobyl; global warming; loss of rainforest and natural diversity and so on. Perhaps natural scientists should take a more active interest in the application of their advances, and in the implication of their work for the general good of humankind.

52 Examine the objections above and the responses. Find an example for each of the objections and discuss whether or not the objection raises a fundamental distinction between human and natural sciences.

53 Are there any other objections to the application of the scientific method to the study of humans? Evaluate them carefully.

There is one additional factor that differentiates the human sciences from the natural sciences, and which ensures that our application of the scientific method will not be identical in the former to its application in the latter: in the human sciences, *we are studying the thing which is doing the studying*, and this raises an interesting difficulty. The more complex we are, the better equipped we are to study ourselves, but the more difficult a job we have. Conversely, the less complex we are, the easier we are to investigate, but the less able we are to comprehend ourselves! We can (arguably) understand some animals' social behaviour, but they (presumably) can't. So are we intelligent enough to understand ourselves? Emerson Pugh once quipped, '*If the human mind was simple enough to understand, we'd be too simple to understand it (Göpferich* et al, *page 1)*.' There may well be truth in that. Nevertheless: we have seen in the natural sciences that the human mind has proven capable of understanding ancient systems that began or existed long before we did, and those which are far removed from the reach of our innate physical capacities to experience. We have shown ourselves to be ingenious; we can surely apply that creativity to the problem of ourselves.

Knowledge framework:
Links to personal knowledge

We have seen, over the course of this chapter, what a close relationship there is between shared and personal knowledge in the human sciences, because the object of the professional endeavour is to discover the nature of the person.

The pursuit of shared knowledge proceeds in a scientific way, as much as possible, but the findings describe how people behave given what they know as individuals.

As we have seen, it is even fair to say that one of the aims of the human sciences is to identify why people do what they do – based on their own personal knowledge – so that ways could be found to improve individual lives and our lives as we live them in community.

Findings in the human sciences, unlike findings in the natural sciences, can be checked against intuitions based on personal experience to see if conclusions seem reasonable or not. This does not mean that intuitions cannot be wrong, but it does reveal an interesting connection between the shared and the personal in this area of knowledge.

There is a natural tendency to believe that the study of our behaviour should be somehow different in principle to that of chemicals or rocks or jellyfish, and that no scientist will ever fathom our motives, thoughts and interactions. Our paradigm of self-worth, free will and individuality is threatened by a science that endeavours to 'explain' humans. Paradigms must be replaced, however, if they can be shown to be based on error. In the case of the human sciences, furthermore, it seems unlikely that we will eventually explain the rules for why people lie or why they buy and sell stocks at particular times with models as clear and detailed, and as universally applicable, as our model for explaining why planets orbit the Sun. It seems more likely that we will have to accept models in the human sciences that offer potential reasons for behaviours and that we will always have to take care not to presume that any given individual will behave in accordance with the patterns set out in the model at all times and in all circumstances.

In any case, as will be suggested below, even if humans can be 'explained' right down to the 'last detail' (whatever that might mean), our dignity and value as humans cannot be explained away, and we should not fear to look at ourselves for fear of what we might find.

How much can the human sciences tell us?

Imagine a world where the human sciences reign supreme, where new concepts and theories have been elucidated, developed, refined and perfected. Crime, poverty and all manner of social ills have been eradicated by the development of social technologies based on these theories. The social world is a happy, peaceful and totally managed one, and no citizen of the future would wish it otherwise – indeed they cannot imagine how bad it must have been before the incredible breakthroughs of the twenty-second century! When a problem arises in their world, the human scientists set up the mathematical models, run some computer simulations and perform a few validating experiments. They then give a practical and efficient solution which accurately predicts how to set up situations such that the general population will, of their own free choice, behave in such a way as to rectify the problem.

Let us ignore, for a moment, whether or not this society is a 'good' thing. Consider instead the implications of this scenario coming to pass.

54 Would our lives then be 'described' or 'explained' in some way?
55 So do these theories tell us everything about us that is important?
56 Is there anything about us that escapes explanation? Or are we, in this scenario, just parts of a social scientific theory and nothing more?

Here we might reflect a little on the limitations of the scientific approach. Reading any scientific textbook it is clear that science necessarily deals in types – 'a *sample* of phosphorus'; 'a *specimen* of *E. coli*'. Science is not, and cannot be, interested in individual cases except in so far as they conform to given types. That is the whole point of science – to make generalizations about classes of objects and to see beyond the differences to the underlying shared characteristics. Thus, as far as science is concerned, unique characteristics are of no interest – it cannot deal with them and they have no place in the scientific canon. But it is precisely our individuality and uniqueness that make us who we are as humans, regardless of our shared general characteristics.
A recent study from social psychologist Emanuele Castano showed that literary fiction

performs a valuable service as a socializing influence. Literary fiction, the study reveals, increases our capacity for empathy by giving us an inside view of individuals:

Often those characters' minds are depicted vaguely, without many details, and we're forced to fill in the gaps to understand their intentions and motivations, Kidd says. This genre prompts the reader to imagine the characters' introspective dialogues. This psychological awareness carries over into the real world, which is full of complicated individuals whose inner lives are usually difficult to fathom. Although literary fiction tends to be more realistic than popular fiction, the characters disrupt reader expectations, undermining prejudices and stereotypes. They support and teach us values about social behavior, such as the importance of understanding those who are different from ourselves (Chiaet).

Most of our bodies are pretty similar as far as science is concerned (which is just as well if you are about to be operated on by a surgeon), but as human beings, living and experiencing our lives every day, we seem very different to each other. Why is it that I love watching sunsets? Maybe science can find the circuits of the brain that are involved in appreciating colourful scenes, but surely no scientist can ever describe in scientific language what it is actually like for me to sit on the beach and bask in the final rays of the day. This extends to all of our experiences. What is it like for you, now, to be reading this page? What was it like for Neil Armstrong to set foot on the moon? What is it like to parachute? What is it like to think that you are going to die? What is it like to sneeze? What is it like to fall asleep? These individual experiences – the quality of human life – are the particular purview of other areas of knowledge, such as the arts, as we saw in Chapter 4.

Any type of science, natural or human, will always fall short of some types of knowledge. No matter what wonderful theories and technologies are invented or discovered, some central and vital parts of our lives cannot, by their very nature, be explained by science in a meaningful way. Therefore we should never fear scientific explanation – if it misses such a central part of our being, if it has nothing to say about us as individuals, then it will never impinge on human dignity and human life.

57 Try to answer some of the 'What is it like to …' questions above. What does this tell you about the limits of sciences and languages?

58 Consider the future world described at the beginning of this section. Given what has been said, do you think the people in this world are in any way impoverished by the scientific knowledge that they have?

Where have we been? Where are we going?

So do the human sciences offer us a reliable and coherent way of knowing? It should be clear that this really depends on what type of 'knowledge' we are looking for. It is possible that the human sciences are converging with the natural sciences, so perhaps we should stick our necks out (hoping that the future will not chop them off!) and suggest that one day the human sciences will hold the same hope for qualified certainty as the natural sciences. However, the qualification is an important one. As we have seen, the natural sciences provide no sure route to absolute certainty and, even if they did, there are still aspects of human existence which seem to be beyond the scientific approach in principle.

Given that problem, we will turn next to a consideration of history as an area of knowledge which also delves into human behaviour, its causes and its

effects from a perspective other than the scientific. In the next chapter, we will investigate the methods and findings of history in an attempt to discover the degree to which we can count on them for understanding human behaviour.

Further study

- For an interesting discussion of the nature and history of the human sciences, see Bruce Mazlish's *The Uncertain Sciences*. The first chapter is available online here: http://tinyurl.com/nawyzjt.
- Stephen Jay Gould's handling of IQ in *The Mismeasure of Man* (W.W. Norton, 1981) is lengthy but brilliant. Philip Davis and Reuben Hersh tackle the issue more generally in *Descartes' Dream* (Harvester Books, 1986). A reasonably technical but readable and rich account of the emerging discipline of decision theory (which attempts to model how humans actually make decisions) can be found in Stephen Watson's *Decision Synthesis* (Cambridge University Press, 1977).
- The issue of free will is brilliantly introduced in Chapter 6 of Donald Palmer's *Does the Centre Hold?* (Mayfield, 1991) and is further explored in Daniel Dennett's *Elbow Room* (MIT Press, 1984). For a case study on psychology, try Adrian Furnham's *All in the Mind* (Whurr, 1996). General reflections on human nature, with an emphasis on language, can be found in the early chapters of Noam Chomsky's *Powers and Prospects* (Pluto, 1996). The links with the natural sciences are superbly and controversially explained in Edward Wilson's *Consilience* (Vintage, 1999), Matt Ridley's *The Red Queen* (Penguin, 1993) and Stephen Pinker's *How the Mind Works* (Penguin, 1998). A broader, far more philosophical (and far more difficult) approach is taken by John Searle in *The Construction of Social Reality* (Penguin, 1995).
- If you are interested in the question of the human genome and its implication for innate racial differences, there are two excellent resources: this podcast from *RadioLab* gives an overview and raises some potential complications to the conclusion that there is no scientific basis for racial differentiation: www.radiolab.org/2008/dec/15/. This article, from *Scientific American*, discusses these problems in more detail: http://tinyurl.com/oh49f9m.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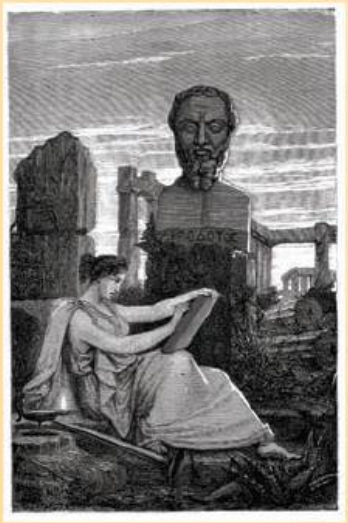
13 History



Historians are dangerous people. They are capable of upsetting everything.

Nikita Khrushchev

Those who cannot remember the past are condemned to repeat it.

Santayana

The charm of history and its enigmatic lesson consists in the fact that, from age to age, nothing changes and yet everything is completely different.

Aldous Huxley

. . . history holds the potential, only partly realized, of humanizing us in ways offered by few other areas of the school curriculum.

Sam Wineburg

Hardly a pure science, history is closer to animal husbandry than it is to mathematics, in that it involves selective breeding. The principal difference between the husbandryman and the historian is that the former breeds sheep or cows or such, and the latter breeds (assumed) facts. The husbandryman uses his skills to enrich the future; the historian uses his to enrich the past. Both are usually up to their ankles in bullshit.

Tom Robbins

It is surprising that history should be so dull considering that so much of it is invented.

Jane Austen

The quickest and surest way to find the present in the past, but hardly the soundest, is to put it there.

C.H. McIlwain

What is history but a fable agreed upon?

Napoleon Bonaparte

Even God cannot change the past.

Agathon

Man in a word has no nature; what he has … is history.

Jose Ortega y Gasset

Historical sense and poetic sense should not, in the end, be contradictory, for if poetry is the little myth we make, history is the big myth we live, and in our living, constantly remake.

Robert Penn Warren

Whoever wishes to foresee the future must consult the past; for human events ever resemble those of preceding times. This arises from the fact that they are produced by men who ever have been, and ever shall be, animated by the same passions, and thus they necessarily have the same results.

Machiavelli

Clio, the muse of history, is as thoroughly infected with lies as a street whore with syphilis.

Schopenhauer

Nothing falsifies history more than logic.

Guizot

Aims

By the end of this chapter you should:

- understand the distinction between history and historiography
- understand the nature of and problems posed by historical facts
- appreciate the roles of bias and selection in the historical process
- appreciate the difficulties associated with the concept of historical causation
- understand that, despite the problems, historical judgements are subject to the standard criteria of plausibility (consistency, coherency, etc.) – history can at least approach truth
- understand the roles of various ways of knowing in making historical knowledge
- be able to compare and contrast history with other disciplines, especially the human and natural sciences.

Introduction

In our search for certainty, looking to the past is very appealing. The past is fixed; immutable and absolutely certain. Nothing we do can change it, and so as the historian G.R. Elton put it:

In a very real sense the study of history is concerned with a subject matter more objective and independent than that of the natural sciences. Just because historical matter is in the past, is gone, irrecoverable, its objective reality is guaranteed; it is beyond being altered for any purpose whatsoever (47).

It would certainly seem difficult to deny this, and therefore we can, it seems, hold up history as the model for truth and certainty. Or can we? Look carefully at what Elton has written and you will see that he has been very careful in his choice of words: he says that the objective reality of the *subject matter* is guaranteed; he does not say that we are guaranteed to know it.

We might make an important distinction here, and one that will be familiar to all historians. In English the word 'history' is used in two very different senses; there is history as the *series of all past events*, and there is history as the *academic inquiry* carried out by historians. It is only in this first sense that history is fixed in the way that Elton suggests. History in the second sense is all about how we know history in the first sense, and we would do well not to confuse the two. Once this distinction is made, the hope for certainty begins to fade rather rapidly – we can be certain that something happened (history in the first sense), but finding out about it (history in the second sense) may be a completely different matter. Historians use the term **historiography** to refer to the study of events and of other historians' writing about those events (that is, history in the second sense); the term **history** itself may be used in either sense. When we talk about history as an area of knowledge, it is in this sense – the sense of historiography – that we mean. The problem is, as any historian knows, that what we know about the past may be incomplete, inaccurate or even completely wrong, and because the past is gone – and therefore beyond our ability to observe it directly – it may be extremely difficult to ever find out. What Elton portrays as a strength of history in the first sense may turn out to be a weakness of history in the second sense!

History as an area of knowledge, then, presents unique problems, but we shall see that it also shares some features with other forms of knowledge. History is

important in a very human sense: our communities are (partly) shaped by their histories, and, in many cases around the world, can be sadly bound and limited by them in terms of hatred and violence. An understanding of the past, therefore, may allow us to better understand the social and cultural norms that motivated the actions – good or bad – of people now dead. And if we can get a better understanding of how certain attitudes and values led to bad actions – or good ones! – we may be better able to shape our current attitudes and values more effectively. To understand the past must be an important step to understanding the present, and maybe even to shaping the future.

The facts of history

The problem of the nature of the historical fact

If the historian attempts to understand the past then the first step is surely to find out as many facts as possible, that they can be interpreted in light of the goal of understanding **cause** and **effect**. It might seem that, in a truly objective, scientific spirit, the historian should collect all the facts. In this way, she might attempt first to establish a 'hard core' of indisputable facts and, on the basis of these, and only these, to theorize.

Let us consider some 'historical facts':

- Hong Kong was returned to China in 1997.
- The Battle of Bosworth Field took place in 1485, on Bosworth Hill.
- Caesar crossed the Rubicon in 49 BCE.
- The First Fleet arrived at Sydney Cove in 1788.
- The French Revolution began in 1789.

We should acknowledge that many such facts are beyond dispute (though not all of them – many 'certain' historical facts, such as the 'fact' that Columbus set out to prove the world was round, have been shown to be false) and to determine them accurately is important. If, however, we assume that these very well-known facts are true, we still have to acknowledge that they are all very tedious! (Have you ever taken a history class which required you to memorize just such a selection of facts and repeat them in tests? Many students loathe the study of history because they believe it consists of this sort of memorization of seemingly irrelevant minutia.) In fact, just as we look to a mathematician to accomplish more than getting his arithmetic right, so we expect more than the 'basic facts' from the historian. Such facts are not history itself, but the building blocks from which history is made. No one really cares much about them for their own sake, and historians hope to answer far more interesting and important questions such as:

- What effect did reunification of Hong Kong and China have on fledgling political parties within China?
- Was social inequality the main factor behind the tensions in England in the fifteenth century?
- Why was the crossing of the Rubicon an important step?
- Was the act by the British of establishing Australia as a penal colony ethical?
- What actions of Louis XVI contributed to the French Revolution?

Recognizing that this kind of question is the driving force in the study of history immediately tells us something important about the nature of the endeavour: the historian, and not the basic facts, has decided that the fledgling

political parties in China are of interest and are worthy of historical inclusion; the historian, and not the facts, determines what we learn about the events of the past.

Once we understand the role of facts in history, there is still the problem of the nature of an historical fact. If, as Elton suggested, historical facts are immutable, then it would seem to be an easy enough task to collect them so that we can begin with a body of indisputable evidence from which to begin to develop our interpretations. This, however, is not so simple a process as it might seem, for a whole array of reasons. Historian Edward Hallett Carr deplored this attitude towards the idea of a body of indisputable facts: '*The belief in a hard core of historical facts existing objectively and independently of the historian is a preposterous fallacy, but one which it is very hard to eradicate*' (page 12). This may seem an eccentric position – if history happened as it happened and cannot be changed, then why aren't the facts straightforward? To begin with, there is the problem of finding them.

The historian cannot simply choose his facts freely from a vast and complete body of information. Just as geologists know little about animals which were too soft to leave an imprint in the fossil record, so the historian is limited to the information that there is. Many facts from history were never recorded or have been lost. Historians working on the history of the Mayans, Aztecs and Incas have available to them the magnificent ruins left by those civilizations, and they may marvel at the wonders of the architecture and the beauty of the cities, but they also find them rather frustrating. What were the buildings for? How were the societies formed? What were the people interested in? What were their beliefs? What were the dramas, hopes, loves and fears of the people? Of course, there is some information on these questions but the data is woefully incomplete and there is much we do not know. Even such written sources as there are often do not help us answer the questions we have.

■ Mayan ruins

This difficulty is multiplied the further back we go in history. Some civilizations left few or no written records; many of whatever records there may have been used early technologies that decayed or have been destroyed in wars or

natural disasters, or they may simply have been lost. Maybe the historian of these cultures finds some facts, but she has no way of knowing what was lost, and no way of knowing, therefore, whether these facts would be the most important ones, if all the facts were known. She must use what there is. This is a very different thing from being able to work confidently from unassailable information.

In recent history, of course, due to the rise of technologies that preserve information, the opposite problem arises: there is far too much data. It has been estimated, for instance, that the administration of each recent US president produced upwards of 5 million pieces of paper a year, which works out at 14 000 pieces of paper each day! President Lyndon Johnson, when he returned home following his presidency, took back with him 2500 five-drawer filing cabinets full of his papers ('The presidents' papers'). This massive flow of information/policy/spin may be beyond the grasp of any one individual, but it will nevertheless be the job of the future historian to try to cope with the data in order to provide structure and to separate the trivial from the momentous. This data is meaningless in historical terms until it has been sorted and sifted.

In order to sift and sort, the historian must necessarily employ some system of categorization to direct the task. That system comes from the theories of the historian, not from the original data, and it represents the beginnings of interpretation. The end result, as Carr puts it, is that:

The facts are like fish swimming in a vast and murky ocean, and what the historian catches will depend partly on chance but mainly on what part of the ocean he chooses to fish in and what bait he chooses – these two facts of course being determined by the type of fish he wants to catch. By and large the historian will get the facts he wants (23).

Once the material is sifted and sorted, theory – the historian's viewpoint – is inextricably tied up with the data, and there is no longer any 'hard core' of fact. In this age of information, the job of the historian is undoubtedly more difficult, but more important than ever. Unless the historian makes sense of the data then it is nonsense. Contrary to popular belief, facts never speak for themselves.

1 What are the two meanings of the term 'history'? Are there any other possible meanings?
2 Think of some part of history about which little is known. Is there any chance that much will ever be known, or is it totally wiped from human knowledge?
3 Take a copy of a quality daily newspaper. Estimate the number of 'facts' in it. Then, allowing for the number of newspapers in your country, estimate the number of 'facts' reported every year. (Remember that different newspapers may report the 'same event' in different ways.)
4 Think of some part of history for which the information is totally overwhelming (recent world events seem most obvious here). Will historians ever be able to sort through the information to arrive at the 'truth' about what happened?
5 Why is the notion of establishing certain facts before theorizing an appealing one? Why might it be a very difficult thing to do?
6 How does this concept of mixing theory and observation apply to other disciplines?
7 What did Reuben Abel mean when he wrote: '*The patterns said to be found in past events are selected by the historian; like the hypotheses of the scientist, they may be suggested, but are neither imposed nor dictated, by "the facts".(167)*'?

Knowledge framework:
Historical development

Over the past century, there has been a gradual transformation in the way that historians have seen their role. In 1896, Lord Acton (Sir John Acton) proclaimed that in his generation, historians should be able to '*dispose of conventional history*' because '*all information is within reach, and every problem has become capable of solution*' (Carr 7).

Sixty years later, Sir George Clark wrote that historians of his generation did not see things the way Acton did, and said instead that '*They expect their work to be superseded again and again*' (Carr 7).

This change in attitude parallels, as Carr points out, a change in attitude in general – from a strong sense of confidence at the end of the nineteenth century to a more jaded attitude in the mid-twentieth, but it also parallels a change in attitude about facts. In the nineteenth century, there was a powerful belief in facts as conveying truth. By Carr's time, in the 1960s, the view had shifted to the one we discuss here – that facts are subject to selection and interpretation. This is still the prevailing view.

Another significant development over the history of history as an area of knowledge has been the change in what is considered to be suitable content for historical investigation. Where once historians focused on kings and rulers, now history takes up the lives of ordinary people – women, children, people of cultures other than our own. History has become more inclusive over time.

The problem of source reliability

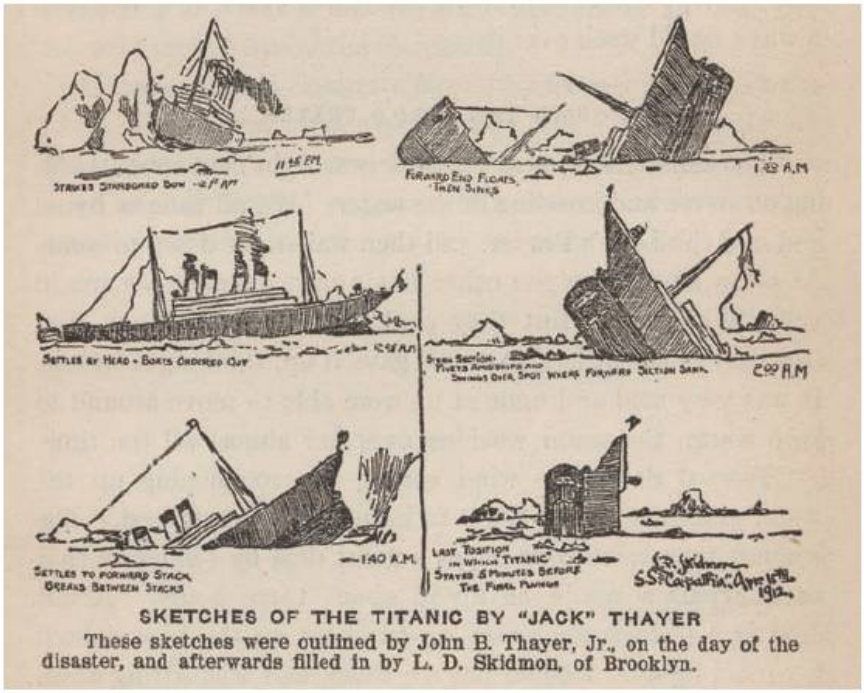
On top of the problem of gathering either not enough facts or too many is the enormous problem of source reliability. Even official records of diplomatic meetings often portray one side's arguments as powerful and compelling statements of clarity and eloquence, and the other side's as feeble-minded. It comes as no surprise that the records of the other side portray exactly the opposite story. The point is that documents are written by humans – they have already been processed through the filter of that human's concerns and motives. No document can tell us more than what the author of the document thought happened, thought would happen, thought ought to happen, would like to have happened or even would like others to think he thought would happen! Historical 'facts' are never pure, as Winston Churchill knew when he said, '*History will be kind to me for I intend to write it ('The Churchill Society').*'

Josef Stalin, for example, famously understood the power of using the media to shape reality. During his rule, he had school textbooks rewritten to convey a particular view of the Soviet Union. '*Concurrent with the purges, efforts were made to rewrite history in Soviet textbooks and other propaganda materials. Notable people executed by NKVD were removed from the texts as though they never existed. Gradually, the history of the revolution came to focus on two figures alone: Lenin and Stalin*' (Shubnaya).

Additionally, Stalin organized the Union of Soviet Writers in 1932 and, in 1934, imposed the policy that all art in the Soviet Union must '*... depict some aspect of man's struggle toward socialist progress for a better life. It stressed the need for the creative artist to serve the proletariat by being realistic, optimistic and heroic*' (Simkin). Stalin also understood that the use of force would not achieve his ends, so, although he did commit rebelling writers to labour camps if he had to, he relied – quite successfully – on other means of enticement. He wanted writers to offer their service to the state voluntarily – a willing writer would, he believed, be much more effective at convincing readers about the greatness of the Soviet Union and Stalin's policies. '*To this end, the Union [of Writers] does not use force as much as psychological and material inducements. Its forms and rituals provide members with a sense of community and status that anchors them in Soviet society*' (Garrard and Garrard xii). Writers who were members of the Union could get published, they had access to the best vacation spots and the best restaurants, and they were among the most highly paid workers in

Soviet society. Consequently, anyone studying the Soviet Union under Stalin must struggle with the question of how much the primary source documents of that era distort the truth about what actually happened. Often the writers were not lying; their experience in Soviet culture was extremely positive, and so their viewpoint was naturally often extremely positive.

Stalin's efforts represent just one example and just one reason that primary source documents might not depict the truth – or even the most common experience – of people in any given situation. Stories of the sinking of the *Titanic* told by the survivors, for example, described the ship having risen up between 45 and 90 degrees from the water and crashing back down before it sank – you have probably seen this dramatic sight depicted in movies. Yet once the ship was found, the mathematicians and physicists working on the debris were able to tell us that that was an impossible scenario, and that it could not have risen more than about 12 degrees (Finton). It seems likely that the intense emotional impact of the experience understandably led the survivors to remember the event in terms even more dramatic than it already was. (We might add that the angle of the sinking bow is still hotly disputed by people who point to old testimony, earlier drawings and other evidence. This simply underlines the point that historical evidence is not always straightforward.)



■ **A survivor's drawing of the sinking *Titanic***

So the whole idea of a 'hard core' of pure, untainted evidence is a difficult one to maintain. The view that all the historian has to do is to collect the facts and let, as Mach said, '*the bare data confront us*' (Abel 1976) is naïve and untenable.

The writing and shaping of history

At this stage, we should mention the term **bias** and contrast it with the concept of **selection**. Bias is potentially an important problem facing the historian, as it is a difficult task for historians to transcend their own paradigms when writing about the relatively recent history of their own countries, especially in eras in which patriotism is highly regarded. It is not difficult to find histories of troubled

areas which show the historian's country coming out very well indeed. Here, for example, is one version of the story of the Russian settlement of the territory which is now Alaska in order to hunt sea otters:

In the fur trade beaver, fur seals, sea otters, foxes, and other mammals found in Alaska provided the furs. Alaskan Natives, either to obtain goods from the Russians or because the Russians forced them to, hunted the fur-bearers. The Natives took the pelts of the animals they killed and passed them to the Russian fur traders.

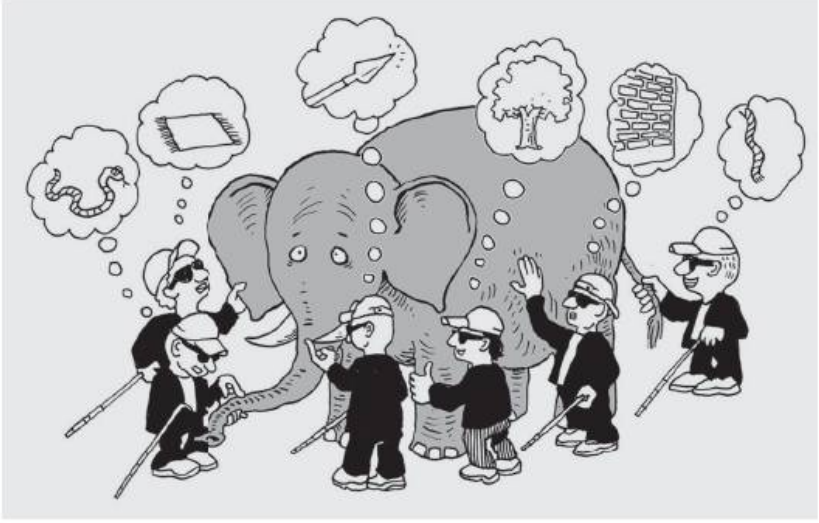
The Russians' first major interest was in sea otters. The pelts of the sea otters, which are found only along Pacific Ocean coasts from Alaska and Siberia south to lower California and Japan, were highly desired by Chinese with whom the Russians traded.

Aleuts and Alutiiq Eskimos hunted the sea otters for the Russians. They killed them at sea. The best time for hunting the sea otters was in late spring when the weather was relatively calm ('Alaska's Heritage').

This same story is told very differently from the perspective of the Alaskan Natives; the Tlingit were defeated in a battle against the Russians at what is now Sitka in 1804, and they were driven from their homes. They were not permitted to return until 1821, and then they were required to build homes outside of what was their original territory. Their history describes the Russians enslaving the Aleuts to fight against the Tlingit.

In 1821 the Russians invited the Tlingit back to Sitka. They intended to profit from the Indians' hunting expertise and, more importantly, to put an end to the occasional Indian raiding. For the duration of Russian occupation, the Kiks.ádi lived in the village, an area just outside the stockaded town. They supplied the colonists with furs and food while the Russians introduced them to their culture through education and religion. But cannons were always trained on the village, and the Russian stockade was closely guarded ('The Tlingit').

We can see, from these two versions of the same story, each of which focuses on a different aspect of events, that the stories we tell are strongly influenced by our personal perspective and can be quite biased. This does not mean, however, that we should be ready to dismiss modern history as a result. For one thing, we see that it is possible to get the same story from two or more perspectives, and the gathering of different versions can give us, in the end, a much more balanced understanding of events. After all, it is not that either of the versions of the story of the Russian fur trade is wrong; it is just that both are incomplete.



It is also possible to find historians who are very critical of their own countries, and in most countries historical debate is alive and well. German historian Frans Fischer, for example, was far more critical than other historians at the time of the behaviour of Germany in the years leading to the First World War (Saxon). An ex-Nazi party member, he was subject to intimidation and abuse, but his ideas have now passed into orthodoxy. And even if individuals are biased, the international historical community as a whole may well be able to come to reasoned conclusions about particular theories; thus, the problem of bias may not be as serious as it first appears. Arguably, it may hardly apply to the writing of medieval or ancient history at all, because most historians will not feel the same levels of personal involvement as writers of modern history, who may have personally experienced some of the events about which they write – or whose parents or grandparents did.

The term 'bias' almost implies some sort of dishonesty, and to this extent a biased historian is a bad historian. Where an historian is dishonest, the problem of bias is similar to the problem of a scientist falsifying his experimental data: in all likelihood he will be found out, because the process of going from personal to shared knowledge means that other historians will have the opportunity to scrutinize any published history and to produce counter-arguments.

The biased historian, however, is not the same as the selective historian. Selectivity is not an option – it is unavoidable for the meaningful study of the past and this contrasts starkly with bias; a non-selective historian is a bad one. All historians are selective and they select on the basis of their own paradigms; as we shall see, this is what makes them worth reading.

8 What fallacy are you committing if you dismiss an historian's views because she happens to paint her country in a positive light? (You may need to refer to the section on common fallacies in Chapter 7 on pages 147–49.)
9 What is the difference between bias and selection?
10 Are bias and selection 'crimes' for an historian? If so, which is the more serious?
11 Are they both inevitable? What are the alternatives?

Knowledge framework:
Links to personal knowledge

We see in this section that the personal knowledge of the historian is crucial to the history that he writes. His ability to understand, his choice of what to study, and his selection of what constitutes relevant facts on that subject are all influenced by his world view.

Sam Wineburg writes that it is better for the reader if the historian is visible in his work, because then we can make some judgements about how balanced, thoughtful and reasonable his treatment of the topic has been (Wineburg, pages 13–15).

School textbooks notably do not do this – they obscure the writer and present the text as if from some omniscient, infallible being. This makes it more difficult to detect any bias or error. They eliminate the links to personal knowledge and, in so doing, for many – if not most – readers, they remove the interest and value.

The other key link to personal knowledge is that individual people make up the stories of history. Much of the content of the endeavour consists of people thinking, doing, feeling and interacting. By looking at individuals, we can learn about the groups they formed.

The issue of selection in history

Recognizing that we cannot 'show it as it really was', that selection inevitably occurs, so that history has been called 'an act of creation', we need to see what factors might make up the historian's overall paradigm, and understand, in general terms, the basis on which any selection is made.

The first point is an obvious but important one – any historian is an individual human, and his history will be based on his particular interests, which are, in turn, partially dependent on his culture. There was a time when English schoolchildren studied the kings and queens of England almost exclusively, reflecting the interests of teachers and academic historians (because the English education system is international, this was also true for children all over the world). This time has passed, and the lives of 'average' or 'typical' people seem to be far more important than they once were, but what aspect of their lives do we look at? We deem education, gender roles and social equality to be very important, and we naturally focus on them. But the people living at the time may not have shared our priorities. Things cannot be important *per se* – they can only be important to someone, and that someone is the historian. Carr writes:

Study the historian before you begin to study the facts. This is, after all, not very abstruse. It is what is already done by the intelligent undergraduate who, when recommended to read a work by that great scholar Jones of St Jude's, goes round to a friend at St Jude's to ask what sort of chap Jones is, and what bees he has in his bonnet. Study the historian before you begin to study the facts. Find out what bee he has in his bonnet. When you read a work of history, always listen out for the buzzing. If you can detect none either you are tone deaf or the historian is a dull dog (23).

Reading an eighteenth-century history about the thirteenth century will tell you as much about the eighteenth century as it will about the thirteenth century, quite possibly more. The same is true of more recent histories. Making the point entertainingly in a well-known paragraph, the historian A.J.P. Taylor writes the complete biography of King George V: '*George V (1865–1936), second son of Edward VII; married Princess Mary of Teck, 1893; King, 1910–1936; changed name of royal family from Saxe-Coburg to Windsor, 1917; his trousers were creased at the sides, not front and back*' (2). It's the people of Taylor's era who are concerned with the trousers, not those of the era of George V.

The problem is compounded as soon as we acknowledge that historians do not write in a social and cultural vacuum. Possibly more than any other discipline, history is fundamentally and unavoidably a social construct.

In the past, it was fair to say that history was written almost exclusively by the winners – often because the losers were dead. Consider, for example, the Aztecs. There were once millions of thriving Aztecs in Mexico (estimates run between 6 million and 25 million), but they were virtually wiped out within four generations after a few hundred Spanish explorers landed there (Tuckman). The causes are still up for debate; smallpox brought by the Europeans killed many, and another plague virus, possibly also brought from Europe, seems to have been largely responsible for the rest. The 'facts' are out there, but it isn't known 'history' in the same way as the genocide against the Jews in the Second World War, because the Aztecs didn't have the opportunity to record their history in the aftermath of the European invasion.

Nowadays, as we saw with the Tlingit story above, as well as with the history of the Holocaust which we do know from the perspective of those cultures which Hitler targeted, we more often have recorded histories from multiple perspectives, and not just from the perspective of conquerors. Still, it is not clear that we get a balance of all relevant perspectives: what if, somehow, after the use of atomic weapons in 1945, the course of the Second World War had turned and the Allies had lost? What would now be the 'historical truth' about the bombings of the civilian populations of Hiroshima and Nagasaki? Perhaps the term 'Holocaust' would have a more general meaning, or perhaps not.

Knowledge framework:
Methodology

Since the telling of historical tales is shaped by fact selection, and since fact selection is shaped by the interest and perspective of the historian and by other filters that we examine here, how can we be sure that we have any accurate knowledge about events of the past at all?

The multiplicity of versions is a powerful strength in this regard. In history as an area of knowledge, the peer review process does not seek to establish the certainty of the historian's work; rather, it focuses on such things as the care with which an argument has been presented and the careful citation of sources.

In history, it is possible to have competing hypotheses based on the same basic facts, and the publication of multiple versions is a very useful knowledge-making strategy.

Different historians may support or correct each other by offering new facts or new interpretations which either cohere with what has been previously suggested, or which contradict older work. Different historians may offer different perspectives. It is through the ever-growing web of ideas that we get solid knowledge of historical events.

We don't expect any one individual historian to have the whole story about any given event, and we remain willing to revise our models as new and better information comes along. In this, history is similar to the sciences.

Related to the question of which version of history we get is the availability of analytical and conceptual apparatus. For example, the Marxist view of class conflict gave us a whole new conceptual structure through which to view historical events. In a similar way, new psychological theories may offer novel and unforeseen insights. Thus history will change as the theoretical frameworks of inquiry advance. Once again, we see that history is as much a product of the present as it is a fixed entity in the past.

12 Find an account of any significant event in a history textbook. Look at:
- the language that is used
- what information has been included/omitted
- what details are stressed
- what analytic concepts have been used
- the extent to which selection, interpretation and packaging have been used to create historical 'truth'.

13 Find another history text which gives an account of the same event. Compare and contrast the two and determine which is more accurate. On what basis do you make your decision?

14 What will our own age be called far in the future? The Age of Democracy? The Age of Hypocrisy? The Age of Disaster? How do you sum up an age in one phrase?

15 For what reasons might future historians have a name for our age which we are totally unable to predict?

16 It has been said that the historian is like a painter rather than a photographer. By examining the nature of painting and photography, explain to what extent you agree with this analogy.

This issue operates on both the macro and the micro scale. We choose both how we describe events, and what is important, and we do so according to the level of analysis that we are capable of and have available to us. That analysis will necessarily be shaped by our paradigms, context and culture.

Consider events whereby a group of people plant bombs in certain places in an attempt to force a government to make social change. We call the explosions which are killing people 'terrorism' in one set of circumstances and 'resistance' or even 'freedom fighting' in another, largely depending on what we think about the government in question. This issue is related to, but not limited by, the language we use. Consider these points:

- Was the dropping of the atom bombs on Japan the final act of the Second World War or the first act of the Cold War? Or both? Or something else entirely? Or just the explosion of extremely powerful bombs?
- Henry VIII failed to seduce Anne Boleyn and married her instead. Was this just a rather sordid business, or the start of the fall of the Catholic Church in England?

- Was the fall of the Berlin Wall the nail in the coffin of communism? Was it a triumph of Western democracy? Was it either of these things at the time? Or was it just a lot of people smashing a wall?
- Many people at a particular time and place are running around killing each other. Later on this is seen as a decisive battle. Was it a decisive battle at the time?

These examples illustrate the fact that we impose a useful structure on certain 'facts'. We have seen that the structure is, inevitably, *our* structure. The facts suggest that many years ago men were sailing on boats, dying of scurvy and petrified that they would be eaten by sea monsters or fall off the ends of the Earth. Notice how the map here, the *Carta Marina*, includes illustrations of giant snakes and other monsters in the sea reflecting this fear. Historians later called these torrid journeys the 'Voyages of Discovery'. One might argue that this goes well beyond selection, and that relabelling in this way is as close to creation as it is to selection!

The Carta Marina

Jorge Luis Borges has written entertainingly and illuminatingly on similar issues in literature. In *Kafka and His Precursors*, he tells how he found echoes of Kafka's writings in a number of earlier authors, but how these authors share no other similarity. It is only in light of Kafka that we can identify these shared aspects of these 'precursors', of which he writes:

In each of these texts we find Kafka's idiosyncrasy to a greater or lesser degree, but if Kafka had never written a line, we would not perceive this quality; in other words, it would not exist. The poem 'Fears and Scruples' by Browning foretells Kafka's work, but our reading of Kafka perceptibly sharpens and deflects our reading of the poem. Browning did not read it as we do now … The fact is that every writer creates his own precursors. His work modifies our conception of the past, as it will modify the future (Gee 115).

This observation beautifully makes the point that whatever we see about the past we see through the eyes of what we know now – and vice versa. What we see about the present we see in the context of what we know about the past.

British palaeontologist Henry Gee applies Borges' observation to history:

The impact of Darwin's views on modern thought has been so profound that it is extremely hard for us, today, to imagine how people thought about the history of life before the publication of The Origin of Species *in 1859. We think of every aspect of our lives in terms of phrases such as 'the survival of the fittest', 'the struggle for existence', or even 'it's evolved' (115).*

This is a perfect example of a psychological structure that shapes our vision of history. We cannot escape these, for they shape our view of what is real and what is important.

17 When Browning wrote his poem, was he a precursor of Kafka, or did he only become so when Kafka started writing?
18 Consider the line, *'... if Kafka had never written a line, we would not perceive this quality; in other words, it would not exist'*. If we regard Kafka as a modern historian, and the other authors as sources, what does this analogy suggest about history? Is it a helpful analogy?
19 John Dewey famously described the past as the 'past-of-the-present'. In the light of what you have read in this section, what do you think he meant?

History and people

Let us consider what might, at first, seem to be real but unimportant features of dealing with people in history. As people, we all know that our decisions and actions are affected by such things as physical and mental health, but we also recognize that historians will often have very little access to these feelings. In *War and Peace*, Tolstoy suggests that Napoleon's poor performance in a key battle was due to his having a bad head cold, but we do not know if this is true. It has also been suggested that the deep unhappiness of Luther, one of the key figures in the Reformation, was directly attributable to his own private agony caused by acute constipation. Two hundred years ago, the majority of the population suffered from toothache, and it is certainly conceivable that the ill health of many major historical figures played a role in their decisions, but these facts are rarely recorded.

These may seem like rather pedestrian points for an historian to worry about, but if we are trying to understand behaviour, then state of mind must be a crucial factor. If this is the case, it means that important, maybe vital, historical factors will be forever beyond our reach.

Of course, we can generalize this idea beyond the concept of health. In any humanities subject, we are investigating an incredibly complex, multi-faceted and dynamic subject – humankind. Historian Barbara Rosenwein, for example, worried (her word) about how historians have tended to interpret the meaning of the actions of past people – especially in the Middle ages – based on a modern interpretation of their emotional expressions. She suggests that history has tended to consider people who freely expressed their passions (in word or deed) as primitive (Rosenwein 7). People's actions *are* affected by their emotions, and so, it would seem, we not only need to know what emotions were relevant to past events, but also what they meant to the people involved in those events, rather than what they mean to us, in the present day. We have already seen, though, (Chapter 8) that emotions are hard to interpret, and may have some variation culturally. So this adds a very difficult element to the historian's work.

The current aim, in most areas of the human sciences, is to explain group rather than individual behaviour. In history, this is often not the case, and while A.J.P. Taylor's claim that, '*the history of modern Europe can be written in terms of three titans: Napoleon, Bismarck and Lenin*' (Wrigley 212), may be overstating the case, it is certainly a reminder that the behaviour of individuals plays a crucial role in history. This makes the job of the historian extremely difficult. The historian Barbara Tuchman writes:

Each man is a package of variables impossible to duplicate. His birth, his parents, his siblings, his food, his home, his school, his economic and social status, his first job, his first girl, and the variables inherent in all of these, make up that mysterious compendium, personality – which then combines with another set of variables: country, climate, time and historical circumstance. The range of factors available make interpretation very difficult.

Her point is a good one, and seems to strongly limit the possible scope of history. The historian R.G. Collingwood reinforced this when he said, '*All history is the history of thought.*' This stark comment cuts deep and might well leave historians slightly nervous. If it is thought we are after, then we are going to struggle! Arguably, even the 'perfect source' – a private diary – is one step removed from 'thought'; it may well be written with an eye to posterity, even if it is private. Even the perfect source, then, may be an interpretation, which we then interpret ourselves. We are then already two steps away from thought, and possibly in danger of serious distortion. Of course, for sources further removed, we face many more difficulties. If we read a public diary or official record, then we read what the author wanted us to think he thought; or possibly even what he wanted us to think he wanted us to think he thought!

Before we get too carried away with the idea that nothing we read is true, however, we ought to stop and consider the fact that most people, going about their day-to-day lives, have no intention of deliberately misleading anyone – or indeed any idea that the records they are leaving behind them, letters, photographs, video or audio tape, and, in more recent times, emails and IM messages – might one day be considered by an historian for their import in conveying the events of our time. Most people, most of the time, when they are sharing their thoughts share their true thoughts. Just read this letter, for example, written by an American Civil War soldier, Sullivan Ballou, to his wife on the eve of battle (and, as it turned out, one week before he died in the First Battle of Bull Run):

July 14, 1861
Camp Clark, Washington

My very dear Sarah:

The indications are very strong that we shall move in a few days – perhaps tomorrow. Lest I should not be able to write again, I feel impelled to write a few lines that may fall under your eye when I shall be no more …

I have no misgivings about, or lack of confidence in the cause in which I am engaged, and my courage does not halt or falter. I know how strongly American Civilization now leans on the triumph of the Government and how great a debt we owe to those who went before us through the blood and sufferings of the Revolution. And I am willing – perfectly willing – to lay down all my joys in this life, to help maintain this Government, and to pay that debt …

Sarah my love for you is deathless, it seems to bind me with mighty cables that nothing but Omnipotence could break; and yet my love of Country comes over me like a strong wind and bears me unresistibly on with all these chains to the battle field.

The memories of the blissful moments I have spent with you come creeping over me, and I feel most gratified to God and to you that I have enjoyed them for so long. And hard it is for me to give them up and burn to ashes the hopes of future years, when, God willing, we might still have lived and loved together, and seen our sons grown up to honorable manhood, around us. I have, I know, but few and small claims upon Divine Providence, but something whispers to me – perhaps it is the wafted prayer of my little Edgar, that I shall return to my loved ones unharmed. If I do not my dear Sarah, never forget how much I love you, and when my last breath escapes me on the battle field, it will whisper your name. Forgive my many faults and the many pains I have caused you. How thoughtless and foolish I have often times been! How gladly would I wash out with my tears every little spot upon your happiness …

But, O Sarah! If the dead can come back to this earth and flit unseen around those they loved, I shall always be near you; in the gladdest days and in the darkest nights … always, always, and if there be a soft breeze upon your cheek, it shall be my breath, as the cool air fans your throbbing temple, it shall be my spirit passing by. Sarah do not mourn me dead; think I am gone and wait for thee, for we shall meet again … ('Historical Document')

The heartfelt nature of this lovely prose surely strikes us as deeply personal and honest, and we feel that we have been given a glimpse into the concerns, values, beliefs and motivations of those soldiers who left families they loved to fight in a war they believed was necessary. The fact that some historical artefacts *may* be false or misleading does not mean that all – or even many – are.

Another approach to mitigating the problem of basing history on the views of individuals is to argue that history is really less to do with individuals than the interplay of titanic social and economic factors. There does seem to be some sense in this; could any leader stop, for example, the impact of information technology? Could any chancellor stop the flow of capital around the world? Recent history might suggest not. Perhaps we should regard societies as unstoppable monsters, headed in a particular direction, and acknowledge that the best any leader can do is to ride the beast in the same direction, perhaps speeding it up or slowing it down. Even if we accept it, however, this **social determinism** does not exactly make the historian's job simple. Analysing individuals may be

difficult, but are these mysterious 'social forces' any easier to understand? When we consider that societies are made up of individuals, then we might be inclined to think that grand social forces are even more complicated and difficult to understand than individual actions and motivations.

The trick, it would seem, is to figure out how individual and societal forces interact in order to cause those events which we think are important enough to study. But this is hardly straightforward.

20 What are the problems in trying to analyse an event when you are part of it?
21 What are the problems in trying to analyse an event by standing back and getting an overview of the whole event?
22 What problems are raised by regarding history as the plaything of individual figures?
23 What are the alternatives to this point of view? Do they solve the problems or do they raise more?
24 Do you think that history is about individuals or social forces? Is this even a valid distinction? Justify your answer with concrete examples.

Causation in history

When we let go of an unsupported object it falls. We may not know why this happens, but we may invoke some phenomenon like 'gravity', or we may say that things have a tendency to fall. That is perfectly acceptable, but it hardly qualifies us as scientists. Similarly we can read or even write about the past and be content. We can say that the Cold War was due to tension between the superpowers, but we may have to remind ourselves that this is a long way from studying history.

R.G. Collingwood makes the case for history as the study of cause and effect:

The historian, investigating any event in the past, makes a distinction between what may be called the outside and the inside of an event. By the outside of the event I mean everything belonging to it which can be described in terms of bodies and their movements: the passage of Caesar, accompanied by certain men, across a river called the Rubicon at one date, or the spilling of his blood on the floor of the senate-house at another. By the inside of the event I mean that in it which can only be described in terms of thought: Caesar's defiance of Republican law, or the clash of constitutional policy between himself and his assassins. The historian is never concerned with either of these to the exclusion of the other. He is investigating not mere events … but actions, and an action is the unity of the outside and inside of an event. …

In thus penetrating to the inside of events and detecting the thought which they express, the historian is doing something which the scientist need not and cannot do. In this way the task of the historian is more complex than that of the scientist. In another way it is simpler: the historian need not and cannot (without ceasing to be an historian) emulate the scientist in searching for the causes or laws of events. …

This does not mean that words like 'cause' are necessarily out of place in reference to history; it only means that they are used there in a special sense. When a scientist asks 'Why did that piece of litmus paper turn pink?' he means 'On what kinds of occasions do pieces of litmus paper turn pink?' When an historian asks 'Why did Brutus stab Caesar?' he means 'What did Brutus think, which made him decide to stab Caesar?' The cause of the event, for him, means the thought in the mind of the person by whose agency the event came about: and this is not something other than the event, it is the inside of the event itself.

Knowledge framework:
Concepts and language

The discussion here focuses on one important concept in history – the concept of *causation*. We talked in Chapter 12 about the difference between **causation** and **correlation**; this is an important distinction for historians, as well.

Other important concepts that we have considered in this chapter are the question of whether events are subject to **determinism** or not, the rather symbiotic relationship between **facts** and **interpretation** (the nature of the historical fact is arguably the most important concept for history as an area of knowledge), and the question of how our **paradigms** influence our interpretations.

We have also considered the nature of historical **facts**, **data** and **evidence**, and it might be worthwhile to spend some time considering the nuanced difference between those three terms.

The history of any given subject will have its own important vocabulary, which you would need to know if you were studying that particular historical topic or event.

History, then, like science, is all about finding out the causes and effects of events, and the greatest historians, like the greatest scientists, are those who manage to find a new way of explaining why things happen. An historian's approach to cause and effect will largely determine the sort of historian he will be.

In our search for causes, we immediately run into problems when we ask a question as apparently basic as 'Why did the Second World War happen?' Any student will quickly realize that there are a number of causes, and to offer merely one would be ridiculous; however, to offer a long list of ten causes would not be much better. What we want is an ordered list with some indication as to the 'most important' cause, an explanation of how the causes relate to each other (if they do!), and an indication as to why the 'most important' cause is central in a way that the others are not.

So how might we go about establishing such a hierarchy of causes? The interlinking nature of history causes problems. How far back should one go when looking for a cause and how far when looking for an effect? There is the old tale of the country that was lost because a war was lost; the war was lost because the battle was lost; the battle was lost because a general didn't receive orders; the general didn't receive orders because a message was delayed; the message was delayed because a messenger stopped en route; the messenger stopped en route because his horse's shoe came off; the shoe came off because of a sharp rock in the road ... and we are very quickly into absurdity. Does this mean that history is one continuous stream of cause and effect, with accident and chance events playing major roles?

This portrayal of historical explanations goes by the name of Cleopatra's Nose, based as it is on the idea that, had Cleopatra's nose been slightly longer, Mark Antony would not have fallen in love with her, and the subsequent history of the Roman Empire and indeed the world would probably have been completely different. This has been a popular view: King Alexander of Greece died from a monkey bite in 1920 and this event started a tragic series of events, about which Winston Churchill later remarked '*a quarter of a million persons died of this monkey's bite*' (Freudenberg 157).

Of course, most events are multi-causal, and the simple chain of event stories like those above may not be realistic. Acknowledging that causes and effects are complex, interrelated and extensive, however, just makes the problem far more difficult! You can imagine a huge web of cause and effect that soon becomes impossible to grasp. If we have to take every little thing into account then history will become nigh-on impossible and certainly lose all its explanatory power.

There are other views of causation, but they seem equally difficult. In *War and Peace*, Tolstoy vividly portrays the bewilderment of the millions of people caught up in the crises and upheavals of the Napoleonic Wars. On the cause of the war, he writes:

The causes of this war seem innumerable in their multiplicity. The more deeply we search out the causes the more of them we discover; and every cause, and even a whole class of causes taken separately, strikes us as being equally true in itself, and equally deceptive through its insignificance in comparison with the immensity of the result, and its inability to produce (without all the other causes that concurred with it) the effect that followed … And consequently nothing was exclusively the cause of the war, and the war was bound to happen, simply because it was bound to happen (Abel 173).

Few historians today would agree with this historical determinism, but it is really no different from social determinism, genetic determinism or just plain (philosophical) determinism. The issue is related to that of free will and perhaps here we need do no more than point out that unless we are willing to jettison the belief that we have free will, the idea that all events are determined is barren. Even if the course of events were fixed, we should still try to determine what that fixed course is. So historical determinism adds nothing of any interest. It does not take us anywhere, and so maybe purely on pragmatic grounds we should leave it there.

Another idea about cause and effect in history is that history is cyclical, and the same things happen over and over again in different guises. If we believe that history can teach us anything about the future – a compelling idea expressed in Santayana's oft-quoted assertion that '*Those who cannot remember the past are condemned to repeat it*' (172) – then we must, to a greater or lesser degree, subscribe to this notion. If there is no cycle of repeated events, situations or contexts, then the past cannot teach us anything at all about the future.

Other cause–effect paradigms have stressed the primacy of race, climate, class struggle, psychology, progress, (ever original, historian A.J.P. Taylor suggested that railway timetables were a key cause of the First World War!), zeitgeist (spirit of the age) and pure chance or luck as central to historical causation. We shall not discuss these now – for present purposes we merely note that it is only once we have selected our paradigm that we can select our data. Once we have the data, we should attempt to be open-minded enough to change our paradigm if the need arises. Any good historian will have a number of approaches available – the key is deciding which is most productive under any given set of circumstances, and not to have a closed mind.

25 Identify an historic event which you believe has a single cause. What was the cause of that cause? Trace the sequence back as far as you feel is meaningful, and explain your choice of where to stop.
26 Do you think that all events have causes which are identifiable by historians?
27 What do we mean by 'historical cause'?

History and the ways of knowing

The making of knowledge in history, as we have seen, is a difficult process. Facts are elusive; interpretations uncertain. The historian's work is investigation, and imagination might be her most important tool for developing viable hypotheses about what the evidence she has really means. That imagination, however, must be tempered by reason. The historian must be willing to subject her ideas

to rigorous examination to ensure that they are not weakened by mere flights of fancy. Emotion, too, is an important way of knowing; for one thing, as Rosenwein shows us, we need to understand our predecessors' emotions if we are to understand their actions. We have also acknowledged that the historian's emotion can pose a problem and result in bias, but it is also true that her passion for her subject is a powerful force in motivating her not only to seek answers, but also to test those answers honestly.

Language is an important tool not only because histories, once developed, are conveyed through language, but also because many of the resources available to the historian in her search are written or recorded, and so the evidence she relies on comes to her through language. Language, because it is so often not literal, requires interpretation, and so the historian must be a skilled user of language – often of languages other than her native one, if she is not to be limited by other people's translations of primary source documents.

In Chapter 2, we suggested that history is an important vehicle for containing and passing on shared, cultural memory. As such, it shares many of the same characteristics of individual human memory – it is fallible, fragmented, and to some degree created. But as shared knowledge it is also testable, reparable and subject to growth.

In the end, faith is required: faith not only that the facts are out there to find, but also that, so long as the historian works with due diligence, and is willing to revise her thinking in the face of new evidence, we are capable of finding – and do often find – truth sufficient to help us know our past.

Knowledge framework: Scope and applications

We have seen throughout the chapter that the scope of historical study is all the events of the past. Where once the study of history was limited to investigation into people in positions of power, and where once history was written only by winners – those people in power – now the scope of history has expanded, and continues to expand, to include as many viewpoints as possible.

The most common explanation for why we study history is that it helps us avoid making the mistakes of the past, but that statement alone, as we see in this section of the chapter, provides only a superficial view of a rich undertaking. That one glib statement downplays the power of what we gain from studying history.

Why study history?

Santayana's warning that we are doomed to repeat history if we do not know it resonates widely as a reason to study history. Whether the study of history achieves what Santayana suggests is debatable – we had a second world war, despite widespread knowledge of the first. Indeed, wars happen over and over again, regardless of our study of history. One can argue that each new war arises out of a different set of particular circumstances and, therefore, no war is a repeat of any earlier one, but such an argument does not seem to justify the hope in Santayana's sentiment.

On the other hand, we do seem, as a species, to make progress. It is hard to imagine another Holocaust happening as it did in the Second World War, because we know enough now to rise up against such an action swiftly and decisively. It's equally hard to imagine the USA returning to slavery, or South Africa returning to apartheid, or Britain returning to a system of absolute authority of a monarch. Gradually human rights seem to spread – albeit slowly, more slowly than we would like – and it does not seem too far-fetched to ascribe that progress, at least in some degree, to our knowledge of history.

If we are to learn from the past in a way that has a material effect on our future, then it will be because we have improved our understanding of human nature by connecting, in a visceral, emotional way, with people of the past. Sam Wineburg argues that if we are to gain anything from history, we have to strive to meet it on its own terms, rather than settling for viewing it through the lens of the present. This requires a dedicated effort to realize how difficult it is to transcend our assumptions that others in the past experienced the world as we do now, and then to work, consciously, at seeing things from someone else's perspective. History, he shows us, is a vehicle for the growth of empathy.

Paradoxically, what allows us to come to know others is our distrust in our capacity to know them, a scepticism about the extraordinary sense-making abilities that allow us to construct the world around us.

A scepticism toward the products of the mind can sometimes slide into cynicism or solipsism. But this need not be the case. The awareness that the contradictions we see in others may tell us more about ourselves is the seed of intellectual charity. It is an understanding that counters narcissism. For the narcissist sees the world – both the past and the present – in his own image. Mature historical knowing teaches us to do the opposite: to go beyond our own image, to go beyond our brief life, and to go beyond the fleeting moment in human history into which we have been born. History educates ('leads outward' in the Latin) in the deepest sense. Of the subjects in the secular curriculum, it is the best at teaching those virtues once reserved for theology: humility in the face of our limited ability to know, and awe in the face of the expanse of human history (Wineburg 24).

Making knowledge in history

Which version is the right version?

We have come a long way from Elton's insistence that the past is fixed and unchangeable. He is right, but only about events, and not about our understanding of them. We have seen that we do not, in fact, have easy access to the absolute truth about those events. History, like science, aims for objectivity, but history, like science, is a human endeavour with all that that entails. Given all the problems we face in history, how close can we come to the truth? If all versions are selective, how do we select the right version?

Since selective knowledge is, by definition, incomplete knowledge, there is a temptation to fall into empty statements such as 'history is constructed by biased historians working with biased sources which were written by biased people; therefore there is no such thing as historical truth'. But just because it is selective and written by people does not mean that history has to be hopelessly twisted, subjective or fabricated. It does mean that it is very difficult to attain certainty, and that the historian will never know all there is to be known about an event. But the historian openly accepts this, and the methods of history as an area of knowledge function to address the problem. We can have three accounts of an event in Roman times – one from a twentieth-century African, one from a fifteenth-century Scot and another from a tenth-century Turk – and while no single account will be entirely true, they will all contain elements of truth. Rather than ask which is the right one, we do well to consider what each reveals about the events and how they work together to create a more complete picture.

The professional historian recognizes the problems, and looks to solve them. The historian seeks a convergence of evidence, and works to ensure that the explanations developed are both reasonable and consistent with as much of the evidence as possible. Theories will be scrutinized, arguments examined and accounts questioned. New evidence will either bolster existing ideas or will reshape them. In this respect history, like science, is self-correcting. The alternative to absolutism does not have to be nihilism; just because we don't have certainty about the past, it does not follow that anything goes.

In addition to the intellectual argument, there is a pressing moral need for us to acknowledge the reality of the past and not accept the 'anything goes' version of

history. The revisionist historian David Irving suggests that Hitler did not attempt to exterminate the Jews in the concentration camps. Others have said that the number of victims was far less than the generally accepted 6 million. However, mainstream historians, and the vast majority of those who have investigated the evidence in any depth, feel that the evidence is overwhelming, and to deny what happened in the concentration camps is to do more than merely cite another historical perspective. Irving was, in fact, jailed in Austria for his views under a statute banning Holocaust denial in that country ('Holocaust denier Irving is jailed').

There is often an ethical dimension to history – many past acts have been either horrifically wrong or supremely good, and that makes either complete relativism or complete scepticism as dangerous as certainty and prejudice. We need to know the good and evil of which human beings are capable so that we can use that model to shape our own behaviour. People who deny overwhelming evidence – not merely reinterpreting evidence in a reasonable way, but actually ignoring the evidence – of either good or evil are not to be taken seriously as professional historians, for they have eschewed the rigour and discipline of the pursuit.

28 Some historians claim that they are not even seeking the truth. Why do you think they say that? Do they mean that they are simply telling stories? What is the value of their study?
29 Does the open admission of many historians that the truth is unattainable in any way devalue the discipline?
30 What is the most important or serious problem an historian faces?

Where have we been? Where are we going?

We turned to history hoping that the fact that it was fixed would offer us the opportunity to find certainty and truth. What we failed to take account of was that we live in the present, and that current attitudes and values always shape how we interpret the evidence of our senses. In this, history has something in common with social sciences, natural sciences and even, come to think of it, the arts. What is more, evidence often forms the premises of our reasoning, and so the problems of evidence seem to play a central role in all the areas we have looked at. Perhaps it is an underlying theme, like rationalism, worthy of attention in its own right. Let us turn, then, to sense perception and examine the way we acquire and interpret the evidence from our senses.

Further reading

★ A very brief overview of some ideas is given in Chapter 15 of Reuben Abel's *Man is the Measure* (The Free Press, 1976), but perhaps the classic introduction is E.H. Carr's very accessible *What Is History?* (Random House, 1967). This is a collection of lectures Carr gave about the nature of historical endeavour.
★ A useful overview of the postmodern criticisms of historical truth is found in K. Jenkins (ed.) *The Post-Modern History Reader* (Routledge, 1997); a response to these claims has been mounted in R.J. Evans' *In Defence of History* (W.W. Norton and Co., 1999). Other excellent books are A. Marwick's *The Nature of History* (Lyceum Books, 1989) and Barbara Tuchman's engaging collection of essays called *Practicing History* (Ballantine Books, 1991).

- ★ Sam Wineburg's *History and Other Unnatural Acts* (Temple University Press, 2001), especially the first chapter, provides excellent insight into the nature and purpose of historical endeavour and the contrasts between what historians do and how history is taught in schools.
- ★ To look at current controversies and some lesser-known views, you will not find better themes than in Ward Churchill's *A Little Matter of Genocide* (City Light Books, 1997) and James Peck (ed.) *The Chomsky Reader* (Random House, 1987).

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14 Sense perception

We hear and apprehend only what we already half know.
Henry David Thoreau

We shall see but a little way if we require to understand what we see.
Henry David Thoreau

Everyone hears only what he understands.
Johann Wolfgang von Goethe

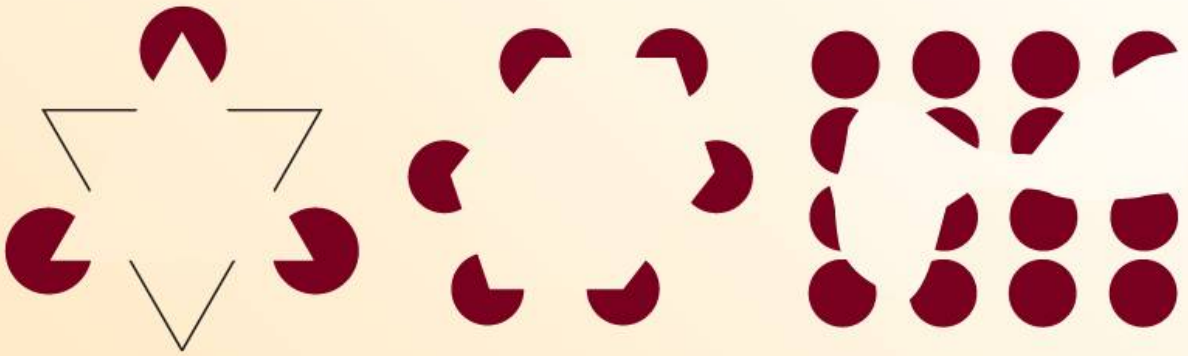
We sometimes get all the information, but we refuse to get the message.
Cullen Hightower

The eye sees only what the mind is prepared to comprehend.
Henri Bergson

There's more to seeing than meets the eye.
K.T. Cole

Discovery consists of seeing what everybody has seen and thinking what nobody has thought.
Albert von Szent-Gyorgy

All credibility, all good conscience, all evidence of truth come only from the senses.
Friedrich Nietzsche



There are three schoolmasters for everybody that will employ them – the senses, intelligent companions, and books.

Henry Ward Beecher

Nothing we use or hear or touch can be expressed in words that equal what is given by the senses.

Hannah Arendt

The only time you really live fully is from thirty to sixty. The young are slaves to dreams; the old servants of regrets. Only the middle-aged have all their five senses in the keeping of their wits.

Theodore Roosevelt

I never knew whether to pity or congratulate a man on coming to his senses.

William Makepeace Thackeray

Man has no Body distinct from his Soul; for that called Body is a portion of Soul discerned by the five Senses, the chief inlets of Soul in this age.

William Blake

Donald E. Carr points out that the sense impressions of one-celled animals are not edited for the brain: 'This is philosophically interesting in a rather mournful way, since it means that only the simplest animals perceive the Universe as it is.'

Annie Dillard

Where the senses fail us, reason must step in.

Galileo Galilei

Aims

By the end of this chapter you should:

- be able to notice, in everyday life, those times when your senses are not reliable
- understand why perception is an active not a passive process, and the implications this has for our view of the world
- be aware of the often unnoticed role that reason plays in interpreting our sensory information
- understand and be able to discuss the basic philosophical problems with empirical knowledge
- understand and be able to discuss the meaning of the phrase 'the mental construction of reality'.

Introduction

Pause a moment in your reading, and look around the space you are in. List five things that are in the space with you. How do you know they are there? There are no prizes for guessing that you know they are there because you can see them, hear them, taste them, touch them, and/or feel them. We are very accustomed to observing the world directly, and the experience that we derive that way is likely to make us feel quite confident in the accuracy of what we see – or hear, or taste, or feel, or smell. As we just saw in Chapter 13, one of the reasons that knowledge is difficult to make in history is that historians cannot directly observe the events about which they wish to know more, and so they lack the advantage of perceptual knowledge of the event they wish to study.

We've spent some considerable time in earlier chapters considering how we use our ways of knowing to process information; now we should take some time to consider how we get the information in the first place. After all, if we are on a search for certain knowledge, then perhaps the obvious starting point should have been our senses. What could be more certain than the fact that I can see that the sea is blue today, or that a rose smells sweet and fresh? Indeed, trusting our senses is so natural that we have sayings that tell us how reliable they are, such as 'I'll believe it when I see it' and 'Seeing is believing'. We even have a word for something which is ridiculous – we call it 'non-sense'.

And yet, it only takes a little thought to see some of the problems.

Have your senses ever let you down? Have you ever thought you saw or heard something when, in fact, you did not, or what was there was actually different to what you thought it was? There are dramatic cases where witnesses were absolutely positive about what they saw, and then they turned out to be wrong. In just one example, Aaron Owens was convicted in 1973 of a double-homicide on the strength of testimony from a victim who was absolutely certain that Owens was the murderer. He told the jury: '*I would never forget the eyes of the man who threatened to kill my little boy*' ('Stories of wrongful conviction'). Owens served ten years before the real murderer was caught. You can read many more examples of wrongful conviction at this website: http://tinyurl.com/6wst2wp.

We do not, however, need to look to such extreme cases to find that we cannot rely 100 per cent on our senses – our everyday experience is almost certainly full of good reasons to doubt that certainty can be found here. You've probably had many such experiences – your mother called you and you didn't hear her; you misread a line in a book and had to read it again because the rest of the paragraph

didn't make sense; you looked at the clock and thought you had plenty of time for something, only to discover later that you misread it. This kind of error happens all the time.

The study of our sensory, or **empirical**, knowledge goes by the name of **empiricism**, and it is a broad and deep topic. The questions raised in this chapter will spill out into other areas and raise more general questions and, because of this, you should read this chapter in close conjunction with Chapter 15 (on paradigms and culture). In this chapter, we will look at the more abstract issues; in the next, we will consider the more practical and immediate difficulties.

One final note: sometimes people confuse 'sense perception' with 'perception' in the more general sense of 'understanding'. For the purposes of Theory of Knowledge, 'perception' *always* means 'sense perception', that is, *the way we make knowledge from our physical sensory mechanisms, often in conjunction with other ways of knowing.*

1 Think of occasions on which your senses have led you astray. Can you explain why they did so?

The limitations of our senses

Limits of our sensory apparatus

British astrophysicist Arthur Eddington reminds us that our sensory experience, like all our knowledge, provides us with a model of the world, not the world itself:

As a conscious being I am involved in a story. The perceiving part of my mind tells me a story of a world around me. The story tells of familiar objects. It tells of colours, sound, scents belonging to these objects; of boundless space in which they have their existence, and of an ever-rolling stream of time bringing change and incident. It tells of life other than mine busy about its own purpose.

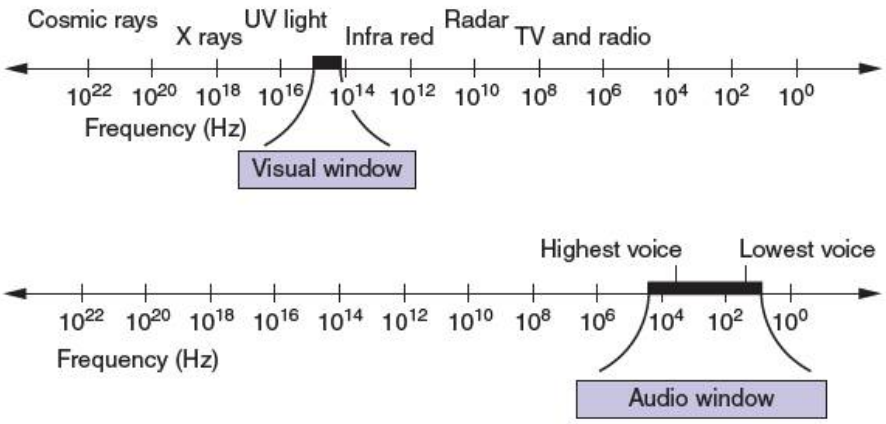
As a scientist I have become mistrustful of this story. In many instances it has become clear that things are not what they seem to be. According to the story teller I am sitting at a substantial desk; but I have learned from physics that the desk is not at all the continuous substance that it is supposed to be in the story. It is a host of tiny electric charges darting hither and thither with inconceivable velocity. Instead of being solid substance my desk is more like a swarm of gnats.

So I have come to realise that I must not put overmuch confidence in the story teller who lives in my mind (1).

This observation may be somewhat alarming. We are quite used to trusting our senses, and the idea that they are giving us a false model of the world might justly cause us to wonder if we have somehow lived a life in which the whole world is an illusion and we are being deceived by an evil demon (as imagined by René Descartes). We need not be too alarmed, however, as there are explanations to account for the 'deception' we experience.

Eddington is correct, when we consider the problem from the perspective of natural science: the desk at which we work isn't 'really' a hard surface; it is made up of little whizzing packets of energy like a mass of gnats. So why do we experience it as a solid hard surface? The simple explanation is that our physical mechanisms for detecting sensory data are limited.

Both light and sound can be represented as waves with particular frequencies (we ignore, for these purposes, the fact that light and sound are fundamentally different entities). Broadly speaking, humans are capable of seeing light between frequencies of 4×10^{14} Hz and 9×10^{14} Hz, and we are able to hear sounds between 20 Hz and 20 000 Hz. However, sound and light exist at many other frequencies.



Notice that these scales are not linear – in fact, the distance between 10^{22} and 10^{16} is 99.9999 per cent of the entire scale from 0 to 10^{22}, so the audio and visual windows are actually far, far smaller than they appear in the diagrams!

Other species are capable of seeing more – or different – frequencies than we can. Dogs, for instance, can hear sounds at a frequency of up to approximately 45 000 Hz – much higher than humans. (If you're interested, there is a very interesting paper, 'Frequency hearing ranges in dogs and other species', that shows the hearing ranges for a number of animals as contrasted to humans here: http://tinyurl.com/7v4gm.)

Our visual capacity is also limited in terms of the amount of detail we can make out. As objects get smaller and smaller, we are less and less able to make out boundaries between them. Atoms and their component parts are far too small for us to be able to make out their edges, and we cannot distinguish them. The same is true of our sense of touch. When we look at the desk in front of us, then, we experience it as a solid object because we are not capable of seeing, with our own sensory mechanisms, its component parts. When we touch it, we experience it as a hard object because the spaces in the molecules in our hands do not line up with the tiny solid portions of the molecules in the desk, and so our hand does not pass through the desk. The barrier is real, and we experience it as such.

It is worth noting, furthermore, that we do know that the desk is comprised of molecules whizzing about at terrifically high speeds; we just don't know it through our unaided senses.

2 Why do you think we are able to see and hear in the regions shown on the scales?
3 Some animals can hear/see other frequencies of sound/light. What do you think life must be like for them?
4 How do you think this idea translates to the senses of touch, smell and taste?
5 What implications does this kind of thinking have for what we know about the world?

Animal senses

More evidence that we cannot count on our senses alone for knowledge of the world lies in the fact that there are several other senses in the animal kingdom that humans do not possess. Recent research shows that sharks have lateral lines which are sensitive to the electric fields around them. They can sense the electric fields of prey that are totally motionless and hidden under the sand. Given that much of the electric activity is generated by the brain, this is almost telepathy! Ants and other insects are believed to have great chemical sensitivity (combining touch, taste and smell in some unimaginable way); birds are believed to find their way home by following the Earth's magnetic field; Sargasso eels return by an unknown sense to the St Lawrence and other rivers which their ancestors knew, but which they themselves have never seen.

There is one fascinating creature, the Mantis shrimp, which sees a vast array of colours unknown to humans. We have receptors for three basic colours – red, green and blue – and these combine into the seemingly endless array of colours you are accustomed to seeing. But dogs can only process two basic colours, and so see only a small portion of the colours we can. The Mantis shrimp, by contrast, has 16 colour receptors, and can process many, many more colours than we can. We literally cannot imagine what colours the Mantis shrimp can see. The Mantis shrimp, in fact, has the most complex visual system by a factor of two of any known creature (Abumrad and Krulwich). The picture shows a Mantis shrimp, which, even to our eye, is amazingly colourful. Since we now know that the shrimp can see a much vaster array of colour than we can, we can only wonder what a Mantis shrimp looks like to another Mantis shrimp!

A Mantis shrimp

Another animal whose experience of the world is vastly different from ours is the bat. Bats, contrary to popular belief, are not actually blind, but their eyesight is very poor and they rely much more heavily on echolocation for mapping the space around them. They emit a stream of sounds that bounce off of any object near them – including a mosquito – and the bats can tell, just as a submarine using sonar can, in what direction and how far away the object is. This is not a magical ability. In bats, it is innate and instinctive, but some blind humans have learnt to use the same system to navigate their world. You can check out one fascinating story here: http://tinyurl.com/29cg7n ('Extraordinary people – The boy who sees without eyes').

It might be tempting to allow the fact that we perceive the world in ways shaped by the physical limitations of our sense mechanisms to lead us to the extreme notion that we can't know anything about reality, but this is too extreme a position. Instead of interpreting that fact as an inability to detect reality, we should recognize, instead, that we have an important ability to perceive some of the reality that exists beyond our minds. (We will return, later in the chapter, to the question of whether there actually is a reality that exists beyond our minds; for now, we will assume that there is.)

Immanuel Kant developed a framework for describing this idea: he contrasted the **noumenal world** with the **phenomenal world** ('Kant, Schopenhauer, Wagner'). The noumenal world, Kant proposed, is the real world, as it is, which exists independently of any human's perception. If we had never existed, or if we suddenly ceased to exist, what would be left would be the noumenal world. The phenomenal world, by contrast is the world that we can perceive via our perceptual apparatus. This terminology allows us to pose two difficult questions:

- What are the differences between the noumenal and phenomenal worlds, and why do they occur?
- Can we ever reach beyond the phenomenal world to understand the noumenal world?

6 Imagine you possess a chemical sense. You can sense in nearby people hundreds of aromas in their clothes, levels of adrenaline and other hormones in their sweat. You are, in fact, a walking forensics lab. What would the world be like for you?
7 Can you think of any other senses which animals (or aliens) might have?
8 What implications does this sort of thinking have for how we acquire knowledge through our senses?
9 What is it like to be a bat? How is the world in which you (as a bat) live different from the world in which humans live?

Selective attention

Another factor that influences our ability to perceive the world accurately is the fact that we cannot consciously process all the information that we get, and so we miss a lot of what is going on around us. In a famous psychological experiment at Harvard University, Christopher Chabris and Daniel Simons had participants watch a video of some people bouncing basketballs. Some of the people were wearing white shirts; some were wearing black. The researchers instructed the participants in the experiment to watch the video and count the number of times the ball was passed by students wearing the white shirts. Before you read on, we suggest you go to Chabris and Simons' website and watch a short version of the video yourself. You can find it here: http://tinyurl.com/3xwumql. The video you want is called 'The original selective attention task'.

If you watched the video, you now know the part of the story that the participants were not told: partway through the video, a person in a gorilla suit walked into the game, stopped, faced the camera, pounded her chest, and walked off. Here is how Chabris and Simons describe the results of their experiment:

Amazingly, roughly half of the subjects in our study did not notice the gorilla! Since then the experiment has been repeated many times, under different conditions, with diverse audiences, and in multiple countries, but the results are always the same: About half the people fail to see the gorilla. How could people not see a gorilla walk directly in front of

them, turn to face them, beat its chest, and walk away? What made the gorilla invisible? This error of perception results from a lack of attention to an unexpected object, so it goes by the scientific name 'inattentional blindness.' This name distinguishes it from forms of blindness resulting from a damaged visual system; here, people don't see the gorilla, but not because of a problem with their eyes. When people devote their attention to a particular area or aspect of their visual world, they tend not to notice unexpected objects, even when those unexpected objects are salient, potentially important, and appear right where they are looking (6–7).

Another name for this phenomenon is **selective attention**. People whose attention has been focused on one particular thing do not pay attention to other things in their immediate environment – even though it seems intuitively impossible that they could miss them. The point here is that selective attention is not conscious – people are not deliberately choosing to ignore elements of their environment; it just happens as a natural part of the perceiving process. This is why talking on phones or texting while driving is so dangerous: people engaged in those activities do not *feel* that they are inattentive. Intuition tells them that they are in control, but they are not.

You can verify this with a simple experiment using a ruler and some friends. You will need to drop the ruler without warning and your friend will need to catch it. Measure where on the ruler she grabbed it and convert the measurement to reaction time. (You can find very detailed instructions and a link to a chart for converting the measurement on the ruler to reaction time here: http://tinyurl.com/ou42ype.) Run a number of trials to get an average, then repeat the experiment, only this time have your friend talk on the phone or text while she is waiting for the ruler to drop. You will probably find that her response time drops dramatically, and she may not even be able to catch the ruler at all. (For this to be a valid experiment, you will need to run trials with as many participants as possible, as one person's reaction is of course insufficient to allow for general conclusions.) You can view data from one researcher's results from this experiment here: http://tinyurl.com/naw7y4n (Thompson). Be sure to click on the chart to see the actual data in detail. The data confirms that, for nearly everyone, response times drop to dangerous levels when they are distracted by a phone.

Drivers who have been in accidents while they were talking on cell phones often claim that they never saw the other car or the bicycle or whatever other object they hit. You can now see that this is literally true – even though the other object was right there in front of them – and presumably the light from the car or bicycle did actually enter the driver's eyes. Their attention was focused on the person on the other end of the phone, and while nothing unexpected happened on the road, they were safe enough. But as soon as the unexpected happened – the car pulled out in front of them, the child chased a ball into the street, or a dog got loose from its owner – they were unable to respond to it because their attention was elsewhere. They literally did not see what was right in front of them.

Biological factors

We've already considered the fact that our sensory mechanisms are limited by biology, and we've acknowledged that we cannot see or hear all of the sound or light that exists in the world; but there are other ways in which our biological nature shapes our ability to perceive what is outside of ourselves. We've also seen

that we are subject to selective attention. Both of these problems are related to how the brain processes sensory information. This, in simple terms, is how the process works (we'll take the smell of a fresh-baked loaf of bread for an example):

- Things that we can smell have molecules which are volatile – that is, they are very light and detach easily from the object. In the case of bread, then, volatile molecules from the bread float through the air to your nose. (Naturally, molecules have no will or sense of direction; they float generally everywhere, and it is only those which randomly happen to reach your nose that get processed as smell!)
- Your nose has special receptors – olfactory receptors – which bond with the bread molecules and convert them to electrical impulses.
- The electrical impulses are sent to special centres in the brain, which then converts them to the mental experience of delicious bread smell (Dowdey).

The process is the same for all of your senses, though the exact form of the data and the exact type of receptor is different for each. Light bounces off objects and then triggers the rod cells on your retinas. Sound waves – which are simply patterns of vibrating molecules – cause the tympanic membrane, or eardrum, to vibrate. Taste molecules bond to gustatory receptor cells in your tongue. Touch uses temperature and pressure, and the sensory mechanism for touch is the largest one on the human body, as all of your skin has touch receptors. In every case, however, the data from the outside world is converted to electrical impulses and sent, automatically and unconsciously, to your brain.

Perhaps you can already begin to imagine the problem your brain faces every second: you have no conscious control over when or how much data goes to your brain. You are bombarded every second with vast quantities of data from every sense receptor you have. It's estimated that your brain fields billions of bits of sensory data every second, but can only process about 2000 (Willis 1). What happens to the rest?

One model of our system of memory is called the Stage Model. This model depicts sensory data travelling through the brain in stages – first to the sensory memory, where it remains only between 200 and 500 milliseconds, then the sensory memory sends the data on to short-term memory. The sorting of the data into what is necessary to keep is the job of your sensory memory. This process is completely unconscious, and you cannot control it. You also cannot train your sensory memory to take longer to make its choices. Data does not become conscious to you until it has arrived in your short-term memory. So your sensory memory, in a fraction of a second, sorts through all the billions of bits of sensory data passing by, chooses what will remain, and ignores the rest (Mastin). It is now pretty easy to understand how selective attention works: if your conscious mind is working on something specific, your sensory memory is likely to send data related to that problem, and to ignore the rest. If you are counting basketballs, sensory memory sends basketball information and dumps the gorilla. If you are texting, sensory memory sends phone information and dumps the car that ran the red light.

Another physical feature of our sensory system that has a significant impact on how our brain processes sensory data is the blind spot in our eyes. There is a spot in the eye where there are no light receptors (where the optic nerve joins the retina); any light falling there cannot be registered. This means that your eye has a blind spot; yet we do not see a blank circle in the middle of every scene we look at. Harvard psychology professor Daniel Gilbert explains why:

Because your brain uses information from the areas around the blind spot to make a reasonable guess about what the blind spot would see if only it weren't blind, and then your brain fills in the scene with this information. That's right, it invents things, creates things, makes stuff up! It doesn't consult you about this, doesn't seek your approval. It just makes its best guess about the nature of the missing information and proceeds to fill in the scene (90–91).

Gilbert provides an ingenious way for you to catch your brain doing this. Close your left eye and stare, as directed:

If you stare at the magician with your right eye (closing your left eye) and move the book slowly towards your nose, the Earth will disappear into your blind spot.

This astonishing capacity of the brain, to assess the data it gets, note the gaps, and generate material that is most likely to belong there plays out in many ways in our day-to-day processing of the world around us. As we saw in Chapter 2, the model we get from our visual perception is actually more like a series of photographs than like a film, but our brain 'joins the photos together' to present a seamless and unbroken model to our minds. And, as we will see in a later section on illusions, our brains can do this same kind of filling in with auditory and even tactile data. Given the brain's power to actually construct sensory data, we now have to return to the question of how much of what we perceive is real and how much is simply invented.

What is in the mind and what is in the world?

What colour is the sea?

You probably said 'blue', but is it still blue on a cloudy day, or to a person who is colour blind? What about someone who has just had a bright light shining in his eyes, or someone who is wearing strange-coloured glasses? These factors have nothing to do with the sea, but they all make the sea look different. So what is the real colour of the sea?

You may think these questions are foolish – after all, don't we all know what we perceive? To say that the colour of the sea depends on the observer seems strange – surely the colour of the sea is the colour of the sea, irrespective of any observer! The point is that the relationship between what we perceive and what is 'really there' is far from simple.

The psychologist Richard Cytowic has written about a man named Michael who, when he puts different things in his mouth, has the sensation of different shapes. In the following extract, Cytowic is talking to Michael at a dinner

party while he is cooking and has just tasted the sauce that he has made for the chicken. Michael seems displeased:

'O dear, there aren't enough points on the chicken.'

'Aren't enough what?' I asked.

His face turned red. 'You'll think I am crazy,' he stammered. 'I hope nobody else heard,' he said, glancing at the other guests nearby.

'Why not?' I asked.

'Sometimes I just blurt these things out,' he whispered, leaning towards me. 'I know it sounds crazy, but I have this thing, see, where I taste by shape.'

'What do you mean?' I asked.

'Flavours have shapes,' he said, staring at the roasting pan. 'I wanted the shape of this chicken to be pointed, but it came out all round.' He looked up at me, blushing. 'I mean, it's nearly spherical,' he emphasized, trying to keep the volume down so the others couldn't hear him. 'I can't serve this if it doesn't have points.'

Later on, the conversation continues:

'People think I'm on drugs or making it up. That's why I keep it to myself. But it's so perfectly logical that I thought everybody felt shapes when they eat. If there aren't shapes then there's no flavour.'

I tried not to sound surprised. 'Where do you feel these shapes?' I asked.

'All over,' he replied, 'but mostly I feel things rubbed against my face or sitting in my hands.'

I kept my poker face and said nothing.

'When I taste something with an intense flavour,' Michael continued, 'the feeling sweeps down my arm into my fingertips. I feel it – its weight, its texture, whether it's warm or cold, everything. I feel it – like I'm actually grasping something.'

Later on, Cytowic reflects:

... taste, touch, movement and colour meshed together seamlessly in his brain. For Michael, sensation was simultaneous, like a jambalaya instead of neat, separate courses (1–5).

Cytowic's book also describes people who see colours when music is played. They literally see blotches of colour appear in front of their eyes when they hear music. Or do they see music?

It isn't a hoax – several people around the world have reported exactly the same thing – enough that this condition and others like it have collectively been given the term 'synesthesia'. This sounds crazy, and one immediate reaction is to suggest that these people have some wires crossed in their brains, but this may be a premature judgement. How do you know that you are 'right' and that they are 'wrong'? All you know is that you, and everybody you know, have always seen colours when you look at things. That suggests that your brain is wired one way. Michael has his brain wired another way. We know which is more common, but which is more 'correct'?

10 Suppose that you woke up tomorrow and everybody except you saw colours when music was played. Would you say that you are the only person who has got it right?
11 Suppose every single human saw colours when music was played. Would we then see music?
12 Why should light be associated with the experience of colour, and noise with the experience of sound?
13 How does this relate to Kant's ideas of noumenal and phenomenal worlds?

This may seem a rather offbeat point, of interest only to psychologists, but let's develop these ideas further. Imagine taking a bucket of boiling water and placing your hand in it. Clearly, you would experience pain. But where is the pain? It seems obvious that the pain is in your mind, not the water. The energy of the water molecules is passed to your hand by contact – at this stage, there is no pain (as proven by lepers who cannot feel pain in their hands). This energy is converted to impulses in your arm – still no pain – and sent to your brain. Here we enter the realm of speculation, but let us observe one thing – that the brain needs to decode the messages from the hand before it 'realizes' what is happening. After all, the impulses might say 'lovely and warm'. So there is no pain until the brain has decoded the signal. Then there is a great deal of pain!

We can conclude the following, uncontroversial (we hope), points:

- Pain is an experience in our minds. It is the finale to a complicated process, involving sensory inputs (such as heat) being converted to electrical impulses, which are sent to the brain and decoded into messages, which we interpret as pain.
- If pain is in our minds, then there is no pain in the world of things and objects. The water only appears painful to me – it is not, objectively speaking, painful.

Let us now apply this model of sensory perception to the sense of sight. You have a big, bright green apple. When you look at it you see the colour. But let us ask again, where is the colour? On the basis of the hot water example, you can probably see where we are going with this. The energy of the light is passed to your eye – at this stage there is no colour (as proven by those sighted people who have suffered accidents where their optic nerves have been cut). This energy is converted to impulses – still no colour – and sent to your brain. Here, once again, we must speculate, but let us observe one thing: the brain needs to decode the messages from the eye before it 'realizes' what is happening. After all, the impulses might say 'red'. So there is no colour until the brain has decoded the signal. Then there is plenty of colour!

We can conclude the following, rather more controversial, points:

- Colour is an experience in our minds. It is the finale to a complicated process, involving optical inputs being converted to electrical impulses, which are sent to the brain and decoded into messages, which we interpret as colour.
- If colour is in our minds, then there is no colour in the world of things and objects. The apple only appears green to me – it is not, objectively speaking, green.

14 Explain the two examples above using the concepts of noumenal and phenomenal worlds.

Many find these ideas deeply disturbing. Notice that this does not mean that the world is black and white; it means that there are no colours, black and white included, in the world. We immediately find that this is almost incomprehensible, but we must remember that perceiving colour, like pain, is 'just' a conversion of energy from light to electrical energy in the brain. Similarly, our sensation of smell is the result of a chemical reaction in the lining of our nose, and our sensation of sound is the result of the brain processing moving molecules.

A common objection to this is to point out that different types of light do have different colours ('red light' vibrates at a particular frequency, 'blue light' at a different frequency, etc.) and so light must be coloured after all, and there is colour in the world. But this objection is misplaced – we can happily concede that there are different frequencies of light, just as there are different degrees of hot water (tepid, warm, hot, scalding); but still, the colour is no more 'in' the light than the pain is 'in' the water. To see why, let's pursue the analogy with water and pain. Two samples of water have different temperatures when their molecules are, on average, moving at different speeds – that's what temperature means. Hot water contains no pain; but hot water molecules may move quickly enough to cause various sensations – irritation, pain or indeed agony, depending on quite how fast they are moving. It seems intuitively obvious that those are reactions to the water, not features of the water. Now the analogy is as follows:

Water molecules	↔	Photons
Temperature	↔	Frequency
Hotter	↔	Higher frequency
Pain	↔	Colour

15 Follow the analogy, and in your own words make an argument to explain why colour is not 'in' light but a product of the interaction between our biology and light.
16 Extend this analogy to the sense of touch, and create a similar argument to show that our sensations of touch are not a part of the world 'out there' but a part of the world 'in here'.
17 Are you convinced by the analogy? Where is the argument strong, and where is it weak?

Taken to its extreme, this analogy suggests that 'reality' may not be what we supposed. But then, reality, as we noted in Chapter 10, is not a slave to our intuitions.

Notice that our *language* exacerbates the problem. When we say, 'The apple is green,' the subject of the sentence is the noun 'apple', the adjective 'green' modifies the noun, and the 'is' clearly attaches the quality of greenness to the subject 'apple'. It is perhaps to be expected that our language reflects the messages from our senses. Language crystallizes the deception, as it were, and reflects it back to us, reinforcing our belief that the quality 'green' does, in fact, belong to the object. Such is the tyranny of language.

18 Follow the examples of pain and colour closely to explain where sounds are to be found.
19 How do you answer the objection that sound must be in the world outside us as it is carried by air molecules from the source of the sound to our ears? (Hint: look again at the colour example.)
20 How far can we extend this argument? What about smell, taste, and even the sensation of touch? What are the implications for what we know about the world? How much of it is in our minds?

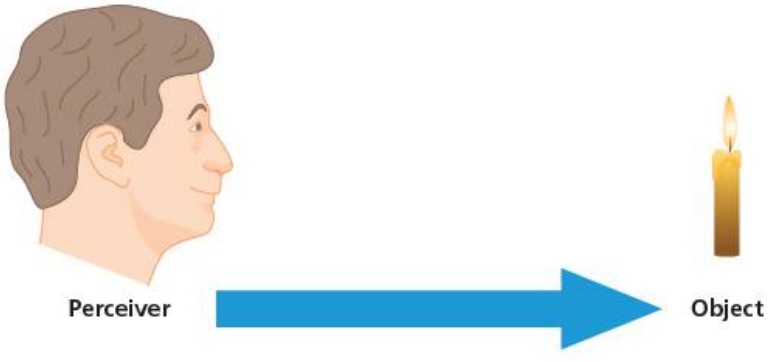
The notion that the world has no colours, sounds, smells, tastes or sensations is a profoundly scary one, one that is very difficult to imagine, and one that might be taken as an indication that everything we know about the real world is in some way wrong. What else is there, if none of those familiar features actually exists? This thorny and disheartening problem is the result of the fact that the physical nature of our sense perceiving mechanisms keeps us from being able to perceive everything exactly as it 'really' is. Of the difference between the eerie, noumenal 'real world' and our phenomenal experience of it, Lincoln Barnett writes:

So paradoxically what the scientist and the philosopher call the world of appearance – the world of light and colour, of blue skies and green leaves, of sighing wind and murmuring water, the world designed by the physiology of the human sense organs – is the world in which we are imprisoned by our essentially limited nature. And what the scientist, and the philosopher call the world of reality – the colourless, soundless, impalpable cosmos which lies like an iceberg beneath the palace of man's perceptions – is a skeleton structure of symbols (114).

Before we get too carried away with the idea that what we perceive has no connection to an actual reality, however, we might pause and consider the fact that there must be *some* relationship between our perceptions and the outside world. After all, we can't just close our eyes and see blue or feel pain. We *can* close our eyes and *imagine* or *remember* blue or pain, but we can't just conjure them up out of nowhere as new experiences. We need the external stimulus if our powers of sense perception are going to be engaged. So the question is: what is the nature of that relationship?

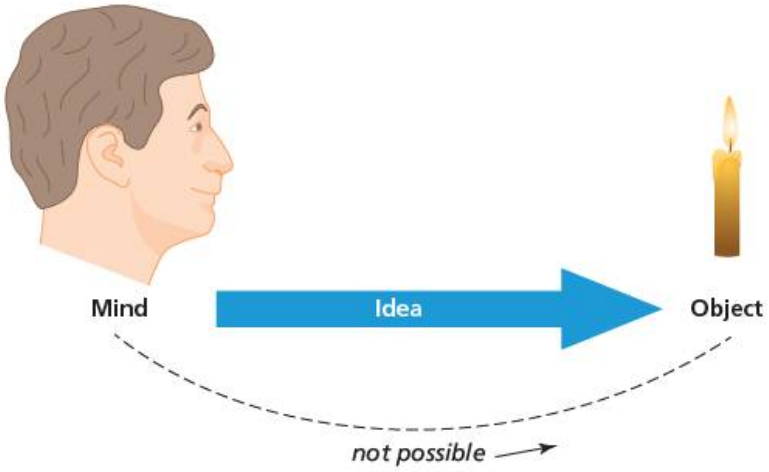
The thoughts of some philosophers

These problems have, throughout the ages, been extensively examined by philosophers in search of a rock-solid foundation for knowledge (and we really do mean extensively). While we can't even summarize all that has been said, it will be helpful to sketch a few important ideas. There are two basic schools of thought that we will consider here: **direct realism** (also sometimes called naïve realism or common-sense realism) and **representative realism** (also sometimes called indirect realism or scientific realism). The former, as illustrated below, is a model of perception that says we have direct access to the world, and that the world is exactly as we perceive it.



■ Direct realism

The second model, the one that depicts perception as we have been discussing it so far in this chapter, suggests that we do not have perfect direct perception of the world as it truly is, but that we perceive the world only in our minds, and that means that the world we perceive is a world of ideas.



■ Representative realism (dualist version)

If we accept the notion that the representational model makes sense, given what we know about how sense perception works, we still have the problem of accuracy. Can we know that this mechanism gives us truth about the real world around us?

One famous approach was taken by the French philosopher and mathematician René Descartes in 1641, when he determined never to make an error by trusting unreliable data, at least for philosophical purposes. He imagined the admittedly unlikely possibility that all his senses were being deceived by an 'evil genius' (in this, Descartes anticipated the 1999 movie *The Matrix* by over 350 years) and wondered how he could ever find out if this logical possibility was true. He reasoned that there would be no sensory evidence that could persuade him as, no matter what evidence he found, he wouldn't be able to trust it because it might have come from the demon. So what could he do? If he had to reject all empirical knowledge, what would be left?

Descartes' suggestion that we use *reason* to find the truth should sound familiar to you – we said much the same thing in an earlier chapter. In studying rationalism we were following Descartes, even if we didn't know it at the time, and we saw that reason is a powerful tool, but that it needs some starting points, or premises, if it is to get anywhere. So what did Descartes use for premises if he could assume absolutely nothing at all about the material world? He suggested, somewhat ingeniously, that he could not possibly doubt that he was doubting – because to do so would be to doubt anyway! And if he doubted, he was thinking. And if he was thinking, he existed. And so he arrived at this very famous conclusion: *cogito ergo sum* – I think therefore I exist.

Having proved to his own satisfaction that he existed (an often neglected first step in many arguments), he went on to demonstrate, again to his own satisfaction, that, based on (what was to him the fact of) the existence of God, there is no problem that we perceive the world through ideas, or representations, in our minds. This is because God is a benevolent being, decent enough to prevent us always being deceived by our senses. ('Logic: Theories of Knowledge').

For many today, however, Descartes' explanation is unsatisfactory. Even if we believe in God, we are probably reluctant to invoke Him to explain the world in this way.

Another argument was offered in 1689, when the English philosopher John Locke proposed that each object has real properties that we can perceive directly, but that it also has some properties which only exist as an outcome of our observation of it. Part of the world, in other words, is in our minds, and part is in the world itself. The main premise for his argument was his belief that all ideas are learnt, that we are born as blank slates – a state described by another famous phrase, *tabula rasa*, and everything we experience is learnt. If our minds are blank to begin with, then what gets into them must come from the outside.

Locke called these two kinds of properties **primary qualities** and **secondary qualities**. In his model, primary qualities really do exist in the bodies themselves (for example, mass, length and hardness), while secondary qualities produce ideas which are only in the mind and not in the bodies themselves (for example, colour and taste). So when we look at our apple, the colour may be in our minds, but that is OK because we can be sure that the 'real' apple (that is, the collection of atoms that makes up the apple) is 'out there'. In this scheme, the 'reality' will be the facts about the primary qualities, and those are demonstrable through mathematical physics (LaFave).

21 Which of the two theories do you find more appealing – Descartes' or Locke's?
22 Can you prove that either you or God exists without appealing to any sensory evidence whatsoever, like Descartes thought? Even if you can, what can you deduce from these facts?
23 What are the problems with Locke's method? Does it explain how some of our senses seem to tell us about things which only exist in our minds (for example, colours, sounds)? What do you think of his distinction between primary and secondary qualities?

The primary and secondary distinction is rather counter-intuitive and soon came under attack, notably from Bishop George Berkeley, who rejected both direct and representative realism. Essentially, Berkeley says, 'OK granted, colours and sounds and tastes are only in the mind. But exactly the same argument can be applied to anything – even your so-called primary qualities. How do you know that they are there at all?' He points out that the way we know the 'primary quality' of length is by noting differences in secondary qualities (for example, the brown colour of the table against the white colour of the wall, or the difference between the feel of the table and the feel of the air) and argues that the notion of a primary/secondary distinction is nonsense – everything is secondary and thus everything is in the mind. '*Although there is no material world for Berkeley, there is a physical world, a world of ordinary objects. This world is mind-dependent, for it is composed of ideas, whose existence consists in being perceived. For ideas, and so for the physical world,* esse est percipi' (Downing). If everything is in the mind, there cannot be anything which is not in someone's mind, and so if people do not perceive something in the mind then it does not exist! This is the reasoning behind that infamous concept: *esse est percipi* – to be is to be perceived – which is a far more subtle argument than is sometimes acknowledged.

That is not to say that we would necessarily want to accept Berkeley's argument! The obvious problem with it is that if things exist only when perceived, then they must blink in and out of existence. Even Berkeley himself would not have

said that our apple vanishes when we stop looking at it, only to appear again miraculously just as we opened our eyes. But he seems to have committed himself to this unless, like Descartes, he is prepared to trust God to watch everything for us! That means that God is perceiving everything, so everything stays in existence! Ronald Knox has expressed the idea entertainingly in a pair of limericks:

There was a young man who said 'God
Must think it exceedingly odd,
If he finds that this tree
Continues to be
When there's no one around in the Quad.'

Dear Sir: Your astonishment's odd.
I am always about in the Quad.
And that's why the tree
Will continue to be
Since observed by, yours faithfully, God ('Limericks').

You might think that Berkeley's scepticism is about as far as you can go, but you would be wrong. The Scottish philosopher David Hume elaborated Berkeley's ideas even further, with devastating critiques of concepts as basic as causality and self, and later philosophers such as John Stuart Mill and Edmund Husserl argued that things only exist as sort of bundles of perceptual data – a model called **phenomenalism**. If you are interested in more detailed discussion of these ideas, you can check out some of the philosophy books listed in the section for further study on page 342.

24 Explain how Berkeley's ideas follow naturally from Locke's. Consider their consequences for what we know.

25 Dr Johnson, a contemporary of Berkeley, thought that Berkeley's **idealism** (that is, the theory that the 'real' world is linked to mental states) was ridiculous, saying 'I refute it thus' and kicking a stone. This might be our first reaction, too – the existence of stones does refute idealism, doesn't it? Or does it? Do you suppose that Berkeley was unaware of the existence of stones? What would he say to the objection?

To follow this tale of intellectual intrigue a little further, we turn to the great German philosopher Kant. As we saw in Chapter 10, Kant, writing well before the scientific discoveries which would verify some of his ideas, suggested that there are some things which we can know without any experience at all (we call these things *a priori*, meaning known 'from before' experience). These are things like the categories of time and space and cause and effect. Kant then suggests that a newborn infant uses these and other categories (colour, substance, mind, etc.) to put all its sensations into some sort of order. But these categories are, to some extent, arbitrary. Kant's model, then, supports the idea that we impose our thinking on the world, rather than the reverse. As for the question that started all this off – 'what can we learn about the real world through our senses?' – Kant said that we can know precisely nothing; we are forever caught in the world of phenomena. You might feel that this is an unsatisfactory answer after 100 years of effort!

26 There is an old riddle that asks, 'does a tree in a forest make a noise when it falls if there is nobody there to hear it?' How does this relate to the senses?
27 Given what we have seen about our senses, what can we say about the objects themselves? How can we find out about the 'real apple' rather than the shiny green and almost spherical object that appears to our senses?

In retrospect, the extreme positions that exclusively use either reason or perception to provide the entire answer as to how we interact with reality seem a little strange. We have two marvellous tools for finding out about the world – our minds and our senses. Yes, they are imperfect, but perhaps that's even more cause to use them both rather than focus on one. What we need is a coherent method for combining both strands of knowing, so that the weaknesses of each tool will be compensated for by the strengths of the other. Maybe we do not yet have full access to the noumenal 'skeleton structure of symbols' – and maybe we never will, but is that such a disappointment?

Lest we despair, we should remember one important thing: our sense perception is functional. The data that we take in through all our senses leaves us with a very strong intuition that there is a real world outside of our heads, and we find, every day, that as we act on that intuition, it works. We do not find ourselves crashing into walls that we cannot see, and the food we eat sustains us. If we love salty caramel ice cream today, we are pretty certain that we will love it again tomorrow (so long as we buy the same brand!). If we smell smoke, we'd best do something about getting out of the building – or at least finding the source! – because if we ignore it, telling ourselves that it just isn't real, we're likely to find ourselves wishing we hadn't when the flames are lapping at the door. The belief in the real world, in other words, is pragmatic. Maybe we can't prove it with mathematical certainty, but we have a whole lifetime of experience that tells us that our senses are, by and large, quite useful aids in navigating our lives.

At the end of his *Beginner's Guide to Reality*, Jim Baggott reminds us that at some point we have to make a choice:

I, for one, believe that we are a long, long way from the end of science. I believe that there is much more to be discovered about the nature of our reality and I believe that the best way to gain new knowledge is to assume that this reality exists independently of our minds and our measurements. Challenge me to defend this assumption and you may find me wanting, for I can do nothing more than declare my faith in the existence of an independently real world (240).

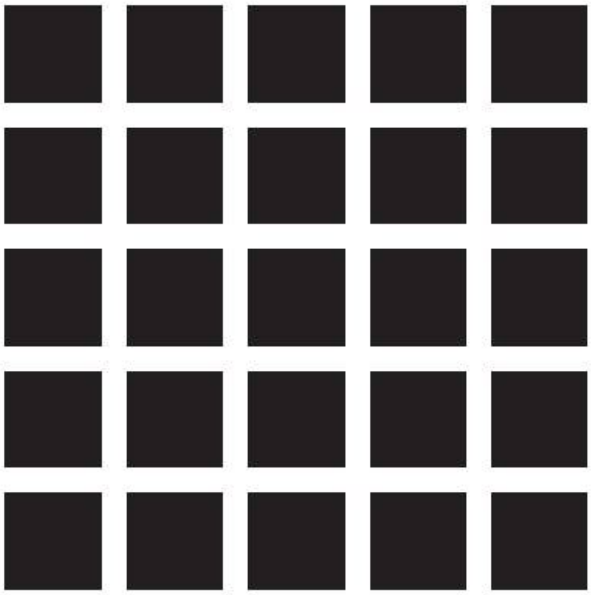
The truth is, of course, that our senses have evolved with us, and they allow us to make sense of the environment. Notice here the phrase 'make sense' rather than 'find sense'. We literally 'make sense' of the world – it does not come pre-packaged in sensible parts. There are many possible senses, and our view of the world is at least partly constrained and limited by the particular ones we have. Using these senses, the mind manufactures experience, with our senses giving us the kind of information we need to survive. What else could we ask of them?

28 Consider the fields of knowledge you are studying. Identify issues or areas where rational or empirical ways of knowing occur. To what extent is it possible to have purely rational or purely empirical knowledge?
29 In light of these philosophers, to what extent do you think reality is only in the mind?

The mental construction of reality

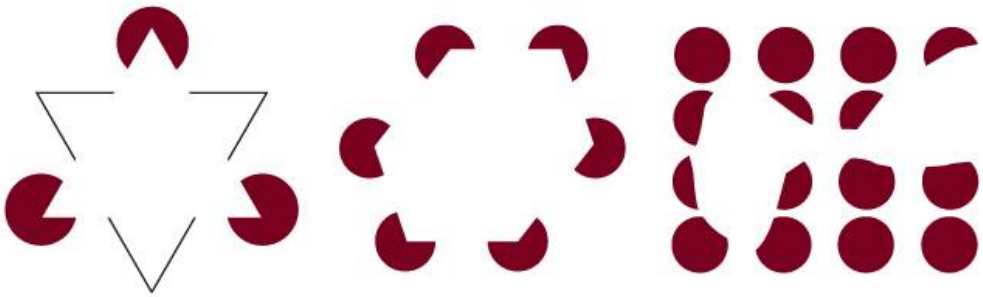
Let us leave the search for ultimate reality, and return to some more everyday questions about how sense perception works. If we have seen that we make sense of the sensory data we receive, then perhaps we should ask precisely how we do that, and attempt to explain the nature of interpretation by investigating the phenomenon of illusion. The aim of this section is to show you that what you perceive is affected by a large number of factors, and the sensory data making contact with your sense receptors is only one of them. We may discover that when we understand what influences our interpretations, we do not have to feel that we are helpless in the face of biology.

The first thing that illusions show us is that our brains will generate experiences that are not real.



In the figure on the left, you will probably find grey dots appearing at whatever intersections you don't watch. It can be an amusing task to chase them around – they always seem to be one step ahead. So where are the grey dots? You don't need to be Berkeley or Hume to realize that they aren't on the paper!

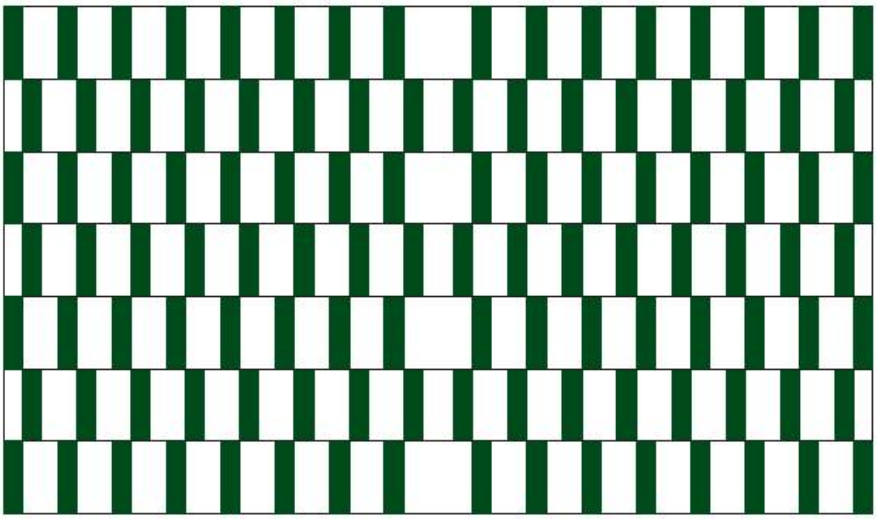
There are many other illusions which lead the brain to invent things which aren't there. Consider these three cases of non-existent shapes:



So what is happening here? In essence, your brain is taking the sense data from your eyes and trying to see what is the best story it can tell your mind.

In the cases shown above, the best story, given the exact alignment of certain edge pieces, is that there is an object. So you do not see what is 'really there'; you see what your perceptual system thinks *should* be there. In this case, they are different things (of course, we might debate what 'really' means when we ask if something is 'really there').

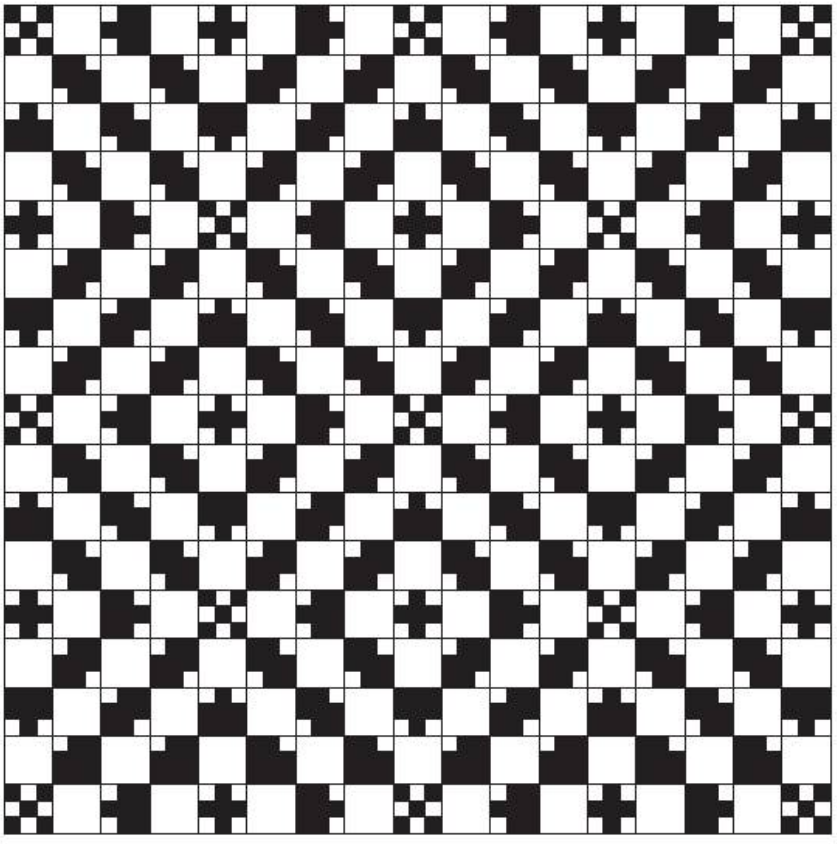
There are plenty of illusions which clearly demonstrate that your brain is very, very ingenious in finding ways to interpret evidence – and that it can come up with many more creative solutions than to flood a problem area with background colour – a strategy we saw on page 327 with the magician and his rabbit. What do you think is happening in the next image?

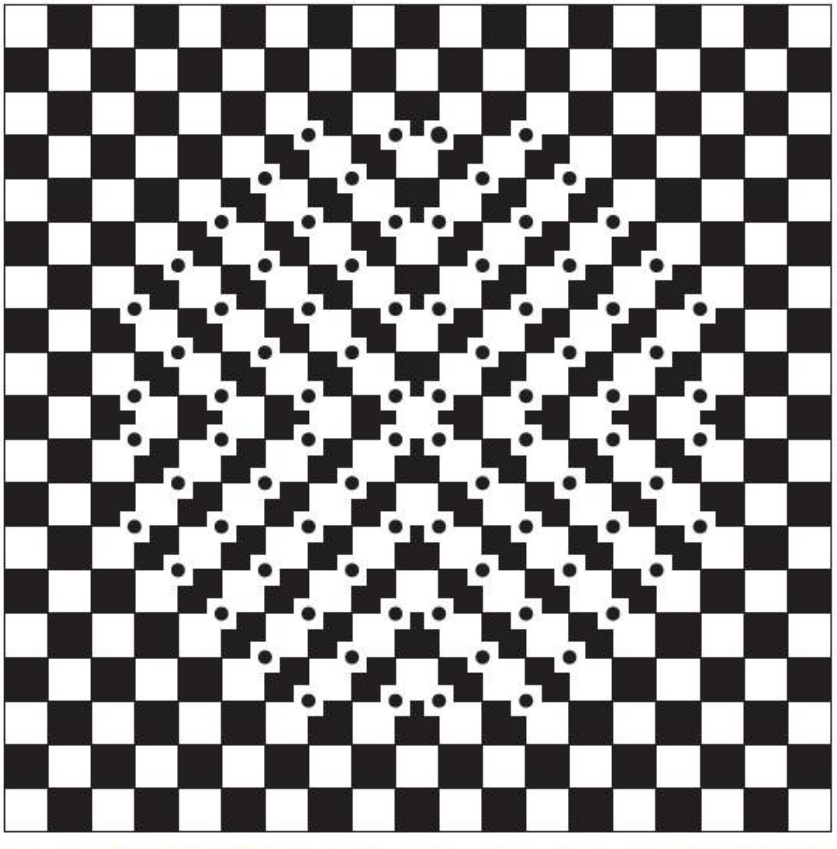


The horizontal lines seem curved, though they are in fact straight, and we might speculate that we can account for this by assuming that the picture is three-dimensional. Your brain has assumed that the vertical lines are continuous (not a bad assumption – where do you get lines as closely and regularly aligned like this in nature, except when they are in fact related to each other?), and they are offset because some are closer to you than others. That is, some rows have been pulled out of the plane of the paper, and the middle of each strip has been stretched a little to arch the strip towards you. Now once the brain has that decided, it knows that the vertical lines at the edge of each strip are further away, and so if they look the same size as those in the middle, they must be bigger (just as an elephant in the distance may actually look the same size as a dog which is close up). And if they are bigger the horizontal strips must be getting narrower in the middle, and if that is the case then the horizontal lines must be curved.

This explanation is speculative; but something like this must happen to explain why the straight lines seem bent. The brain is constantly doing a detective's job; what is surprising is not that we can catch it out every now and then, but that it happens so rarely!

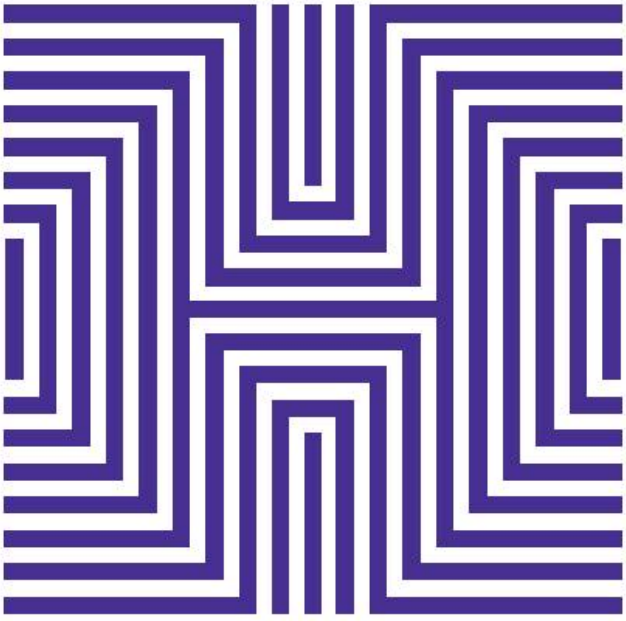
Of course, the brain is not foolproof. If you give it too many options, it may get a little confused. Try staring at the next two images for a minute or two, in the same way as you look at a 'magic-eye' picture.





As you stare, you will notice that things start to get a little strange – you will see the squares and other shapes start to rearrange themselves into a variety of configurations. When this happens, you are observing a process that is normally well hidden: the brain trying to weigh the options, figure out the best interpretation, and tell the most convincing story.

The following example is especially good. As you look at it, you must remember to ask, what is the real pattern?



30 In the example above you should flip between 'diamonds' and 'rectilinear' patterns. Where is the pattern – is it secondary or primary?

31 Imagine you are in a noisy room with lots of people talking, including you. You can't hear the other conversations, but suddenly you hear your name mentioned across the room. This seems very strange … you couldn't hear the conversation, but you heard your name. Explain.

32 In each eye there is a blind spot. The blind spot is a small area near the centre of the visual field where the optic nerve leaves the eye to go to the brain. There are no light receptors in this area (hence the name blind spot), so why don't we see small dark spots there?

33 Professional tea tasters can distinguish between literally thousands of brands of tea. Wine tasters can tell you the grape, year, country, region, vineyard and even which side of the valley a particular bottle of wine has come from. But these professionals have no more taste buds than you or I do. They have no more nerves in the tongue, and those that they do have are not any more sensitive than the norm. How can this be?

34 Like most people, you probably have an excellent sense of balance. This sense comes from the tubes in your ear, where fluid in certain canals causes small hairs to lean one way or another. You have absolutely no experience or awareness of these small hairs, but you are very conscious of the angle of your head. What's going on here, and how does it relate to perception in general?

These illusions are not limited to sight, and they are sometimes of much greater consequence. You may have heard that people who have lost limbs sometimes suffer from the problem of a phantom limb. They feel pain – sometimes very intense pain – in the space where the missing limb ought to be. There is a video about understanding how the brain created this illusion of pain, and how neurologist V.S. Ramachandran worked out an extremely

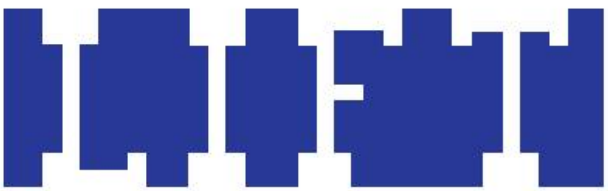
clever way to trick the brain into abandoning the illusion. Watch the video here: http://tinyurl.com/nmn5cv. The relevant segment runs from 9:25 to 17:40.

A more light-hearted version of a tactile illusion, 'The rubber hand illusion', is available here: http://tinyurl.com/32vmxsv.

Our sense of hearing can also be fooled. Check out this link for some examples and an explanation: http://tinyurl.com/2554jdg.

The visual and audio illusions reveal something very similar to what the optical illusions reveal about the way our minds work: the brain is not satisfied with the literal truth, because the literal truth is sometimes not at all useful. We don't need to see a reality with a big blank spot in the middle of the scene, for example. So the brain takes the data available and, drawing on past experience, gives us the reality that makes the most sense under the circumstances. Illusions provide a fun way for us to catch the brain at work doing what it always does, but which, because it is normally so effective, we don't normally notice happening at all.

Back to sight for the final examples! These are very famous examples because it is so difficult to see both aspects of the pictures. Many people can only see what is there when they have been told. Once they can see 'the other' picture, however, they can no longer ignore it – it may even become the dominant image.



Another interesting aspect to the second illusion is that we can use it to demonstrate one more factor that influences interpretation of data: expectation. If we show people a series of photographs of young women before we show them the illusion, they are far more likely to see the young woman, and will find it difficult to see the old woman. If, on the other hand, we show people a series of photographs of old women just before we show them the illusion, they are far more likely to see the old woman. The brain uses context to determine what is relevant information, and we tend to see, therefore, what we expect to see.

So is seeing believing, or is believing seeing?

Sense perception and the areas of knowledge

Now that we know something about the complexity of sense perception, let's consider how it functions in the various areas of knowledge.

- Natural science is possibly the most empirical of all the areas of knowledge, and much of the knowledge that has been made in fields such as chemistry, astronomy and physics has been possible because of the development of technologies that allow us to expand our perception beyond the capacity of the normal human limitations. We began this chapter with Arthur Eddington's lament about not being able to see reality directly, but what he didn't acknowledge is that he does know about the molecular reality of objects; science has been able to expand our perceptual reach through telescopes, microscopes, X-rays, ultrasound, infra red, and a whole host of other technologies.
- The arts, by contrast, rely on sense perception in an entirely different way. While it is true that sometimes the goal of art is to reproduce reality in an image, very often the goal of art is to produce something much more imaginative.
- Some other areas, such as religious systems, ethics or history, do not seem to rely on direct sensory experience to the same degree as other areas of knowledge; in these areas, sense perception is still important, of course, for communication, but we rely on other ways of knowing, such as memory, faith and language (which has, of course, a sensory component!) for making knowledge.

In all the areas of knowledge, sense perception is in some way foundational, because it is only through our senses that we have any data to work with at all, but beyond that basic function, there is a surprising range of functions for our sensory perception as we try to make knowledge in different areas.

35 Order the areas of knowledge from that which depends the most on sense perception to the one that depends the least. Explain your order.
36 Consider the area that you chose as the most dependent on sense perception. What methods of that area of knowledge help to ensure that the knowledge is not undermined by problems of perception?
37 Consider the area that you chose as the least dependent on sense perception. Is it completely immune from the kinds of problems we outlined above?
38 Are there any areas of knowledge for which the interpretative nature of the brain's processing of sensory data is an actual advantage? Why?

Where have we been? Where are we going?

We were initially attracted to the idea of sense perception because it seemed to be an issue which appeared again and again. Indeed, it has proved to be important, but perhaps in unexpected ways. Rather than finding a bedrock of certainty on which to build, we have actually been forced to question things that seemed intuitively absolutely certain, such as the existence of the material world! We seem to be forced to accept that much of what we thought went on in the world seems to be going on in our minds and that what we know is as much about how we interpret the world as it is about the world itself. If our interpretation of our sensory data is shaped by what we believe, what we expect, and what we share with others, then culture and its attendant paradigms, the basis of our interpretation, should be the next topic in our quest for truth.

Further study

- The phenomenon whereby senses get 'mixed up' (technically, 'synesthesia') and its implications are described in detail in Richard Cytowic's *The Man Who Tasted Shapes* (Abacus, 1993). An overview of the philosophical ideas may be found in any introduction to philosophy; we recommend Chapter 3 of Donald Palmer's *Does the Centre Hold?* (Mayfield, 1991) or Chapter 3 of John Hosper's *An Introduction to Philosophical Analysis* (Prentice Hall, 1953).
- For a defence that the world really is there (do you need one?), Chapter 1 of Martin Gardner's *The Whys of a Philosophical Scrivener* (Oxford University Press, 1983) is delightful. A more controversial (maybe extreme, but still important and interesting, if rather difficult) defence of empiricism may be found in A.J. Ayer's *Language, Truth and Logic* (Dover Books, 1946). *Empiricists [Abridged] Locke, Berkeley and Hume* (Anchor Books/Doubleday, 1961) is a good primary source.
- As far as the practical problems go, a powerful book based on a legal perspective is psychologist Elizabeth Loftus's *Eyewitness Testimony* (Harvard University Press, 1979).

- If you are interested in a detailed explanation of how blind people can use echolocation, view this TEDx talk by Daniel Kish, who trains blind people around the world to use it: http://tinyurl.com/p9tumop.
- Finally, Jim Baggott's *Beginner's Guide to Reality* (Pegasus, 2009) provides an entertaining and accessible exploration into the question of whether reality exists or not, and how we might know.

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15 Paradigms and culture

Never solve a problem from its original perspective.

Charles Thompson

The test of a first-rate intelligence is the ability to hold two opposed ideas in the mind at the same time, and still retain the ability to function.

F. Scott Fitzgerald

In seeking truth you have to get both sides of a story.

Walter Cronkite

If everybody is thinking alike, then somebody isn't thinking.

General George S. Patton, Jr

Man's mind, once stretched by a new idea, never regains its original dimensions.

Oliver Wendell Holmes

Man the battle stations! Someone's coming who wants to reason with us.

Ashleigh Brilliant

I am quite sure now that often, very often, in matters concerning religion and politics a man's reasoning powers are not above the monkey's.

Mark Twain

Concepts that have proved to be useful in ordering things easily acquire such authority over us that we forget their human origin and accept them as inevitable.

Albert Einstein

In science it often happens that scientists say, 'You know that's a really good argument; my position is mistaken', and then they would actually change their minds and you never hear that old view from them again. They really do it. It doesn't happen as often as it should, because scientists are human and change is sometimes painful. But it happens every day. I cannot recall the last time something like that happened in politics or religion.

Carl Sagan

Great spirits have always found violent opposition from mediocrities. The latter cannot understand it when a man does not thoughtlessly submit to hereditary prejudices but honestly and courageously uses his intelligence.

Albert Einstein

The conventional view serves to protect us from the painful job of thinking.

John Kenneth Galbraith

We sense that 'normal' isn't coming back, that we are being born into a new normal: a new kind of society, a new relationship to the earth, a new experience of being human.

Charles Eisenstein

Ideas that require people to reorganize their picture of the world provoke hostility.

James Gleick

The Wright brothers' first flight was not reported in a single newspaper because every rookie reporter knew what could and couldn't be done.

Edward R. Murrow

The voyage of discovery is not in seeking new landscapes but in having new eyes.

Marcel Proust

Aims

By the end of this chapter you should:

- understand the meaning of the term 'paradigm' and recognize how paradigms shape our reason and our perception
- understand why paradigms naturally and inevitably affect both rational and empirical approaches to knowledge
- appreciate the strengths and weaknesses of holding a paradigm
- be able to give and discuss examples of paradigms at several levels (the 'grand' paradigms and the 'everyday' paradigms)
- appreciate the role of culture as an important paradigm
- reflect on the nature of your own culture and its conventions.

Introduction

The notion of a **paradigm** is in one sense quite trivial – the fact that we have our own paradigms mean that different people interpret things in different ways. But, in another sense, the notion is profound because we often forget that we are operating within our own paradigms and we think that we have some special channel to 'the truth'. In the sense that we shall use the term here, a paradigm is a mental model by which we organize our reasoning and classify our knowledge. People holding different paradigms may see exactly the same scene, but interpret it completely differently.

1 In each of the following cases, identify the differing paradigms held by each of the two people and think of a third paradigm.
   - Two people look at a vast, beautiful mountain. One sees evidence of a good God; the other sees a geological formation.
   - Two people visit an extremely harsh prison, where facilities are minimal, prisoners do manual labour for eight hours a day in silence, and life is very unpleasant. One says that it seems barbaric; the other that it is an excellent prison.
   - Lights are present in the sky. One person sees UFOs; the other sees a freak weather phenomenon.
   - A Brazilian minister and a tribal Indian survey the felling of Amazonian trees. The minister watches with pride whilst the tribal Indian views the scene with dismay.
   - Two people are in downtown New York during rush hour. One feels an exciting 'buzz' from the city; the other merely feels depressed.

Case study: paradigms of the steamboat pilot

The steamboat was once a common form of transport in America. These huge boats would sail the great rivers, but the sailing was not as safe as it is today. Unmanaged and unmonitored, the rivers were dangerous places. There were no signs or warnings, and a shallow fallen tree or a sharp rock could spell grave danger to an unwary pilot, whose job it was to learn to 'read' the river and navigate the dangers.

In *Life on the Mississippi*, Mark Twain recounts a scene where the novice steamboat pilot and his friend (who had not been trained in the same way) were watching the sunset. The friend found it beautiful, but the pilot was able to see something else.

The face of the water, in time, became a wonderful book – a book that was a dead language to the uneducated passenger, but which told its mind to me without reserve, delivering its most cherished secrets as clearly as if it uttered them with a voice. In truth,

the passenger who could not read this book saw nothing but all manner of pretty pictures in it, painted by the sun and shaded by the clouds, whereas to the trained eye these were not pictures at all, but the grimmest and most dead-earnest of reading matter.

Now when I had mastered the language of this water and had come to know every trifling feature that bordered the great river as familiarly as I knew the letters of the alphabet, I had made a valuable acquisition. But I had lost something too. I had lost that which could never be restored to me while I lived. All the grace, the beauty, the poetry had gone out of the majestic river. I still kept in mind a certain wonderful sunset which I witnessed when steamboating was new to me. A broad expanse of the river was turned to blood; in the middle distance the red hue brightened into gold, through which a solitary log came flowing, black and conspicuous; in one place a long slanting mark lay sparkling on the water; in another the surface was broken by boiling rings, that were as many tinted as an opal; where the ruddy flush was faintest, was a smooth spot that was covered with graceful circles and radiating lines, ever so delicately traced; the shore on our left was densely wooded and the sombre shadow that fell from this forest was broken in one place by a long ruffled trail that shone like silver; and high above the forest wall a clean-stemmed dead tree waved a single leafy bough that glowed like a flame in the unobstructed splendour that was flowing from the sun. There were graceful curves, reflected images, woody heights, soft distances; and over the whole scene, far and near, the dissolving lights drifted steadily, enriching it, every passing moment with some new marvel of colouring.

I stood like one bewitched. I drank it in, in a speechless rapture. But as I have said, there came a day when … if that sunset scene had been repeated, I should have looked upon it without rapture, and should have commented inwardly, after this fashion: The sun means that we are going to have wind tomorrow; that floating log means that the river is rising; that slanting mark on the river reflects a bluff reef which is going to kill somebody's steamboat one of these nights if it keeps on stretching out like that; those tumbling 'boils' show a dissolving bar and a changing channel there; that tall dead tree, with a single living branch is not going to last long, and then how is a body ever going to get through this blind place at night without the friendly old landmark?

No, the romance and the beauty were all gone from the river. Since those days I have pitied doctors from my heart. What does the lovely flush in a beauty's cheek mean but a 'break' that ripples above some deadly disease? Does he ever see her beauty at all, or doesn't he simply comment on her unwholesome condition all to himself? And doesn't he sometimes wonder whether he has gained most or lost most by learning his trade? (77–80)

Twain suggests that he and his friends see different things when they look at the river. This says far more about the watchers than it says about the river, and it shows how paradigms affect our perception. But the impact of paradigms goes much further than perception – paradigms influence our reasoning, too, and are important because they play a central role in two central ways of acquiring knowledge.

2 In what sense are the two friends seeing the same thing? In what sense are they seeing different things?
3 Twain suggests that there are two ways of perceiving the river. How would you characterize the two paradigms? Are there any others?
4 Might someone be able to see the river in both ways? What about the example of doctors – are they unable to see beauty in patients?
5 Which of the two paradigms leads to a more realistic understanding of the river?
6 Has the steamboat pilot 'gained most' or 'lost most' by mastering the language of the river?

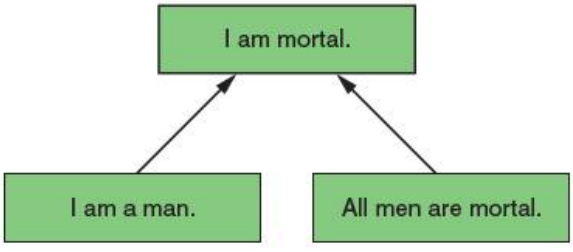
How do paradigms affect how we think?

Recall the section on 'The importance of premises' in Chapter 7 (pages 139–41). You were asked about logical deductions based on a story. To refresh your memory, here is one of the stories again:

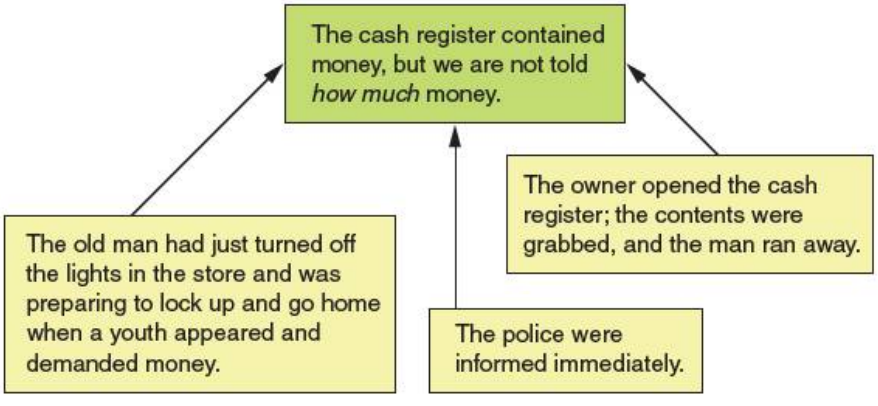
The old man had just turned off the lights in the store and was preparing to lock up and go home when a youth appeared and demanded money. The owner opened the cash register; the contents were grabbed, and the man ran away. The police were informed immediately.

In one of the questions you were asked if it is possible to say if the following statement is true, false, or cannot be decided: 'The cash register contained money, but we are not told how much money.' Most people say that the statement is true. In fact it is undecided, and after a little reflection that is quite obvious. Let us examine why most people make an error in answering this question.

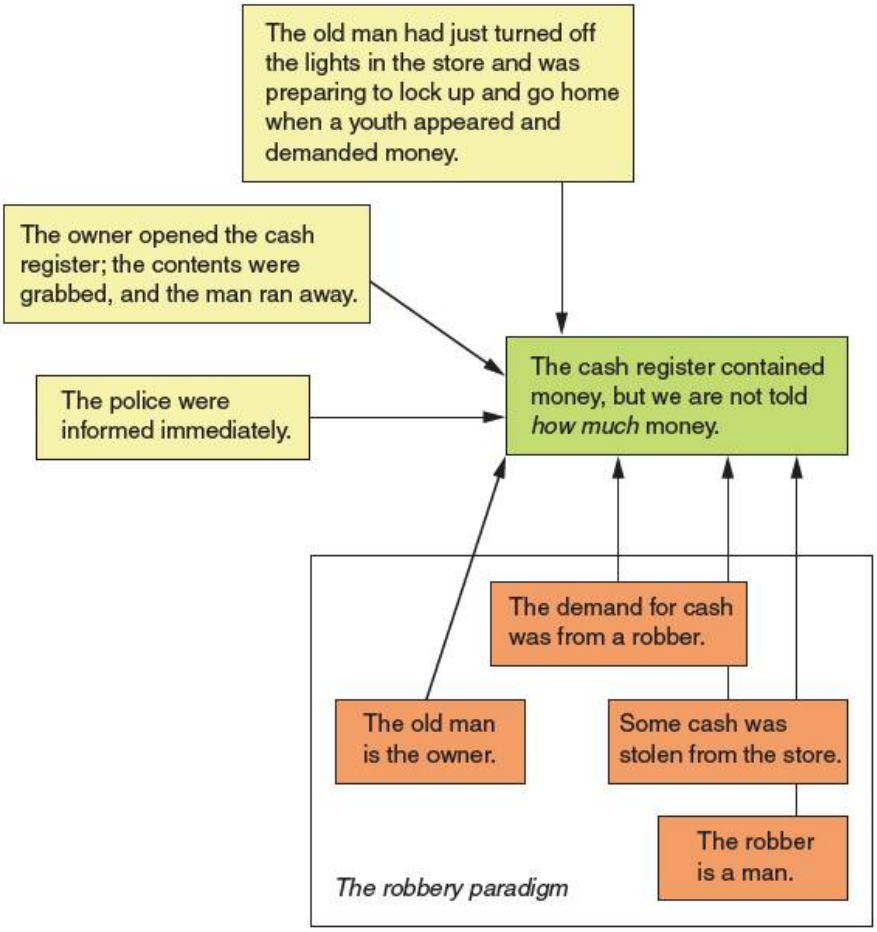
On a simple model of deduction, we start with our premises and we try to build a logically valid tower of truth from them. Socrates' famous syllogism shows us the model, as you have seen.



If our premises are true, the correct application of the rules of logic guarantees the truth of the conclusion. This much we know. So let us apply this model to the above story where so many people come unstuck. Why is it that most people initially say that the statement is correct, but when they are told that they are wrong, are quickly able to see that this is not a logically valid derivation?



We have already seen that we are likely to assume things that, strictly speaking, we have should not have assumed. In particular, we probably assumed that this is a simple robbery involving two people, that the robber was male, and that cash was stolen. If we show these on the diagram, then the deduction is a good deal more plausible.



A crucial aspect of the robbery paradigm is that it remains hidden unless we have reason to bring it out into the open. This means that its central influence on what we know can go unnoticed. The stories in 'The importance of premises' were designed to confront you with your automatic assumptions. We can now see that a network of these assumptions formed a filter through which you interpreted the whole story.

Taken together, these hidden assumptions, and the hundreds of others that are not included, make up what we have called 'the robbery paradigm'. This paradigm consists of all the expectations that we have about robberies. Other possible aspects of the paradigm relating simply to the man who demanded the money (who said it was a robbery?) might be:

- his age (was he over 70 years old?)
- his race (do you hold stereotypical views of race?)
- his clothing (was he wearing a suit or a balaclava?)
- what he was carrying (do you think he had an umbrella, a gun or a heavy pile of books?)

One can almost imagine the unconscious mind telling itself a story and passing it up to the conscious mind:

'The old man ...' *White hair? Glasses? Maybe unsure on his feet?*

'had just turned off the lights in the store ...' *Probably a shopkeeper? Probably end of the day about to close up shop?*

'and was preparing to lock up and go home ...' *Definitely a shopkeeper closing up at the end of the day – it is probably dark outside.*

'when a youth appeared and demanded money ...' *Appeared from where? Didn't just walk in? Why did he 'demand' money and not 'ask' for money? And what is the relationship with the shopkeeper? This seems odd …*

'The owner opened a cash register ...' *Who is the owner? Somebody else? The man who appeared? The old man? Best guess is the old man – so the owner is a man. Why did he open the cash register? Probably to give the man who appeared the money. If it is the end of the day then there is probably money in the register, so this seems likely.*

'The contents were grabbed ...' *Who did that? The owner or the man who appeared? And it probably is money isn't it?*

'and the man ran away ...' *Ah, who ran away? The owner or the man who appeared? And why? Sounds like something bad is happening. Was any money handed over?*

'The police were informed immediately.' *So the police were told; maybe there was a crime involved; so the money must have been stolen. But I know this type of thing – it's a robbery. Now it all makes sense; someone is holding up a store late at night. The robber demands money; the old man/owner opens the cash register, the robber leans over, grabs the cash and runs out.*

This last story is the story that your conscious mind gets. All the other little details that were considered along the way are not available to you – you only get the 'finished' version. We have no direct way of knowing if the unconscious mind really works this way, but we also know that even if this wasn't the precise story you had in mind, you were thinking of some sort of story that went far beyond what you were actually told. The mind fills in the missing details – it assumes certain things and to do this it must rely on certain guiding principles, certain stories about stories (**meta-stories**). These are our paradigms.

7 Look at the other story, on page 140. Identify some of the assumptions you made and see if they fit into an overall paradigm.

8 Look again at the diagram showing the robbery paradigm on page 349. This is only one of the multitude of everyday paradigms which impinge on our interpretation of a given situation. Most of these paradigms are the built-in common-sense assumptions we make when we are not told anything to the contrary. Identify some of these other paradigms.

9 What is the difference between a paradigm and a belief?

10 Why do we have these paradigms built in to our cognitive systems? Wouldn't life be much easier if we could get rid of them altogether and avoid making all these unnecessary assumptions?

11 Several years ago, I was shopping for apples. At that time South Africa was practising apartheid, and for this reason I did not want to buy South African fruit. I asked the shopkeeper where the fruit was from; he said it was from Europe. 'Oh that's fine then,' I said. 'I'll buy these apples.'
'No, I wouldn't buy South African fruit either,' said the lady in the queue behind me.
The natural interpretation was that the lady did not support apartheid either. It was only when I heard the lady muttering 'all those black hands' under her breath that I realized why she had supported me. I had perhaps assumed too much! How is this related to paradigms? Can you think of any similar situations yourself?

How do we choose our paradigms?

If it is reliable knowledge that we seek, and our knowledge is heavily influenced by our paradigms, then we need to be very careful that our paradigms are reliable or we have no hope of making progress. So how do we choose them?

We should perhaps distinguish between how we *do* choose them, and how we *should* choose them. It is clear that we have little or no conscious choice over many of our paradigms, and our backgrounds are quite influential. (This is explored later

on in this chapter when we look at culture.) So we sometimes have little choice as to our hidden paradigms. However, once our attention has been drawn to our own, perhaps deeply held, convictions, we should take stock and review. This review will consist of looking reflectively at the paradigm, weighing up the empirical and rational reasons for belief, and making a judgement about it. In short, a critical analysis of the paradigm is called for, using all the tools that you are reading about in this book.

There are two possible cardinal errors. The first is to think that all paradigms are equally valid. They are not. Requirements such as logical consistency and the ability to stand up to available evidence must be stringently applied. If paradigms fail these tests they should be abandoned and rethought. Even in this age of politically correct speech and tolerance, we should not be duped into respecting ridiculous beliefs just because they are part of someone else's paradigm. Having said that, we should beware the second possible error, which is perhaps even less attractive – that of closed-mindedness and bigotry. Other paradigms may be seriously flawed, but so may ours. We have a duty to try honestly to stand back from our own sentiments and prejudices and to attempt to see our views as others see them.

There is no sure-fire method of choosing the 'right' paradigms any more than there is a sure way of finding a 'true' scientific theory or writing a 'beautiful' piece of music. The best we can do is to be aware of where our own beliefs lie, and to test them continually against experience and reason.

12 Identify a commonly held paradigm that you believe is completely wrong, and justify an alternative paradigm.

Everyday paradigms case study: only one can go free

Consider this story: Many years ago, a prince visited the jail in the French city of Toulon. It was well known that the jail was a terrible place, with awful conditions for the prisoners, so when the warden offered to free one of them in honour of the prince, all the inmates were extremely hopeful that they would be chosen. The prince said to the warden, 'Let the prisoners elect the three most deserving of them; I will then select from the three.'

And so the prince came to hear the stories of the three prisoners. The first man said:

'I was in love with the daughter of a rich man, and she loved me, too. But my family was poor, and the father thought I was not good enough for her. So one day when his daughter was not there he gave me a diamond ring, and told me that he would give me a thousand gold coins if he never saw me again. His daughter appeared before I could reply, and I did not tell her. But I also did not accept the offer.

'The next day the police came to my home, searched it and found the ring and I was taken to jail. At the trial, the father said that I had stolen the ring – and as he was rich the judge took his word over mine.

'My beloved still waits for me; she suspects the truth. Please release me from this unjust imprisonment.'

The warden mentioned that the father had later been arrested and was in jail on charges of corruption. The daughter visited regularly and often told the warden that her father had wrongly had her lover jailed.

The second prisoner had this to say:

'I am here for theft. Alas I have no excuse – I stole from my kind and generous employer when he left me in charge of the house. I could be freed if I could repay him, but I do not have the money to do so. I deserve this sentence – the punishment is just. I do not ask for your leniency.

'My trial was fair and my sentence was just. I have begged my employer for forgiveness, but I cannot repay the money I took from him. At least I can repay my debt to society. Thank you for considering to release me, but I am sure there are others who deserve freedom more than I do.'

The warden told the prince that the employer had actually asked the judge to let him go, but that the judge felt that he needed to make an example of a thief.

The last man had this to say:

'I am a farmer from Tanzania. My farm is by the coast, and I have much work to feed my family of six children and five grandchildren. One day I was walking home when a group of white men came upon me, attacked me and carried me off to their ship.

'They made me work for eight months on the voyage to France, cleaning the decks. When we arrived I had a chance to escape, so I ran, but I was weak and one of the sailors caught me. We fought, and I was crazy for freedom, and my life. I pushed him into a rough sea and he drowned.

'In court I was found guilty of murder. My sentence is to be here until I die.'

The warden said that some of the man's children had visited, and that he was a kind and gentle man who was much liked in the prison.

Before we decide who to release, we should consider some important factors which might influence our conclusion.

Answer the following questions, which are designed to make you aware of your own paradigms in this case.

1 A prison is a place where:
   - society takes revenge against criminals
   - criminals are punished so that they do not re-offend
   - society protects itself by locking criminals away
   - criminals are re-educated so that they do not re-offend
   - life is made so unpleasant that potential criminals are deterred from crime.
2 On the basis of your answer to the previous question, would you have released:
   - the most deserving prisoner
   - the prisoner whose release would serve justice best
   - a prisoner who is ready to return to society?
3 How could the prince decide which of the prisoners was telling the truth?
   - Is this really important?
   - Do you think most prisoners claim they are innocent?
   - Could the prince rely on the information from the warden?
4 Consider the effect of releasing each of the three prisoners on:
   - the rich merchant whose ring the court had judged stolen
   - the daughter who was waiting for her lover to be released
   - the family of the man who waits for his release from a foreign prison
   - the community and the judge who convicted the confessed thief.
5 So who would be the correct person to release? For what reasons?
6 How does this case study relate to paradigms?

The grand paradigms

Paradigms affect the ways we filter and interpret evidence. They are common enough, and you are now familiar with the everyday variety. But we want to suggest that there are broader, 'bigger' paradigms of which we may not be aware. We all have a set of beliefs about ourselves, ranging from the trivial (*my name is Nick*) to the profound (*I'm deeply misunderstood*). Many of these beliefs refer to our place in the universe and how we fit into the bigger picture – beliefs such as 'I am unique' ,'I am more intelligent than a cockroach', 'Humans are the most advanced creatures alive', 'God loves me', 'There is no God', 'We are controlled by fate', and so on. When taken together, these various assumptions, many of which we probably couldn't identify if asked to, make up a belief set, a model of what it is to be a human in the world. This model affects the way we think about ourselves, and when something threatens it, we feel disorientated and disturbed. You are probably aware that sometimes novel ideas are rejected simply because they are new and new things upset people.

Because we are all unique, we all have different models and different beliefs. But there is a paradigm that is common to many – the paradigm that 'modern man' holds. Modern man, of course, doesn't exist: he is an abstract concept like 'the average taxpayer' or 'the typical student' (we obviously intend the term 'man' to include women as well). But in many senses, we all share beliefs, and here we explore the model that characterizes the way man currently thinks of himself.

It will surprise no one to learn that this hidden paradigm – this model of what we are, and where we fit into the universe – has changed radically over time. Sometimes these changes have been gradual and practically undetectable. The basic Western model of man's place in the universe that was constructed by the Ancient Greeks around, say, 500 BCE, changed very little as it was adopted by the Romans, suffered a few setbacks in the Dark Ages after the fall of the western Roman Empire, but was resurrected in the Middle Ages, and was not seriously challenged until 1543. In other words, this paradigm was not overthrown for well over 2000 years. In all this time, man's perception of himself changed very little.

What was this paradigm? It may be broken down roughly like this:

Classical paradigm

- Humans are at the centre of the universe.
- Humans were placed there by God(s).
- Human purpose is the worship of God(s).
- Religion is the path to truth.

It supports a view of humankind roughly like this:

Source: 'The Examined Life'

On this 'celestial pyramid', humans are slightly lower down on the ladder than God(s). Certainly they are above lowly animals. This had important implications for the way that holders of this paradigm related to the world. For now, we merely note that man was a privileged creature.

Certain modifications have occurred over time. The vision of many gods – the view of the classical Olympians – was replaced by one God; the pagan augurs and soothsayers were replaced by the Church. This may or may not have been a move from falsehood to truth, but this is not the issue currently at stake. The shadowy Greek Hades was replaced by the Christian Heaven and Hell, and Plato's theory that man exists to contemplate God was replaced by the idea that man exists to worship Him. But these are only minor changes so far as our inquiry is concerned. The basic conception of man as superior to everything except God, and of man as central to God's design, remained unaffected. Until 1543 that is.

A paradigm is a model of how our view of the world should be. When new discoveries come along we try to fit them into this model. Some new ideas can be fitted in easily: exchanging a belief in several gods for a belief in one God makes little difference to the paradigm as a whole. But some discoveries simply cannot fit into the model, and when that occurs, and the new discovery is certain and important enough, then the model itself has to change. We call such a change a **paradigm shift**: when a new piece of knowledge is so fundamentally different to previous ideas that we have to throw all our ideas out and build a new paradigm around this discovery. Such a thing happened in 1543, when a Polish astronomer named Nicolaus Copernicus published a work called *De Revolutionibus Caelestrium Orbium*, or *On the Revolution of the Heavenly Orbs*. What Copernicus questioned in this work was the first belief in the paradigm set: the belief that the Earth was at the centre of the universe. Up to this time, with one or two notable exceptions, the generally accepted model of the universe had been the so-called Ptolemaic one: the Earth was at the centre, and all other heavenly bodies orbited at different distances, as if part of a series of concentric spheres. Copernicus rightly contested this view, and argued that the Sun was, in fact, central to the system, and that the Earth revolved around the Sun. The work of Copernicus met violent opposition from the Catholic Church, and both he and his successors, Kepler and Galileo, were persecuted for this discovery. The fact that the Catholic Church was so offended by this discovery had nothing to do with its scientific truth. It was simply the fact that if this was true, then the whole view of man's place in the universe – the whole paradigm – would have to be rewritten.

Why? Well, up to this point, man had believed that he was at the centre of everything. From this simple belief flowed a host of other beliefs – that he was superior to all other living things, that he was especially loved of God and made in His image, that the universe was created for him alone, and designed to ensure his well-being. Suddenly Copernicus revealed that the Earth did not rule the universe; rather, it was only one of many planets subject to the Sun, no more important perhaps than the other planets visible to the naked eye. Suddenly the universe seemed much bigger, and man seemed much less significant. Of course, in itself this constitutes a simple scientific paradigm shift: the old geocentric or Ptolemaic paradigm was replaced by the heliocentric model. But the effect of this scientific paradigm shift on man's larger conception of himself was enormous: suddenly priorities changed, and man felt a need to reassert himself, to find other reasons for claiming his universal superiority.

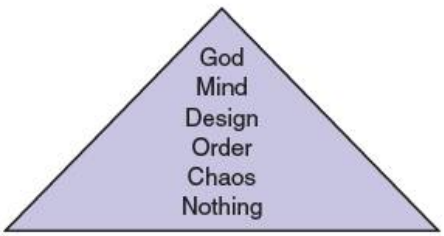
You will notice that in the classical paradigm, the basic belief set is religious: man's divinely chosen centrality to everything secured him an existence in which he had no doubts and no need to question. After Copernicus, the

emphasis changed. In the following centuries man was certain of his superiority not through his faith, but through his scientific inquiry. We can call this 'the modern paradigm', and a central feature of modernity is a stance whereby scientific understanding displaces the need for theological dispute (note, by the way, that here 'modern' is a name of an approach, not simply an adjective meaning 'up to date').

Modern paradigm

- Man is rationally superior to all things.
- Reason is a gift of God.
- Man's purpose is to investigate the universe.
- Science is the source of truth.

This faith in reason and the dedication to investigating the universe is characteristic of the whole period from 1543 onwards – even to the present day. After Copernicus upended the earlier belief that our physical centrality in the universe signalled and symbolized our centrality to the meaning of the universe, man needed a new reason to assert his evident superiority. No longer geographically central to the scheme of things, he seized upon the one faculty that seemed to mark him out from the rest of the living world: his ability to reason. Now man became obsessed with understanding the world around him and, through understanding, controlling it. The new celestial pyramid showing how modern man typically saw his place in the universe is thus:



Source: Ankersmit 79–80

Above all was God, but second only to God was mind, or reason. And mind in this sense is unique to humans. How convenient! With our minds we can explore, understand, control; we can bring order to chaos, and design to order; we can take an ordinary lump of flint and turn it into a tool with a purpose; we can build houses out of brick, we can make weapons out of metal ore; we can plough fields and make them produce crops; we can use steam to drive an engine; we can alter the landscape to make it more beautiful even than nature. This sense of purpose – of adapting nature to our own ends – is characteristic of modern thought, and goes hand-in-hand with an idea we take for granted, but which is really only a recent one – that of scientific, social and intellectual *progress*. It's not that there never had been progress or purpose before – far from it – but although these ideas had existed for thousands of years, they had never been so central to the way man defined himself; it had never been paradigmatic.

After Copernicus, man had to earn his exalted status on the second rung of the ladder after God – the pattern of the universe no longer guaranteed it. Now it was possible to doubt the sacred beliefs of the older paradigm;

and indeed atheism, the denial even of God's existence, finds its first real apologists in this period. Rather than innocently celebrating man's greatness, people began to doubt that they were as central as they had previously thought.

Copernicus' proof of the heliocentric system was a shattering blow to human confidence in human superiority but, perhaps unfortunately for man, the story did not end there. A succession of great discoveries torpedoed any remnants of the classical paradigm. Darwin's theory of evolution offered an alternative to Creation, and the reverberations of that theory are still echoing through the intellectual landscape. Even before we amassed the vast body of evidence that shows that Darwin was right, his alternative to Creation by God was a psychological blow for many. Sigmund Freud then showed that we are not fully in control of our behaviour: below our conscious thoughts lie subconscious thoughts that drive us to do inexplicable things. We are not aware of these urges, but they may nevertheless determine how we feel and act. Man can no longer see himself simply as a rational, self-controlled being. He is, in part at least, subject to uncontrollable mental forces of which he is not aware. Albert Einstein went on to teach us that our concept of space–time is not fixed or objective, but is subject to the observer's state of motion relative to the objects being observed; in the field of quantum physics, we now know that an event may be uncaused; Werner Heisenberg has taught us that a particle's position and velocity can never be simultaneously known – the so-called Uncertainty Principle; and so on. The modern search for scientific knowledge has thus led science to uncover its own problems, and (some would say) to ironically establish possible limits to modernity. Fashionable new theories like Chaos Theory, Superstrings or the Gaia hypothesis create increasingly bizarre (according to a common-sense paradigm) models of the universe every day. We live in a unique time: in the last few decades we have watched scientists genetically alter living matter; we have seen men walking on the moon, and babies conceived outside the womb. Could it be possible, in these turbulent times, that there is still a paradigm to which we all more or less subscribe? Is there anything left to believe in?

Perhaps after the findings of Copernicus, Darwin, Freud, Einstein, Heisenberg (and others), we have to leave behind the simple unified view that we were created to discover eternal truths, that reason will get us everywhere, and perhaps a postmodern paradigm should look something like this:

Postmodern paradigm

- Humans are random evolutionary accidents.
- Humankind is one of a billion biological species.
- There is no God.
- There is no purpose to life.
- There is no path to truth.

This paradigm leaves no room for a celestial pyramid because the universe just is. There is no hierarchy, and there is no favoured place for man. Possibly for this reason, many will find this a pretty depressing belief set, and maybe only a few would happily admit that this model underlies their conception of themselves. But such a view seems to be accepted by many in the scientific community. This extract is from the physicist Stephen Hawking in his best-selling book, *A Brief History of Time*:

We have developed from the geocentric cosmologies of Ptolemy and his forebears, through the heliocentric cosmology of Copernicus and Galileo, to the modern picture in which the Earth is a medium-sized planet orbiting around an average star in the outer suburbs of an ordinary spiral galaxy, which is itself only one of about a million million galaxies in the observable universe. Yet [some] … would claim that this whole vast construction exists simply for our sake. This is very hard to believe (126).

At this point, we need to exercise caution. We are dealing with massive generalizations, and in our search to discover how we as a race see ourselves, we may need to forget how we as individuals see ourselves. Clearly the two views are different. From the cosmic point of view, we are all insignificant blips in organic and geological history. From my point of view, I can think of nothing more significant than me. This ability to simultaneously see the world from the objective and subjective points of view characterizes the human way of thinking and creates some interesting dilemmas. This is the basic problem with much of our philosophy, but if we are careful, we should be able to talk about a paradigm that characterizes us not as individuals, but as a race at a particular point in time. While billions of people will subscribe to one of the earlier paradigms, the postmodern paradigm is increasingly influential, though inevitably controversial.

13 Which paradigm do you believe is 'correct'? Identify the central belief of that paradigm, without which it would fall apart. Reflect honestly on your own beliefs. How have you come to make a judgement about the validity of those beliefs?

14 The three suggested paradigms (classical, modern and postmodern) are themselves open to doubt, elaboration, adjustment and alteration. They have no necessary link with 'truth'. Are there any other 'grand paradigms' which explain our role in the universe?

15 These grand paradigms will determine the approach taken to several important questions. Consider the following from the point of view of each of the above paradigms:
- Why are we here?
- How did we get here?
- What is the purpose of life?
- Is there extra-terrestrial life?
- What happens after death?
- What is our relationship with nature?
- Why does evil exist?
- What is right and what is wrong?
- Where do our beliefs of right and wrong come from?

16 What other questions call forth different answers depending on your grand paradigm?

17 We have no totally compelling reason to believe that the postmodern paradigm, as it has been called here, will be the final paradigm. What do you think the next grand paradigm will be?

Grand paradigms case study

The harmony of the spheres

by Paul Davies, *Time*, February 5 1996

The discovery of life beyond Earth would transform not only our science but also our religions, our belief systems and our entire world view. For in a sense, the search for extra-terrestrial life is really a search for ourselves – who we are and what our place is in the grand sweep of the cosmos.

Contrary to popular belief, speculation that we are not alone in the universe is as old as philosophy itself. The essential steps in the reasoning were based on the atomic theory of the ancient Greek philosopher Democritus. First, the laws are universal. Second, there is nothing special or privileged about Earth. Finally, if something is possible, nature tends to make it happen.

Philosophy is one thing; filling in all the physical details is quite another. Although increasingly many astronomers suspect that bio-friendly planets may be abundant in the universe, the chemical steps leading to life remain largely mysterious.

Traditionally, biologists believed that life is a freak – the result of a zillion-to-one accidental concatenation of molecules. It follows that the likelihood of it happening again elsewhere in the cosmos is infinitesimal. The viewpoint derives from the second law of thermodynamics, which predicts that the universe is dying – slowly and inexorably degenerating toward a state of total chaos. Life bucks this trend only because it is a statistical fluke.

Similar reasoning applies to evolution. According to the orthodox view, Darwinian selection is utterly blind. Any impression that the transition from microbes to man represents progress is pure chauvinism on our part. The path of evolution is merely a random walk through the realm of possibilities.

If this is right, there can be no directionality, no innate drive forward; in particular, no push toward consciousness and intelligence. Should Earth be struck by an asteroid, destroying all higher life-forms, intelligent beings, still less humanoids, would almost certainly not arise next time around.

There is, however, a contrary view – one that is gaining strength and that directly challenges orthodox biology. It is that complexity can emerge spontaneously through a process of self-organization. If matter and energy have an in-built tendency to amplify and channel organized complexity, the odds against the formation of life and the subsequent evolution of intelligence could be drastically shortened.

The relevance of self-organization to biology remains hotly debated. It suggests, however, that although the universe as a whole may be dying, an opposite, progressive trend may also exist as a fundamental property of nature. The emergence of extra-terrestrial life, particularly intelligent life, is a key test for these rival paradigms.

These issues cut right across traditional religious dogma. Many people cling to the belief that the origin of life required a unique divine act. But if life on Earth is not unique, the case for a miraculous origin would be undermined. The discovery of even a humble bacterium on Mars, if it could be shown to have arisen independently from Earth life, would support the view that life emerges naturally.

Historically, the Roman Catholic Church regarded any discussion of alien life as heresy. Speculating about other inhabited worlds was one reason philosopher Giordano Bruno was burned at the stake in 1600. Belief that mankind has a special relationship with God is central to the monotheistic religions. The existence of alien beings, especially if they were more advanced than humans intellectually and spiritually, would disrupt this cosy view.

Christianity faces a peculiar problem in relation to the Incarnation. Was this event unique in the universe, as doctrine insists, or did God take on alien flesh too? Is Christ the saviour of humans alone, or of all intelligent beings in our galaxy and beyond?

Weighed against these threatening factors is the uplifting picture of the universe that the ubiquity of life and consciousness implies. A cosmos that starts out in a sterile Big Bang and gradually progresses through complex chemistry to life, intelligence and culture – and sentient beings who can look back and reflect on the meaning of it all – is profoundly inspiring. The fact that this advance can take place entirely naturally, without divine intervention, adds to the wonder.

Bertrand Russell argued that a universe under a death sentence from the second law of thermodynamics rendered human life ultimately futile. All our achievements, all our struggles, 'all the noonday brightness of human genius' as he put it, would, in the final analysis, count for nothing if the very cosmos itself is doomed.

Russell's despairing tone is frequently echoed by contemporary thinkers. Thus the French Nobel Prize-winning biologist Jacques Monod writes, 'Man at last knows that he is alone in the unfeeling immensity of the universe, out of which he has emerged only by chance.'

But what if, in spite of the second law of thermodynamics, there can be systematic progress alongside decay? For those who hope for a deeper meaning or purpose beneath physical existence, the presence of extra-terrestrial life-forms would provide a spectacular boost, implying that we live in a universe that is in some sense getting better and better rather than worse and worse.

18 Imagine we discover intelligent alien life. What questions would we want to ask if we could communicate with the aliens? What answers would most disturb you? Why?

19 Are there any questions that you would not want to ask for fear of the answers? If so, what does this tell you about your paradigms?

Culture

It will be no news to you that we do not exist in a social vacuum. Instead we inhabit a complex world where the attitudes and beliefs of our parents, siblings and friends have a massive impact on every aspect of our lives. Consider meeting a stranger – what we say as a greeting, when we say it, how loud we say it, what tone we say it in, who else is present when we say it, whether we bow or offer a handshake or a kiss – all these are factors that we automatically take into account when we meet someone. How we greet is influenced as much by these factors as by our wish to make a greeting. And this is true not just for greeting, but for many aspects of our lives – how we eat, how we dress, our relationships, how we speak to others, how we expect to be treated, and so on.

Culture mediates almost every aspect of our daily lives and experiences. It dictates to us with regard to language, customs, ethics, values, legal systems, eating habits and traditions. Most importantly, for our purposes, these norms can influence what we believe and what we know. Since different cultures hold certain values which may not be shared by other cultures, practices differ around the world. This is an excellent example of the central importance of paradigms to everyday life.

Of course, our parents, siblings and friends are not immune to the influence of culture either, and their attitudes and values will also be shaped by their contexts. For older children and adults, this will include the media, religious beliefs, academic trends and political movements. We call the whole social, personal, intellectual, spiritual and commercial environment a **culture**. A culture is a paradigm in that it forms a filter for us to interpret the world, and it should be clear that cultures based on national/racial lines are just one type of culture. We can easily distinguish between, say, Italian and British cultures by spoken language, body language, personal space habits, physical intimacy and cuisine (to pick a few of the more obvious traits). But we can also speak of the culture of a corporation or of a school, or even of a family. The point is simply that the culture has certain norms which the members tend to obey, and these norms may appear very strange to outsiders.

20 Consider the following 20 statements. With which of them do you agree?

- People usually shake hands when introduced to each other.
- Blowing your nose in public is OK.
- A woman should not look a man in the eyes when he is talking directly to her.
- Asking someone how much they earn is OK.
- Asking someone about their religious beliefs is OK.
- Promiscuity is OK.
- When invited to a party, bringing a friend is OK.
- When eating dinner at a friend's house, asking for a second helping is OK.
- A woman's primary role in life is to serve her husband and raise his children.
- It is common for students to call teachers by their first names in secondary schools.
- Couples in love should get married.
- It is common to introduce yourself to new neighbours and to buy them a small gift.
- Teachers should strike students who are disobedient or disrespectful.
- Students should always stand up when answering a teacher's question.
- You should always bring a gift when you go to a friend's house for dinner.
- Parents decide whom their children will marry.
- Teenagers go out on dates a lot.
- A man usually gives a woman a gift when they go out on a date.
- Young people usually live with their parents after they get married.
- A couple will live together before they get married.

21 Which statements, if any, would you say should be true for all cultures?

Once different cultural viewpoints have been identified, there immediately arises a problem – which viewpoint is better? We have seen this problem before, but the point is worth stressing because it is so central to identifying standards of judgement. We should neither blindly accept nor blindly reject any cultural perspective which differs from ours. Rather we should try to subject the differing view, and our own view on the subject, to an evaluation that is as objective as is possible.

At some levels, this is clear – for example, why do we not accept the values of a racist culture? Well, partly because it 'feels' wrong to us (probably because of our cultural background), but also because when we subject racist values to scrutiny, we find that these values do not have a sound basis in reason or in experience. For this reason, the apartheid regime in South Africa was, by and large, not respected by thinking people, regardless of the fact that the racism was institutionalized as part of the culture. Of course, we need to be careful that we reject other cultural habits for 'good' reasons and not just because they come from other cultures (eating food with one's hands is an interesting example). Otherwise, we are guilty of blind prejudice.

However, it is extremely difficult to judge different perspectives (see the questions below). How can we try to do so? Possibly the best we can do is to be aware of our own cultural paradigms, both the 'grand' and the 'everyday' ones, and to understand how reason and experience can be brought to bear on a problem, while being aware of the pervasive influence of language. This is, of course, part of the nature of this course.

22 Reflect on your own experiences and identify times when you have had different cultural expectations of a situation from somebody else. These situations often arise when a newcomer meets/joins an established group. If possible, find examples where the cultural paradigms are:
- national or racial in nature
- based on gender
- based on family situations
- based on friendship groups.

Can you identify aspects of the cultures that are in conflict? Which aspect is 'right'?

23 All of the 20 examples given on page 360 were or are the norm in some cultures at some point in time. Some of them are now considered totally unacceptable and in some cases morally repugnant by many cultures, but the obvious question which arises is: how do we know that what we now consider acceptable will not be considered barbaric at some point in the future? Or, more generally, how can we be sure that our cultural paradigm is a good one?

24 What do we mean by 'good' in the last line of Question 23?

25 'We should neither blindly accept nor blindly reject any cultural perspective which differs from ours. Rather we should try to subject the differing view, and our own view on the subject, to an evaluation that is as objective as is possible.' This was offered as a recipe for choosing the 'best' cultural perspective. What are the problems with an objective evaluation of any cultural view?

Culture case study: Japanese politeness

The interplay of language, culture, and thought

by Eileen Dombrowski

Inscrutable, evasive, insincere. Saying 'yes' when they really mean 'no', and smiling politely all the while. The image of the Japanese in the west is often of an incomprehensible culture, whose smooth and polished surface cannot be penetrated. It is perhaps through examining the Japanese language, though, that English speakers might gain a glimpse into the culture, as the language and culture are so reciprocally interconnected. The Japanese language shows some of the substance behind the polished surface, as it reveals a culture of politeness, of respectful treatment of others, and of highly tuned social awareness.

In Japanese, one can scarcely speak to another person, and certainly not correctly, without a highly developed sensitivity to relative social position, based on a fusion of factors such as age, gender, or importance in a company. The language provides different levels of politeness, so that the speaker must recognize whether to speak 'up' to a superior, 'level' to an equal – though never 'down' to an inferior! 'We can't say exactly what form for what occasion,' writes Misa Tanaka, 'but we have to use our sensitivity.'

This sense of relative position permeates the forms of the language. 'If I want to say something very polite,' comments Junko Sagara, 'I have three ways. One is to put the verb or sentence in the polite form. The second is to use the verb which is used only for a respected person for the action of the person I am talking to. The third is to put the verb which shows my own action into the modest form.'

To complicate matters, modesty and humility are so much part of speech that one would refer indirectly to one's own group – one's family, for example – using a humble form which pushes them downward, and to the group of the person to whom one is speaking in an honorific form, raising them upward in comparison, in order to be respectful toward the other person.

The words for 'I' and 'you' likewise vary according to the relationship between people, to the point that Japanese students in an English-speaking college describe responding quite differently toward bilingual teachers depending on whether they are speaking with them in English or Japanese. Izumi Sasaki describes her feeling that English gives her different possibilities from Japanese in forming relationships with families where she was a guest:

I would like to give an example from my experience here. When I was in Japan, I went to stay at my friend's house for the weekend. Of course, I was talking to my friend using the informal form of 'you', and I was using polite forms (for which the exact translation in English does not exist, as far as I know) for her parents and her grandparents. Although I had known all those people for quite a long time, I never got to talk to her parents and her grandparents about their private life as I do to her, because those polite forms that I was using would not go together with those questions that I wanted to ask them about their private life. I would never ask those questions in those polite forms unless I was their lawyer or something like that. If I actually did ask them, I might have been considered as being such a nagging teenage girl. Therefore, I never got to know how her parents met each other, or even about their childhood or adolescence at all. No matter how close the friend might have been to me, the relationship with her family was always like this.

But when I stayed at my host's family's place for the first time in Canada, the condition was totally different. First of all the feeling that I had when I was asking them on the phone if I could stay or not, was the one that I had never experienced when I was talking to someone who I had met (or talked to) for the first time. Although we were talking to each other without even knowing the other person's face, we were talking to each other in such a way that people who overheard our conversation might have thought that I was talking to my friend. Actually, I myself couldn't believe that I was talking to my host family rather than my friend. It seems to me that this was because we were both using the same word 'you'.

Male and female speech also varies, with 'I' and 'you' in different forms and particular endings added to other words. The possibility for subtlety and innuendo, though, is not eliminated by such structure. Saeko Hagihara comments, 'If I, as a woman, use "ore", the word for guys, that means I'm wild or I don't feel feminine.'

Japanese politeness, however, is not confined to this sense of relative social position. It also affects the openness or frankness of speech. Makiko Oyama describes the way in which indirectness can soften potential conflict in order to preserve a social harmony:

When talking in English, usually one can get the other's opinion as soon as that person starts talking, whereas in Japanese, one may have to wait for a longer time to hear the other's opinion since the verb which states the final conclusion is at the end. Therefore, in Japanese, since it is difficult when one has to respond negatively, one can start speaking a little bit in an affirmative way by stating one's reasons politely and, through explaining, one can reach the negative conclusion at the end. The Japanese are used to this kind of situation. However,

it could cause a problem when English speakers have to deal with this, since it is thought to be polite to answer straightforwardly for them.

This indirectness – a sidestepping of the confrontational or the too naked assertion – also characterizes the content of what is appropriate to say. Akiko Koyama tells a story in one of her essays of a romance which floundered on language:

Once my Dad told me a funny story about his 'miai'. An arranged marriage starts not with love between the young man and woman but with an introduction, a 'miai', set up by a go-between who thinks they would make a good couple. If they finally find that they hit it off, the go-between sees them through to marriage. Anyway, he had a 'miai' with a lady who had been in the USA for a long time, before he got married to my mom.

This is what he said to me. The lady to whom he was introduced seemed graceful and nice. This is a part of their conversation at the 'miai' which is a very common and typical question at any 'miai':

Dad: *Do you have any pastimes?*

Lady: *Oh, yes! I have lots. Especially I am really good at playing the piano. All my friends love me playing it. I'm sure you'll love it, too.*

He was quite shocked by her words, and he found that there was no way to marry her, because he thought that she lacked modesty, which means for Japanese that she had no common sense. I wonder if non-Japanese can see what is wrong with this part of the conversation. Probably not. But if the lady had been a typical Japanese, what would the conversation be like?

Dad: *Do you have any pastimes?*

Lady: *Yes I play the piano only a little bit. But I am too shy to play it in front of you.*

These words were expected to be said even if she was an amazing pianist. At the same time people would know for sure that she is a good pianist if she says that she plays it 'only a little bit'.

Clearly, Japanese, both in the content of what is spoken and in the linguistic forms of the language, reflects and reinforces a culture in which group harmony is more important than individual self-expression, and in which politeness is a supreme value. Sylla Cousineau emphasizes that the politeness is much more than a veneer or a false mask, and that the linguistic forms are an integral part of the Japanese way of thinking:

I was a grown individual, aged 21, when I learnt Japanese, but even acquiring the language at that point of relative maturity, as an outsider, I found that it mediated my thinking. Perhaps it has not changed the filters through which I see reality, but it has modified them.

In Japan one is never determined by the self as an individual, but always as a member of a group, and the language is shaped by that. In learning Japanese, I had to come to a new understanding of myself, and of hierarchy and group, and the language forced me to internalize this new understanding, partly intellectually, partly organically.

I had previously assumed that sincerity was something that one saw on someone's face. Not anymore. In Japan, the language is such that personal

expression makes one feel quirky. It is rough, confrontational. In Japanese society, feelings are not displayed but intimated; it is not a culture of representation of the self but of representation by consent. In Japan, one generally deals with people completely in their social roles, where everything is codified, and smooth, with the support of the expected: one always knows what to do or to say.

The Japanese are thought of as hypocritical, but they are less hypocritical than people in the west, because no one is fooling anyone else. I find this more honest. The mask is a lie – but it is a socially true lie. In the west we also wear masks, but we pretend that it is our real self. In fact, we have a 'representational neurosis' – enhanced by television, with its emphasis on faces – whereby people are acting their own lives. 'I feel joy. I feel anger. Can't you see it on my face?'

He comments, too, on the way that Japanese manners penetrated his own Canadian conduct. 'When I returned from Japan, I found that at first I was very formal with everyone – and when I talked on the telephone, I found that as I spoke I kept bowing to the phone!'

Language, culture, and thought can scarcely be disentangled. Perhaps it is easier to recognize the union in a language which is not our own, as our own ways are so often invisible to us, simply assumed as the way things are and therefore must be. For English speakers, then, a consideration of Japanese might illuminate these interconnections and help us to raise some questions about our own invisible norms.

Where have we been? Where are we going?

We have learnt that paradigms are an unavoidable part of the human condition, and that they, and culture in particular as the paradigm *par excellence*, play a large part in the way we interpret the world. Awareness of this cannot be anything but a step in the right direction. If we are sensitive to the fact that interpretation tends to be woven into all our beliefs and reasoning, then we will be sensitive to the interpretations of others. Of course, that does not mean that we *never* have the 'best' interpretation – we wouldn't want to say that we can never get it right – but this sensitivity allows or makes us experience the world in a different way.

So far in this book, we have been examining the making of knowledge largely through a contemporary (and largely Western) paradigm of rationality and the idea that everything – even human behaviour! – can be explained in terms of processes of cause and effect. In the next chapter, we will consider knowledge through an older, different paradigm: that of indigenous cultures.

Further study

★ The term 'paradigm' was made common by Thomas Kuhn's *The Copernican Revolution* (Random House, 1959) and the more abstract *The Structure of Scientific Revolutions* (University of Chicago Press, 1970), both of which are very readable and extremely interesting. There are few books which deal directly with the issue (most are written in a particular paradigm), but Paul Davies' *Are We Alone?* (Penguin, 1995) deals with the implications of finding alien life.

- Another great read is Peter Suber's *The Case of the Speluncean Explorers* (Routledge, 1998), which takes a legal/ethical problem (involving cannibalism, murder and so on) and approaches it from several difficult judicial perspectives. That opposing paradigms can come to a similar conclusion, and similar paradigms arrive at opposing conclusions, gives a fascinating insight into the issue.
- Perhaps most helpful would be a list of books dealing with the great paradigm shift we are currently in. With the topic of evolution so controversial, why take anyone's word for it? Read the following and make your own mind up! Richard Dawkins' *The Blind Watchmaker* (repr. W.W. Norton and Co, 1996) and *The Selfish Gene* (repr. Oxford University Press, 1990) were the first popular books to spread evolutionary arguments to the general public in a detailed way. Robert Wright's *The Moral Animal* (Vintage, 1994) applies the theory to see if it can explain our sense of right and wrong, and Stephen Pinker in *How The Mind Works* (Penguin, 1998) argues that most aspects of what we know about the brain support evolutionary theory. Daniel Dennett's *Darwin's Dangerous Idea* (Touchstone, 1996) takes an overview.
- Anti-evolution writers who argue that the scientific evidence is simply not good enough to support the theory include Michael Behe, who in *Darwin's Black Box: The Biochemical Challenge to Evolution* (Touchstone, 1998) suggests that irreducible biochemical complexity in nature cannot be explained by evolution. Phillip E. Johnson's *Objections Sustained: Subversive essays on evolution, law and culture* (Intervarsity Press, 1998) takes a similar line, and this is followed up in detail by Lee M. Spetner in *Not by Chance* (Judaica Press, 1998), who uses many compelling examples to show that many natural forms of life must have been designed. A.N. Field in *The Evolution Hoax Exposed* (Tan Books, 1971) suggests that believing in evolution leads to many social ills, and Michael Denton, in *Evolution: A theory in crisis* (Adler & Adler, 1996), argues that a rational appraisal of the evidence will lead to the jettisoning of Darwinism in due course.

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16 Indigenous knowledge systems

We are all visitors to this time, this place. We are just passing through. Our purpose here is to observe, to learn, to grow, to love … and then we return home.

Aboriginal proverb

By divorcing ourselves from Nature we have also removed ourselves from the wisdom that comes from living as part of What Is.

Robert Wolff

The ideal of a single civilization for everyone implicit in the cult of progress and technique impoverishes and mutilates us. Every view of the world that becomes extinct, every culture that disappears, diminishes a possibility of life.

Octavio Paz

For those who have never learned the language of indigenous peoples, true contact is impossible, for the culture is embedded in the language.

Thom Hartmann

…
the social world in which we live does not exist in some absolute sense, but rather is simply one model of reality, the consequences of one set of intellectual and spiritual choices that our particular cultural lineage made, however successfully, many generations ago.

Wade Davis

English is so hierarchical. In Cree, we don't have animate–inanimate comparisons between things. Animals have souls that are equal to ours. Rocks have souls, trees have souls. Trees are 'who', not 'what'.

Tomson Highway

Aboriginal people are a steady beating heart at the centre of our Australian spiritual identity.

Caroline Jones

If the people forget how to praise God, the trees, moving in the wind, alive and growing, do it. The ocean, rolling in and rolling in, over and over again, does it.

Nina Baumgartner, Chehalis elder

This is another world to the ones most Australians know. It was explained by my father once that it's like a blanket on the ground. We, the uninitiated, only see the blanket. Lift it up and that's what our elders … see – the real thing – a world most of us will never know or understand. Through their paintings, artists … offer us a glimpse of the world of dreams where the past, present and the future link.

Hetti Perkins

We know we cannot live in the past but the past lives in us.

Charles Perkins

We cannot own the land. We are but the custodians of the land.

Oodgeroo of the Tribe Noonuccal (Kath Walker)

We do not inherit the Earth from our ancestors, we borrow it from our children.

Proverb

Around 65 000 years ago, the first people arrived in Australia. … They formed a visionary culture. Their mission, to safeguard the world as it existed from the beginning of time.

Wade Davis

I'm the tree you are me with the land and the sea we are one life not three in the essence of life we are one.

Kevin Gilbert

You know what they call alternative medicine that's been proved to work? Medicine.

Tim Minchin

Aims

By the end of this chapter you should:

- be able to define indigenous knowledge
- be able to identify key features of indigenous knowledge systems
- understand the relationship between indigenous mythologies and cultural practices
- understand how key features of indigenous knowledge play out in three different case studies
- understand which ways of knowing are particularly important to indigenous knowledge systems and why.

Introduction

Paradigms, as we saw in Chapter 15, shape what we know, what we believe and what we value. We operate under paradigms for how to do just about everything – including the way we come to know things and what we believe it is important to know. We saw that one very powerful paradigm is based on the belief that increased shared knowledge and continuously developing technology necessarily constitute progress, and that to continue developing technologically is the inevitable force of history. This often leads people to the unacknowledged assumption that anyone who does not share this paradigm must be 'primitive', underdeveloped and, by nefarious extension, even less valuable that more technologically 'advanced' people. This is an old idea; in the nineteenth century, anthropologists Lewis Henry Morgan and Herbert Spencer '*… envisioned societies as stages in a linear progression of advancement, leading, as they conceived it, from savagery to barbarism to civilization*' (Davis 64).

Certainly we are familiar with the numerous historical efforts by explorers to 'civilize' the 'savage' and 'barbaric' people they encountered during the era of colonization. Even today, it is very easy to assume that people who live using ancient technologies, and who, for example, see the earth as a living force to be worshipped, rather than exploited, are 'simple' people, less advanced than those of us who rely every day on myriad technologies ranging from microwave ovens to automobiles to aeroplanes. Perhaps this is an inevitable offshoot of the modern paradigm we looked at in Chapter 15, which in many ways serves us very well. It is doubtful that very many people would support the idea that we should jettison our iPads, cell phones, internet connections or satellites in order to return to an earlier stage of development (we'll say 'development' rather than 'advancement!'). Advances in medicine and science, hard-won in the last few centuries, have resulted in longer, healthier lives and advances in the arts, literature and elsewhere, and mean we can fill our lives increasingly richly. Few would wish undone the moon landing, or the development of the microscopes and telescopes that have given us access to parts of the universe otherwise out of our reach. These things speak to a deep human desire to explore and to know more.

But despite all these positive developments, perhaps something has been lost in the process.

Thom Hartmann describes the process that led to that paradigm this way:

Those of us with European or African or South American roots have ancestors who lived as indigenous, tribal people for the vast majority of the history of the human race. Yet nobody in Europe today remembers the Old Ways, the sacred places and plants, the

meanings of the stones and markings and holy groves. It was all wiped out in a massive holocaust led first by the Celts, then the Romans, and then the Catholic Church. And that great forgetting was then carried to five other continents by zealous missionaries (Wolff iii).

So, if most of us have been subject to the 'great forgetting', what was it that we forgot and no longer know? There are many indigenous people still alive in the world that have not forgotten, and we will attempt, in this chapter, to consider their paradigm, a paradigm that has existed among a vast number of indigenous peoples for thousands of years, in order to seek to understand its strengths and values. We will engage, in other words, in a bit of the kind of anthropology that Bronislaw Malinowski, of the London School of Economics, described when he said that the goal of the anthropologist is '*to grasp the native's point of view, his relation to life, to realize his vision of his world*' (Davis 69).

Before we proceed, however, we must acknowledge that the language we use in this chapter to name the various indigenous groups – and also to name some of their beliefs and practices – is not necessarily definitive. These words vary widely, especially as they have been translated from native languages that have no written form. The words we use here may not, therefore, be precisely the words that the indigenous people would use themselves. This is an important point for, as Thom Hartmann puts it: '*Those who have never learned the language of indigenous peoples, true contact is impossible, for the culture is embedded in the language*' (Wolff ii). We will acknowledge, then, that our understanding is conscientious, but incomplete.

What is indigenous knowledge?

An obvious question to begin with is what do we mean by **indigenous knowledge**? Why do we separate it out from other knowledge? A good definition is provided by the International Development Research Centre (IDRC) in a guidebook for researchers – anthropologists – working with indigenous cultures. They define indigenous knowledge (IK) as:

... unique, traditional, local knowledge existing within and developed around the specific conditions of women and men indigenous to a particular geographic area. The development of IK systems, covering all aspects of life, including management of the natural environment, has been a matter of survival to the peoples who generated these systems. Such knowledge systems are cumulative, representing generations of experiences, careful observations, and trial-and-error experiments (Grenier 1).

UNESCO, in a database of best practices for working with indigenous cultures, offers another definition (de Guchteneire *et al*):

Characteristics of indigenous knowledge

- IK is generated within communities.
- IK is location and culture specific.
- IK is the basis for decision making and survival strategies.
- IK is not systematically documented.
- IK concerns critical issues of human and animal life: primary production, human and animal life, natural resource management.
- IK is dynamic and based on innovation, adaptation and experimentation.
- IK is oral and rural in nature.

First, note that we take *indigenous people* to mean those people who first inhabited various lands, before colonization and conquest imposed a new culture over the original one. Secondly, note that these definitions stipulate that indigenous knowledge has been handed down through generations through an oral, not written, tradition. Lastly, the definitions highlight the relationship between the people and the land, because the survival of the people has depended upon that relationship.

These are broad definitions which apply to many, many people around the world. Before you read further, answer the following questions to see what you know about who and where these cultures are located.

1 Make a list of the indigenous cultures you can name.
2 Where are these cultures located?
3 How many indigenous people would you guess there are in the world?
4 Are there any indigenous cultures near where you live? Who are they?

Knowledge framework:
Scope and applications

You can see from the list of cultures here that the geographical scope of indigenous knowledge systems is literally worldwide. The scope of the content of indigenous knowledge is all encompassing – as we shall see over the course of this chapter, it ranges from worship to finding food to organizing families to raising children.

The basis for indigenous knowledge is the mythology of each group, which tells them how to live properly, safely and well. That knowledge is applied in every aspect of their lives, including art, religion and ethics.

A recent estimate suggests that there are approximately 370 million indigenous people in 5000 groups spread out among 70 countries ('Indigenous Cultures'). Here is a list of a very few such cultures – primarily to illustrate the geographic diversity (note also that these names are often the version that has been translated into English; the people themselves may call themselves something different).

- Inuit: Greenland, Northern Canada (Nunavut and Northwest Territories), Alaska
- Tlingit: the Alaska and Pacific Northwest
- Coahuiltecan: Texas and northern Mexico
- Nottaway: Virginia and North Carolina
- Kikapú: Coahuila, Mexico
- Yora: Amazon rainforest, southeast Peru
- Awá-Guajá: eastern Amazonian rainforest, Brazil
- Assyrians – Aramaic-speaking people: mostly found in northern Iraq. They are also found in Syria, Turkey, Iran and Armenia.
- Tharu: Nepal, North-East India
- Sami: Northern and central Norway, Sweden, Finland and Kola peninsula in the Northwest of Russia
- Eskimo (Yuit, Inuit) (эскимосы): Chukotka Autonomous Okrug (in the Russian far east)
- Nubians: Egypt, Sudan
- Pygmy peoples: Central and Western Africa
- Maasai: Kenya and Tanzania
- Tigray-Tigrinya people: Eritrea
- Bushmen: Kalahari Desert, Botswana/Namibia
- Mangyan: Mindoro in the Philippines
- Ryukyuans: Ryūkyū Kingdom, now Japan
- Australian Aborigines, including the Koori in New South Wales and Victoria

5 Check out this website, which has tried to catalogue the various indigenous peoples in Africa, Asia, and Latin America: http://tinyurl.com/7jgeb4b. Click on each region, and you will see that there are hundreds of different groups in each. Click on some individual groups to get more information about the estimated population and exactly where they live. What do you find the most surprising about this information?

The Wikipedia page 'List of Indigenous Peoples' lists hundreds more groups in North America, the Arctic, Europe, the Middle East and Oceania. The diversity might perhaps surprise you!

We cannot begin to provide a meaningful look into more than a fraction of these cultures, so later on in the chapter we will take a more detailed look at just three, and then we will hope that your curiosity will be piqued, and you will be inspired to learn more – especially about any indigenous groups in your own local area.

Some shared characteristics

We have just made an important point about the huge number of indigenous cultures in the world and about the wide diversity of these cultures, so we shall tread lightly when we talk about shared characteristics of indigenous knowledge systems. Working, however, from the definition above, we will make some generalizations about the nature of indigenous knowledge systems, as opposed to the more familiar, modern, documented knowledge systems we have been considering in this book. Keep in mind, however, that these general descriptions will not apply directly to any specific indigenous culture, which will have its own particular, nuanced and specialized knowledge system.

Perhaps the most important shared aspect of indigenous culture is the understanding of man's relationship to the Earth. '*Mountains, rivers, and forests are not perceived as being inanimate, as mere props on a stage upon which the human drama unfolds. For these societies, the land is alive, a dynamic force to be embraced and transformed by the human imagination*' (Davis 123–24). Wade Davis, the National Geographic Explorer in Residence, offers the people who live along the Andean Cordillera of South America, those who live in the Sierra Nevada de Santa Marta in Colombia, and the Australian Aboriginals as examples of peoples whose cultures embody this belief, but there are many, many more. The Tlingit of the Pacific Northwest, as we shall see in more detail later, believe that everything has a spirit, an idea shared by Tomson Highway, a Canadian Cree playwright, as we saw in the quotation on the opening pages of this chapter: '*English is so hierarchical. In Cree, we don't have animate–inanimate comparisons between things. Animals have souls that are equal to ours. Rocks have souls, trees have souls. Trees are "who", not "what"*' (Methot).

6 Do you think that animals have souls? Trees and plants? Mountains? What is the basis for your belief?

7 How do you think that we would behave differently if the predominant belief in the world was that animals, trees and mountains had souls? How would this change our lives?

In *Original Wisdom*, Robert Wolff, a Malay born in Sumatra and trained as a psychologist in America, describes a profound experience he had after a series of visits to the Sng'oi settlement in Malaysia that he called Three (because it was the third one he visited – Sng'oi people do not generally name their settlements, because they are temporary). Wolff tells a story of repeatedly going back to try to learn from Ahmeed, a Sng'oi shaman, whose method of teaching consisted of nothing more than taking Wolff on daylong walks through the jungle (Wolff 144–69). They did not talk; they just walked. Wolff eventually grew quite frustrated, as he didn't know what he was supposed to be learning, and he started feeling stress over being away from his home and his job, and he felt the weight

of his responsibilities on him. And then one day the breakthrough occurred when Wolff suddenly found that he could sense where water was cupped in a big leaf. Wolff describes it this way:

My perception opened further. I no longer saw water – what I felt with my whole being was a leaf-with-water-in-it, attached to a plant that grew in soil surrounded by uncounted other plants, all part of the same blanket of living things covering the soil, which was also part of a larger living skin around the earth. And nothing was separate; all was one, the same thing: water – leaf – plant – trees – soil – animals – earth – air – sunlight and the little wisps of wind. The all-ness was everywhere and I was part of it (page 156).

This experience parallels what British physicist F. David Peat describes as the experience of the Blackfoot Indian of North America in relation to the land. (Napi, mentioned in this extract, is the creator of the land, also known as the Old Man.):

An expression of the Blackfoot's relationship to a reality of rocks, trees, animals and energies is expressed within what many Native Americans call 'a map in the head'. This map is a way of knowing where one is in relationship to the land, its history, society and all the living beings of nature. For the Blackfoot this map begins with Napi's body, which is traced out in the landscape in the form of rivers, buttes, hills and valleys. It is also the track left by Napi as he walked across his land. The map in the head is songs sung and the stories told around the fire at night. It is the relationship of the Blackfoot people to their world.

The map in the head is a form of knowledge, but knowledge, for the Blackfoot, is no mere collection of facts but something that one grows towards. Knowledge, like a song, is a living being; a being with which one can come into relationship. Coming to knowing is an active dialogue with nature; with the rocks, plants and animals. As one Blackfoot put it, 'the plants and animals are our microscopes and laboratories'.

The belief that humankind is one integrated piece of the whole web of living things pervades indigenous culture and, as we see from the Blackfoot, shapes their understanding of what knowledge is and how it is expressed. It also shapes the values, traditions and art of indigenous cultures.

8 Have you ever had an experience in which you suddenly felt connected in a visceral way to the world around you, perhaps when you were in a stunning natural setting?
9 What ways of knowing were you – or would you be – using in such a situation?

A second important feature common to many indigenous cultures is the use of art to preserve and convey the mythologies that depict the people's relationship to the Earth. (We use the term 'mythology' here as we used it in Chapter 9: it does not mean 'something false'; rather, it refers to the stories which form the foundation of cultural beliefs.)

We'll examine the use of art to convey stories in more detail in some of the case studies below; for now, we will acknowledge that the art of indigenous cultures is highly symbolic and relies on traditional symbols relating to the land and the animals of the environment in which the culture lives. In 2003, for example, a cave was discovered at Eagles Reach, 160 kilometres from Sydney, Australia, in which an extensive collection of cave paintings were found, dating back 2000 to 4000 years. At least 12 layers of images have been superimposed, one upon the other, documenting the art and culture of many generations of

Aborigines. A wide variety of birds, lizards and marsupials are depicted, including kangaroos, wallabies, goannas, leaf-tail geckoes and many other animals from the region. Also included are life-sized, delicately drawn eagles and an extremely rare design of a wombat (Allen).

Another Australian cave painting depicts a bird which has been extinct more than 40 000 years, and it is believed that the detail in the painting could not have been so accurately depicted if the painting had been made long after the bird became extinct. This is, therefore, believed to be the oldest piece of Australian art.

■ **Australian cave painting**

At the other end of the world, and centuries later, we can see the tradition carried on in the art of Bart Hanna, an Inuit artist from Baffin Island in north-western Canada, near Greenland, who creates mostly in sculpture. His work is described, by the Inuit Art Museum in Toronto, as interpreting the Inuit Sea Goddess legend and other aspects of the '*many themes embodied in Inuit mythology*' ('Hilataani Ataanilu Tariumi').

■ **A Bart Hanna sculpture entitled *Sedna*. Sedna is the goddess of the sea.**

There are, of course, many other forms of indigenous art – including totem poles, dances and ceremonies. Elders are respected because of their wisdom, and young people learn the history of the universe, and the history of their people, from the elders. Many – perhaps all – indigenous cultures have a wise man, a shaman or other figure, who serves as the connection between the people and the gods and a guide to the spirit world. These leaders are central figures in rituals which honour the spirit world and embody the people's connection to it. Robert Wolff describes one such ritual that takes place in every village in Bali, in Indonesia: the Barong.

The Barong begins when Rangda, a figure who appears twice each month, enters the village with a horrible scream. '*She strides around the square, threatening, cursing, screaming*' (Wolff 26). She taunts the villagers to stand up to her, and a battle ensues. The men draw daggers against Rangda, and she is able to use her powers to turn them back on the men, who must then struggle against the daggers in their own hands. '*When the men seem at the end of their endurance, the spirit protector of the village enters: Barong, a wonderful monster, a mythical beast, with a huge carved head*' (27). Guidebooks call this ritual a 'trance dance', but Wolff sees it differently:

A dance is a stylized story, and we often know how it ends. But the ending of a Barong cannot be predicted. Having watched this dance several times, I believe that. It is obviously a battle fought on another plane. It is almost visibly a battle of spirit – good and evil. But that is a Western simplification. The Barong ceremony is not about those two opposing spirits. Rangda is the spiritual force of destruction, Barong is protection, and the people are the spirit of survival, of growth, of life. Twice a month these forces are testing each other's strengths and weaknesses (28).

The Barong usually ends with the villagers driving out Rangda under the protection of Barong, but sometimes Rangda prevails: '*If that happens, earthquakes shake the ground, volcanoes erupt, epidemics descend, and many other terrible things occur, the Balinese say*' (28).

This ceremony is one example of how the rituals of indigenous people reveal the integral role that humans play in nature. Human strength is directly tied to the strength of the village, the spirit and the land. Human weakness leads to natural disasters. Man and nature are inextricably bound.

Knowledge framework: Methodology

Ritual is one important form of methodology in indigenous knowledge making. It is part of the oral tradition, which is the means by which all cultural knowledge is passed down to the next generation, and the next generation after that.

The story that Robert Wolff told of his learning how to understand the jungle is a good example of one way in which the knowledge is passed down – it is experiential. Learners are immersed in the environment and led to begin to notice it deeply, until an intuitive understanding develops. (We will see this again later in the chapter with the initiation of infants who are destined to become ocean-going navigators to the sea.)

The other important method we have seen so far is the use of the arts to preserve and convey cultural knowledge.

10 What important cultural rituals have you participated in?
11 Do they convey information about your history or values in the same way that the Barong does for the Balinese?
12 Many more modern cultures have maintained art forms as a means of telling stories – Indian dance, is one example. Are you familiar with any of these? Do you participate in any yourself?
13 How does learning history and mythology from a dance or performance differ from reading about it in a book or listening to a classroom lecture? What different ways of knowing are involved?

The relationship between man and nature and the oral tradition, reflected in the artwork of indigenous peoples, are two common characteristics of indigenous cultures. In the next section, we will investigate three different indigenous cultures to see, in more detail, how these common elements play out in different places.

Case study 1: The Australian Aborigines

There are many Aboriginal groups in Australia – approximately 150 different languages as of the turn of the twenty-first century (Dalby 43) – so the discussion here will deal in generalizations common to groups of the whole country. If you investigate the topic more thoroughly – and we hope you will – you will find many different nuances of the beliefs and practices we lay out here.

Perhaps the most famous feature of the Australian Aborigine is the mythology of the **Dreamtime** and the **Dreaming**. This vocabulary is not Aboriginal vocabulary, however. Hetti Perkins, an Aboriginal activist and art curator explains:

So what is the Dreaming? I would say the Dreaming is a non-indigenous term used in its broadest sense to describe the stories of our ancestors and how they shaped the land and how they are still part of the land. … Across Aboriginal Australia there are as many different terms for Dreaming as there are language groups (Lister).

So 'Dreaming' is not really a translation; it's a Western word for a concept that has many different names in many different Australian Aboriginal cultures, but which is common to all of them.

There are many different versions of the Dreamtime story but, in general, the Dreamtime was the time before living memory. When the great spirits moved from dreaming to actions, they created the Earth and all her creatures, as well as the celestial bodies. According to the Aboriginal Art and Cultural Centre in Alice Springs:

The Dreamtime is the beginning of knowledge, from which came the laws of existence. For survival these laws must be observed.

The Dreaming world was the old time of the Ancestor Beings. They emerged from the earth at the time of the creation. Time began in the world the moment these supernatural beings were 'born out of their own Eternity'.

The Earth was a flat surface, in darkness. A dead, silent world. Unknown forms of life were asleep, below the surface of the land. Then the supernatural Ancestor Beings broke through the crust of the earth from below, with tumultuous force.

The sun rose out of the ground. The land received light for the first time.

The supernatural Beings, or Totemic Ancestors, resembled creatures or plants, and were half human. They moved across the barren surface of the world. They travelled, hunted and fought, and changed the form of the land. In their journeys, they created the landscape, the mountains, the rivers, the trees, waterholes, plains and sandhills. They made the people themselves, who are descendants of the Dreamtime ancestors. They made the Ant, Grasshopper, Emu, Eagle, Crow, Parrot, Wallaby, Kangaroo, Lizard, Snake, and all food plants. They made the natural elements: Water, Air, Fire. They made all the celestial bodies: the Sun, the Moon and the Stars. Then, wearied from all their activity, the mythical creatures sank back into the earth and returned to their state of sleep.

Sometimes their spirits turned into rocks or trees or a part of the landscape. These became sacred places, to be seen only by initiated men. These sites had special qualities ('Meaning of the Dreamtime').

We can see already evidence of the two patterns we identified. The close relationship between humans and nature is reflected in the belief that the same Ancestor Beings who created the animals and the landscapes and celestial bodies also created human beings as part of the same process, so that our existence is intertwined with the existence of all other things. The belief that the Dreamtime is the source of knowledge, along with the laws of existence, also reveals a profound commitment to adhering to the laws of nature – mankind's survival, as the myth tells us, depends on it.

Knowledge framework:
Language and concepts

We have noted that each indigenous culture has its own language, and that the language is oral only. What has been learnt by non-native speakers of the important concepts, such as the Dreamtime and the Dreaming discussed here, has been learnt largely by people speaking to a bilingual member of some indigenous group. The concepts have been translated into English, which is a language which does not have terms for those concepts, because English speakers don't experience the world the way the Aboriginals, for example, do.

There are two important implications of that fact: one, the concepts have been rendered here imperfectly. If we wanted to understand them much better, we would need to learn the appropriate native language. Secondly, language is a problem for any human scientist studying any indigenous culture. The researcher has to interact with the subject. If this means that the subject has learnt English (or any other language of the researcher), then the subject no longer views the world purely through the culture of the indigenous group. Even if the researcher has learnt the native language of the subject, the subject's behaviour, as we saw with the Hawthorne effect in Chapter 12, will necessarily have changed – even a little bit – because she is aware of being watched.

Ironically, the writing down of the cultural traditions of a culture without a written language is necessarily and unavoidably an alteration of that cultural tradition.

14 There is another version of the Dreamtime here on YouTube: http://tinyurl.com/paf94gl. Watch it. What elements of the version told above can you see repeated in this version?
15 How does the Dreamtime story differ from your understanding of how the world was created? Are there any similarities?
16 We have noted that the Dreaming is not a direct translation of any aboriginal word. What does this mean for our understanding of (what we call) the Dreaming?

The Dreaming is more difficult for non-Aboriginal people to understand. This seems to be a more personal experience that connects individuals today to the Dreamtime in the past. In fact, talking about 'past' and 'present day' is misleading because, for the Aboriginals, there is no word for 'history' or 'past'; instead, present *is* past. Time stands still. The Dreamtime is not over; it still exists. The world is still being brought into being with every ritual that takes place today. In the Western world, we have the idea of the Garden of Eden, a paradise from which mankind was expelled. In Aboriginal culture, however, it is as if the Garden of Eden still exists, and they are living in it, and the Aboriginals see it as their duty to preserve the world as it is. Dreaming is one way in which that duty is preserved (Davis, 'Songlines'). The Dreaming helps to guide people's daily actions; as such it is, like more familiar religious systems, as much an ethical as a mythological system.

Because of this ethical duty to preserve the world as it is, there is a powerful need to teach the stories and practices to each ensuing generation. One way this is done is through a complex system of journeys along Songlines (Davis, 'Songlines'). A **Songline** is a pathway through the wilderness that delineates the events of a story. The Aboriginals can follow these Songlines by watching for signs – animal footprints, the emergence of a butterfly, formations of the land. Along the way, many rituals will be performed to connect the people with the place. As they walk, they re-animate the stories. Children are taken on journeys as apprentices to learn about the Songlines, and to learn about how to survive using the bounty of the land.

Because there is no written language, another way that the history and mythology of the Australian Aboriginal people are conveyed to the next generation is through art. Aboriginal art also stands as a written language:

Aboriginal art is a major part of the unwritten 'encyclopedia' of being an Aboriginal person and as such it may have many layers of meaning. Australian Aboriginal people have no written language of their own, and so the important stories central to the people's culture are based on the traditional icons (symbols) and information in the artwork, which go hand in hand with recounted stories, dance or song, helping to pass on vital information and preserve their culture (Owen).

Knowledge framework:
Historical development

Given the Aboriginal sense that 'past' and 'present' have no meaning, it is perhaps strange to consider what historical development there can be of indigenous knowledge.

Unfortunately, however, the historical development has very often been tragic. Thriving cultures were invaded by colonizing forces, who saw the indigenous peoples as uncivilized savages and set about doing their best to civilize them. Children were taken from families and put into schools, villages were destroyed, cultural practices outlawed. All too often indigenous people died in great numbers due to exposure to diseases that were not native to their land, and for which they had, therefore, no resistance, and in many other cases indigenous people were killed in battles or executed as savages.

In many places, however, the cultural knowledge and practices have managed to survive in small pockets, and in others, as we shall see in a later section about Polynesia, the old ways have been consciously revived. In many places around the world, the old languages are being taught in schools in a deliberate effort to save them.

The history of indigenous knowledge systems, then, has been difficult and destructive, but recent interest and improvements in human rights around the world mean there is increasingly reason to hope for the future.

17 The Songline journeys are a rite of passage for Australian Aboriginals. What rites of passage do you go through in your culture?
18 What have you learnt from the rites of passage you have undergone?
19 Can you make your own way through a wilderness, finding your own food and water and shelter? Why not? Do you think this is a valuable skill in the twenty-first century?
20 Cultural practices such as 'offer a seat to an elderly person' or 'look after your parents when they are old' are clearly ethical. How do any of your own cultural beliefs encode ethical rules (as well as simply state them as in, for example, the Ten Commandments)?

Aboriginal art – both ancient and modern – is, therefore, infused with elements of the Dreamtime story and with stories of people's lives on the land. Painting relies heavily on traditional symbolism, such as the elements depicted in the two charts below (Diana):

■ Aboriginal symbols

The colours used, too, tell the story of the peoples' life on the land, because they are the colours of the earth, the colours that the Aboriginal people see around them every day. If you are interested in further explanation of the iconography of Australian Aboriginal art, there is a website with more examples here: http://tinyurl.com/okpqqrg.

21 Given those symbols above, can you pick out some of the elements of the story in the following painting?

■ Aboriginal painting

The symbolic elements in this painting include campfires or meeting places with people sitting around them, and some honey ants. Apparently this is a story about several groups gathering together in a place where the honey ants walk.
We don't have exact explanations for the meaning of Aboriginal artworks (indeed perhaps the Aborigines do not either; we have seen that part of the nature of art is that it transcends spoken language), because the stories they tell are sacred, and they are not often shared – certainly not in their entirety – with people outside the culture. In fact, in Australian Aboriginal culture, the group in this case is as small as the family.

Artists need permission to paint a particular story: Where ancient and important stories are concerned, and particularly those containing secret or sacred information, an artist must have permission to paint the story she or he paints. Traditional Aboriginal artists cannot paint a story that does not belong to them through family lineage (Owen).

Keep in mind, however, that 'family,' in Australian Aboriginal culture, does not mean the kind of nuclear family that we have in most of the Western world – mother, father and children. Instead, an Aboriginal family is a vast web of relations that may include hundreds of people (Davis, 'Songlines').

Notably, specific details and aspects or areas of cultural knowledge are generally held and maintained by individuals or within particular family groups. Although the broader community may be aware of the general features or elements of that knowledge, it is not a common practice within Aboriginal society for detailed cultural knowledge to be vested in the broader community or within Aboriginal community organisations, although it is these organisations that often defer to particular individuals or family groups as being the knowledge-holders of particular sets of cultural knowledge about places or the environment ('What is Aboriginal cultural knowledge?').

Earlier we mentioned the cave paintings at Eagles Reach in the Wollemi National Park in Australia (Taçon *et al*); these paintings are typical of an ancient tradition.

Like all Aboriginal art, cave and rock paintings are inseparable from the 50 000-year-old Aboriginal society and culture. Aboriginal people did not develop a written language but communicated their religion, laws and history through song, poetry, painting and carving. The various art forms, such as body painting, song, dance and storytelling were not separate practices but were integrated into ceremonial performances. Art was not simply for enjoyment or self-expression but a means of passing on ideas and values that had complex social significance (Allen).

Art, for the Aboriginal people, is not just an area of knowledge, but is also an extremely important way of knowing. It serves as cultural memory – and it is interesting to contrast with personal and shared knowledge as we have discussed them throughout this book.

In the present day, Aboriginal art has come to be highly valued. It is exhibited in museums – some of which are dedicated to Aboriginal art, but some of which are more general museums. The highest price paid, so far, for a work of Australian Aboriginal art was $2.4 million, paid by the National Gallery of Australia to Clifford Possum Tjapaltjarri for his painting *Warlugulong*.

This painting may seem to be much more abstract than the one on the previous page, and it is very modern – painted in 1977 – but it still contains traditional elements. Warlugulong is the name of a place where the Blue-Tongue Lizard Man created the first great bushfire (Cubillo and Carauna). Can you see anything in the painting here that suggests that story?

■ **Clifford Possum Tjapaltjarri (Anmatyerr people, 1932 Australia – 2002), *Warlugulong* 1977. National Gallery of Australia, Canberra. Purchased with the generous assistance of Roslynne Bracher and the Paspaley Family, David Coe and Michelle Coe, Charles Curran and Eva Curran 2007. © The Estate of Clifford Possum Tjapaltjarri licensed by DACS/AAA/VISCOPY 2014**

These Dreamings include a group of women from Aileron dancing across the land, represented by their footprints in the top right running laterally across the canvas. Below these are the tracks of a large group of Emus returning to Napperby (the artist's homeland). The footprints of the Mala or Rock Wallaby Men, travelling north from the area around present-day Port Augusta (in South Australia), can be seen in the vertical line of wallaby tracks to the left of centre. Further to the left are the tracks left by the legendary Chase of the Goanna Men (Cubillo and Carauna).

If you visit the museum website, you can find a more detailed explanation of the symbolic elements of this painting, along with a video showing much more close-up images: http://tinyurl.com/nmkgpce.

22 Spend some time looking at Aboriginal art. (If you just put the term into a search engine, you will find hundreds of images.) Does it appeal to you? Why or why not?
23 Do you think you understand any of the artwork? Does it tell you anything about the world? Why or why not?
24 Do you think that your experience of this art differs from that of an Aboriginal person your age? Why or why not?
25 There is a video of a master playing a didgeridoo, an Australian Aboriginal instrument, here on YouTube: http://tinyurl.com/6myvop. Can you see any way in which the music of the didgeridoo makes a connection with the natural world?

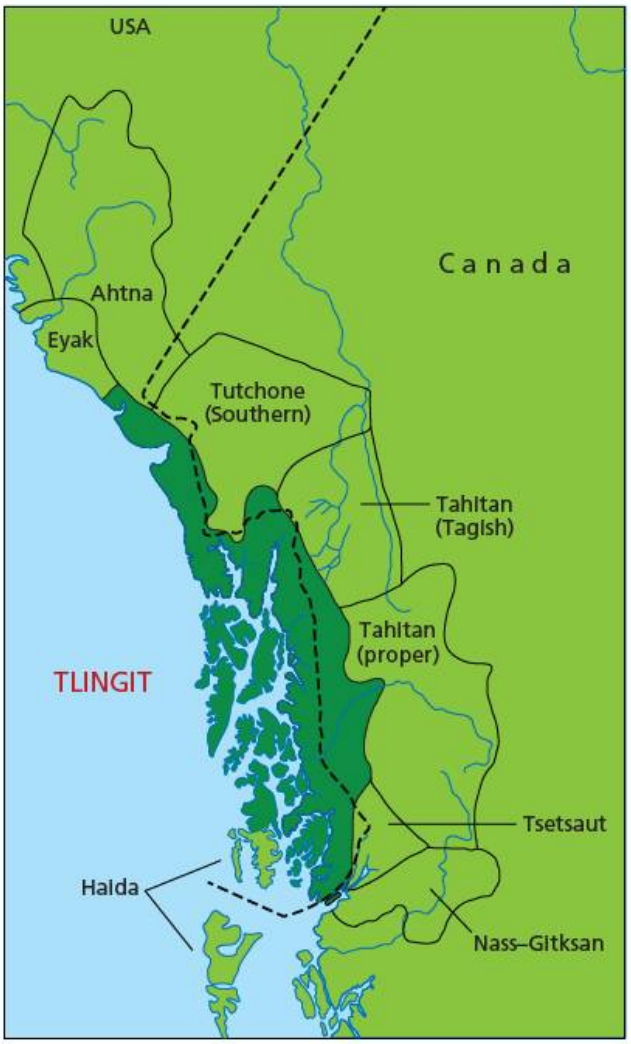
We have taken only a very brief look at Australian Aboriginal culture, but already we can see that knowledge depends heavily on faith and memory. The knowledge of how to survive and fulfil their duty to the land is conveyed through a complex system of dreaming, storytelling and ritual that intertwines art, mythology, ethics, religion, and

what we would call history. This would certainly seem to bear out Wade Davis' claim that to mistake an indigenous culture for an undeveloped one is an egregious error, indeed!

We will give the last word to Aboriginal author, Olaf Ruben, who wrote, in *Tangaroa's Godchild*:

The Australian aborigines, reckoned to be among the most primitive of races upon evidence that is far from conclusive, have a religion that is well-developed. They worship the Earth Mother, and recognise in their graceful, plaintive stories the prior existence of culture heroes as well limned as any in Valhalla. To an amazing degree they feel the reality of the metaphysical world they have created – the dream-time, which is neither a dream nor a period, or if it is a period is one which has no dimension, so that the past and the present exist together (pages 301–302).

Case study 2: The Tlingit



■ Tlingit territory

The name of this tribe is an excellent example of what we were saying about the use of a name that is not precisely correct. The Tlingit people have no written language, and their language has many more sounds in it than English has – it has several sounds that are not known to exist in any other language on Earth (Grant). The word 'Tlingit' is a word that probably came down to English through the Russian (where it would have been rendered in Cyrillic text), because the Russians were the first people to live in close concert with the Tlingit. 'Tlingit' is an attempt to render phonetically the tribe's name, and most English speakers pronounce it 'Klinkit'. That is not the correct pronunciation, however. In fact, the intial 'Tl' represents a sound that you make by putting your tongue up against your teeth and blowing around it. Try it out! It does sound a little like 'Tl,' but certainly that is not exact.

The Tlingit are a people who live in the Pacific Northwest along the coastline of what is present-day Alaska and British Columbia. Despite the vast distance between this area and Australia, we can see the commonalities of the ties to the land and the reliance on the local natural resources for survival, and of embedding of traditional myths and values in the artwork.

Artist and fisherman Faith Grant is a Huna Tlingit. Huna is a village 30 kilometres south of Glacier Bay, to which the tribe retreated when an advancing glacier drove them out of their homeland in what is now Glacier Bay itself. Grant explains that all things have a soul: trees, fish, seals, mountains, humans. When the Tlingit take anything from the land, therefore, they make sure to use every part of it, because to waste any would be disrespectful (Grant). When the Tlingit eat mussels, for example, they retain the shells and use them to make toys or jewellery. If they catch a seal, they render the blubber for oil, they eat the meat, they use the skins for clothing – even the stomach is cleaned and then inflated and sealed and used for buoys and floats for fishing traps.

Similar to the Australian Aboriginals, the Tlingit prize the land for its abundance and they value rules and rituals which preserve the resources and make survival possible. There is a local knowledge captured by a Tlingit proverb: '*When the tide goes out, the table is set*' (Grant). This refers to the abundance of food available in tidal areas – mussels, clams, oysters, crabs, limpets, seaweed and other sea plants are just some of the valuable foods that can be collected after high tide. The Tlingits' use of resources for food extends well beyond the tidal pools, however. Their diet is varied and, therefore, no individual resource can be depleted or hunted or harvested beyond recovery.

The Huna Tlingit have maintained a long-standing tradition as mariners and have always had a strong connection to the sea. The water and its resources have remained closely integrated with the people and the topography of Southeast Alaska. … Southeast Alaska was a land abundant with food and natural resources; foods were harvested and preserved to sustain the people through the winter months. Abundant salmon, halibut, seal, goat and deer were among many sources of protein that would be dried, smoked and preserved. Plants, berries and seaweed were among many items collected from the land. These traditional foods are still prized to this day ('Connected to the Land & Waters').

The awareness of the need to conserve resources is reflected in Tlingit fishing practices. One of the ingenious tools they use is the halibut hook, shown in the photograph below. The hook is carefully designed so that it can only catch halibut of a certain age: those that are too old (prime breeding stock) have mouths too big to fit in the space and be caught by the hook, and those which are too young are too small to reach. This is a tool of ancient design; it has been in use for centuries (Grant).

Tlingit halibut hook

Notice that on the side of the tool opposite the hook (which is traditionally made out of bone) there is a carving of a creature – in this case a puffin. The creatures vary widely; sometimes there are otters, whales, fish, ravens, or any one of many other figures. The figures are from Tlingit mythology, and they confer magical powers on the halibut hook.

... halibut fishing has a cultural significance to the Tlingit which transcends its importance as a means of acquiring a food both eaten by the Tlingit and used as an exchange medium in trade. Instead, halibut fishing relates to the view of a world composed of two complementary parts: one, the secure realm of the village and its environs; the other, the far less secure and potentially hazardous external realm beyond human settlement. To fish for halibut is to penetrate the external world and to subject oneself to its dangers. Supernatural assistance in the form of a halibut hook helps minimize this danger (Jonaitis 1981: 3).

Like the conscientious use of all parts of a resource, the halibut fishing practices show a respect for nature and a desire to live within it safely.

The same kind of wisdom is shown in the tribal marriage practices. Tlingit society is divided into strictly organized groups. In simplified form: families are part of clans; clans are part of moieties. There are two moieties: the Eagle and the Raven. Within those, there are several clans. In Glacier Bay, for example, there are three Eagle clans: Kaagwaantaan, the wolf; Wooshkeetaan, the shark; and Chookaaneidi, the bear. The Raven moiety has only one clan in that area: T'akdeintaan, the whale ('Glacier Bay'). The Tlingit are a *matrilineal* people – that is, tribal affiliation passes down through the mothers. So if someone is a member of the Eagle moiety, it is because his mother was an Eagle. Marriages are organized across the boundary of the moieties: Eagles always marry Ravens. In the modern era, we understand that this strict division results in there being no health problems due to intermarriage (Grant).

These practices reveal a deep knowledge of how to live as part of the ecosystem in such a way that all species survive.

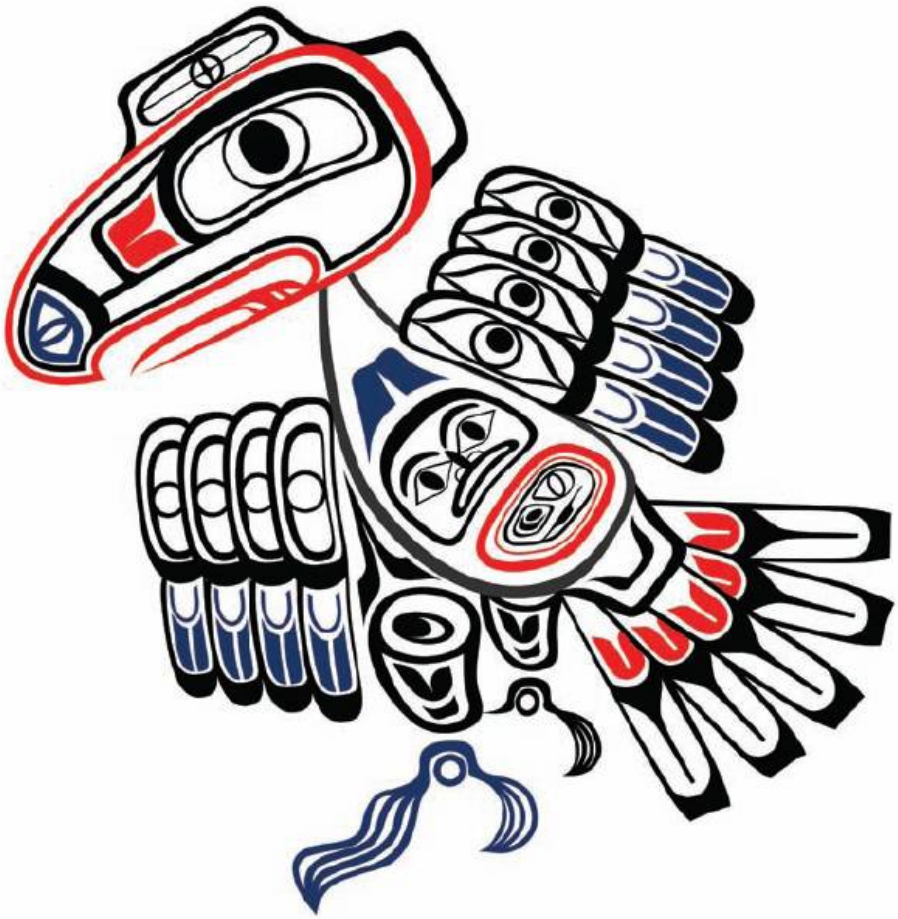
26 Do you see any similarities between Tlingit cultural practices and Australian Aboriginal practices?

27 The picture below is of an Inupiaq parka. The Inupiaq, like the Tlingit, never waste any part of an animal they kill. This parka is made out of the intestines of a seal and sewn together with sinews. Grass is woven into the seams, because when the garment gets wet, the grass swells and fills any gaps between sections. Would you be willing to wear such a garment? How does it compare to a parka made out of synthetic materials? Do you think that one is better than the other?

Collection of Anchorage Museum at Rasmusen Center.

28 What knowledge do you think the Tlingit might have which might have been lost in the modern world?

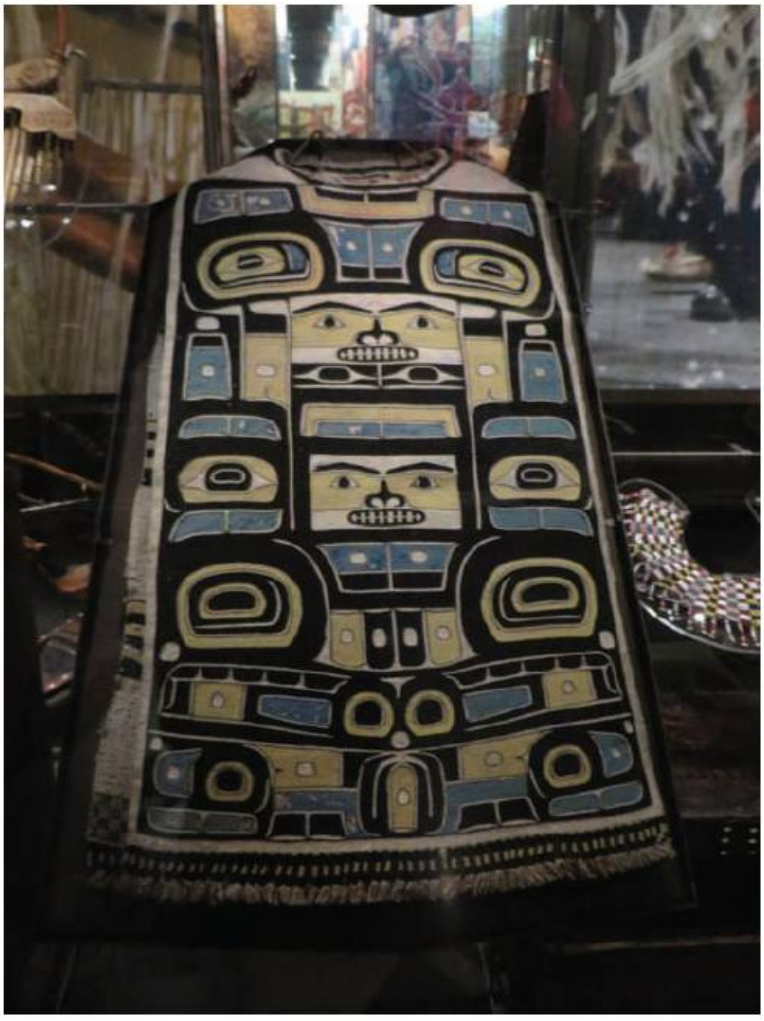
Tlingit artwork is not confined to tools; there is an ancient tradition of aesthetic art using a design style called 'formline'. Formline uses three major design features – among others. You can see all three features in the drawing of the *Haida Raven*, by Betty Baranski.



■ ***Haida Raven***

The first feature is a triangular shape, which you can see at the beak and at the corners of the eyes in the body of the raven and in the upper right-hand wing. This shape is based on the tail of the Flicker, a large woodpecker native to the area. The second feature, visible in the blue feathers of the wings, and in the red and the black and white feathers in the tail, is the U form. This represents the land carved out by a glacier when it has retreated. The third feature, visible in the raven's eye and in the upper feathers of the left-hand wing, is the oval. This represents the shape of the eye sockets of humans and animals alike (Jackson). We can already see the close affiliation with nature in the Tlingit artwork.

Two important artistic media are weaving and totem poles. Both kinds of artwork play important roles in Tlingit rituals. Woven robes, such as the one pictured on the next page, feature figures from the clan and the moiety and are used for ceremonial dancing. When the dance begins, the dancers will enter backwards, revealing the full design of the robe. This is so that the audience is introduced to the performer through knowledge of what the symbols mean (Grant).



■ **Symbols on a Tlingit ceremonial robe**

Totem poles perform several cultural functions. They were sometimes used as memorial or funereal poles; in the latter, there would actually be a space in the back into which a box of the ashes of the person being remembered was inserted. Some totems were used as a means of negotiating when a wrong was done by one Tlingit to another. The wronged group would raise a pole that told the story of the misdeed. The wrong would be redressed at a potlatch, a ceremonial gift-giving event, after which the pole would be burnt, and the incident would never be mentioned again. The most common kind of pole, however, is the art pole, that can tell of a family's position and history within the culture (Jonaitis 2012: ix) or recount the tribal mythology ('Coastal Trail'). The poles were raised at potlatches, and both the raising of the pole and the potlatch conferred status upon the family who hosted the event and gave many gifts to the guests. Some of the poles are marked with rings that represent the number of potlatches held by that family: more rings mean more status.

Totem poles use a traditional system of symbols, just as Australian Aboriginal art does. Tlingit symbols are often animals, and they often represent the clan and moiety of the family who raised the pole. The stories depicted on the poles are sacred, and they are not often shared with people outside the Tlingit. We know a few stories, and we know what some of the symbols stand for, but we seldom know how to read an entire pole the way a Tlingit of the specific region could. The pole pictured on the next page, for example, has some recognizable features.

■ **The Gaanaxadi Raven Crest Pole**

A crest is public record of the person who owns the item; this is also true for other objects, such as blankets, baskets and robes. The identification of the crest is important, because objects are privately owned and passed on through families over generations. The crest speaks to the history of the people. On a totem pole, the crest is the top of the pole, although, otherwise, the most important position on a totem pole is the bottom, so the English saying about someone being 'the low man on the totem pole' shows a misunderstanding of the nature of the totem pole! In this case, the top figure is a raven so this is a pole made for someone in the Raven moiety (though it may have been made by someone in the Eagle moiety, as that was a common practice).

Although this pole is called a crest pole, it is actually uncertain whether it is a story pole or a crest pole. Figures on the pole suggest clan crests, which have origins in myth. The frog, which is the third figure down on the pole, suggests that the pole may signify a legend that tells of a man who married into a clan of cranes held in human form by the power of a giant frog. When he unknowingly killed the frog with a stick, he unleashed the curse on the people. Another possibility, suggested by the whale near the bottom of the pole, is the legend of Raven the trickster, who got himself trapped in the belly of a whale. Thinking he might eat some whale meat, he lit a fire. The whale died and floated ashore with Raven trapped inside. Raven made a noise, which led the villagers to become curious and cut open the whale. Raven stepped out and tricked the villagers into giving him food. Yet another possibility for a story the pole may recall is a story about how Raven gave the moon to mankind ('Coastal Trail').

■ Whale – near the bottom of the pole

All of these are speculative, of course, as we don't know the truth about the meaning of this pole to the Tlingit. It is important that we recognize, however, that these poles have a meaning beyond the simple aesthetic in Tlingit culture, and the symbols they use reveal a close relationship with birds, animals and other features of the natural world around them.

Like the Aboriginal peoples, the Tlingit, despite being half a world away, share a belief in their custodial duty to the Earth, in the importance of using resources wisely, and in the wisdom of keeping their mythologies alive through the generations. We will turn finally to a culture in yet another geographic region, the Polynesians.

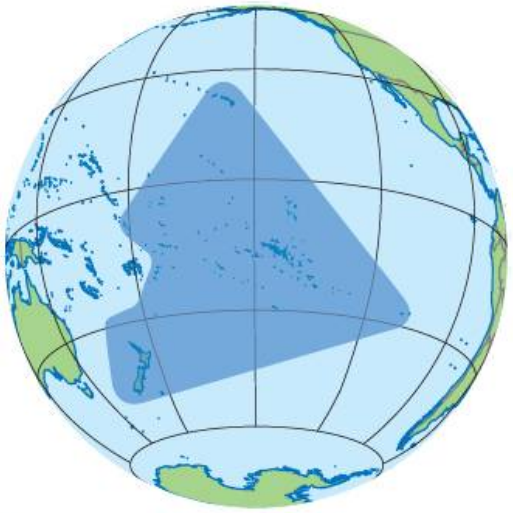
29 Can you think of any modern artwork in your culture which conveys knowledge in a way similar to the way that totem poles do in Tlingit culture?

30 You probably do not have much opportunity to wear ceremonial gowns that have been woven with specific information about you and your family, but you probably are familiar with the idea that clothing sends certain kinds of messages. What kinds of messages do you send with your choice of clothing? What kinds of messages do you recognize in other people's clothing?

31 How do you know what messages any clothing is sending?

Case study 3: The Polynesians

Polynesia includes an enormous geographic area, encompassing nearly a quarter of the Earth's ocean surface. It extends from New Zealand in the south west to Hawaii in the north, to Easter Island in the south east.



Polynesia

In our consideration of the Polynesian peoples, rather than looking at their artwork, we will focus on their connection to the physical world, which, as they were an oceangoing culture, takes a rather different form than that which we saw with the Aboriginal Australians and the Northwestern Tlingit. We will look, instead, at the ancient art of **Wayfinding**: a means of navigation without compass or sextant, which linked islands spread over 25 million square kilometres of ocean (Davis: 'Light at the edge of the world').

Wayfinding is a skill that until the 1970s was all but dead. It has been revived, in the past 40 years, by a group working out of Hawaii: the Polynesian Voyaging Society, an endeavour spurred, at least in part, by the desire to prove wrong a widespread misunderstanding about how Polynesia was originally settled.

A little history is in order. '*Evidence suggests that early Polynesians made it from somewhere in southeast Asia to Samoa and Tonga, then sailed eastward spreading through the Marquesas Islands, before going north toward Hawaii and south to Easter island*' (Davis: Light). This happened more than three thousand years ago (Kane). This feat was not, however, accepted by the Europeans, who came along much later.

When the Spaniards first encountered the Polynesians, in 1595, it was at the islands the Spanish would name the Marquesas. The native Marquesans, as the Spanish called them, were stunned at the appearance of such men, because they came from the east, which was believed to be the lands of the afterworld, '*where spirits departed the body and plunged into the sea*' (Davis 38). The only place the Marquesans could find to place the Spaniards in their mythology was as demons. On the other hand, the Marquesans confounded the Spaniards. Among other cultural shocks was the rigid system of *tapu*, what we would call taboo, the system of magical rules and sanctions that were an integral part of the belief in the spirit world.

But … the most perplexing question was how such a primitive people could have accomplished so much … thousands could gather for ceremonial events, the feasts and celebrations that marked the end of war or the accession of a chief. At such moments, a priest would recite the entire mythological history of the world, hundreds of lines of sacred verse held in the memory of a single man. If he faltered or stumbled on a single phrase, he would be obliged to begin anew, for the words defined the contours of history … (Davis 39).

That powerful capacity for memory turned out to be integral to the ability of the Polynesians to accomplish what they did.

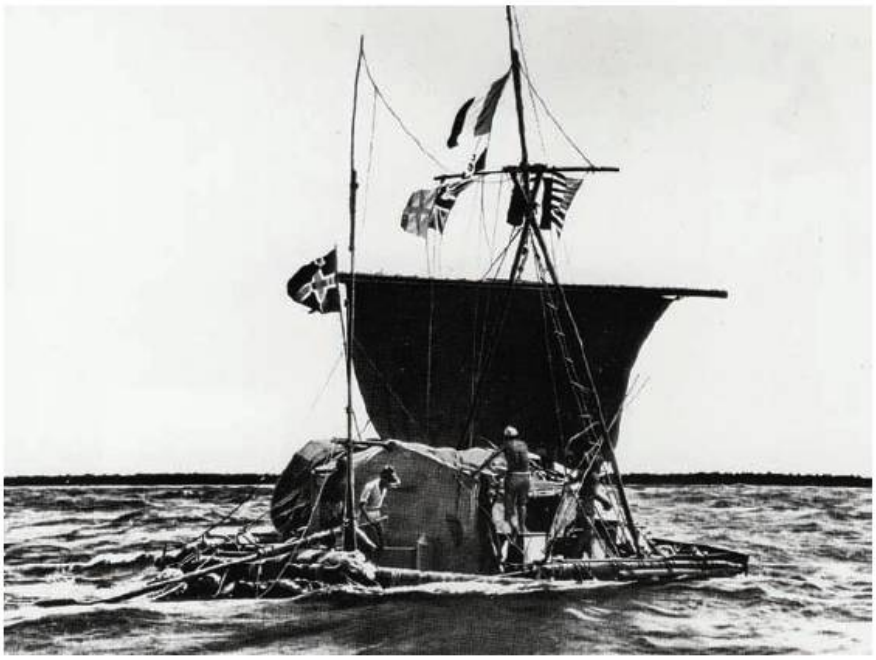
Captain James Cook, on his eighteenth-century voyages, encountered even more puzzling facts: he found that people in the Marquesas could understand the language of the Tahitians, even though the islands were nearly 1600 kilometres

apart. He met a navigator in Tahiti, in 1769, who, using stones that he placed in the sand, mapped every major island group in Polynesia, including a span of 4000 kilometres between the Marquesas and Fiji.

Tupaia later sailed with Cook from Tahiti to New Zealand, a circuitous journey of nearly 13 000 kilometres that ranged between 48 degrees south latitude and 4 degrees north. To his astonishment, Cook reported, the Polynesian navigator was able to indicate, at every moment of the voyage, the precise direction back to Tahiti, though he had neither benefit of sextant nor knowledge of charts (Davis 42).

None of the European explorers, all working from the modern paradigm and believing that only those with advanced and advancing technology could be considered civilized, could believe that the Polynesians could possibly have purposefully discovered and settled, without technological aid (other than the boats themselves!), all of the islands that were, indeed, populated.

In 1947, Norwegian explorer Thor Heyerdahl set out to test a theory he had developed. He believed that Polynesia had been settled from explorers from South America. Heyerdahl set out to prove his point by sailing from Peru to some of the Polynesian Islands in a balsa wood raft named *Kon Tiki*.



Kon Tiki

You may be familiar with the story; a 2012 film retold Heyerdahl's journey for a new generation. Heyerdahl made it to the Raroia Atoll in the Tuamotus, after a journey of 7000 kilometres (Davis 45), but he did not actually do it under conditions that would have been necessary for the Ancient Polynesians. He had help from the Peruvian navy, and he had on board some modern instruments, such as charts, a radio and a sextant. He felt that didn't matter, however; his point was to show that such a boat could actually make it that far. Historical inaccuracies notwithstanding, the project caught the imagination of the world, and Heyerdahl was treated as a hero. His book about the journey has been translated into 70 languages and has sold more than 50 million copies.

The Hawaiians, whose tradition told them a quite different story, were inspired to demonstrate that Heyerdahl's version of events was wrong. Heyerdahl's ideas

... went against our oral traditions, which tell of great navigators and voyagers, and against the archaeological, linguistic, genetic, and botanical evidence that points to islands off Southeast Asia as the original homeland of the Polynesians. Others, like Andrew Sharp, agreed that the Polynesians came out of Asia, not South America, but that they did not have the skill to navigate more than 100 miles from land, but were blown off course by storms and drifted to new islands. So the perception in the past was not very flattering to those of us of Polynesian ancestry (Thompson).

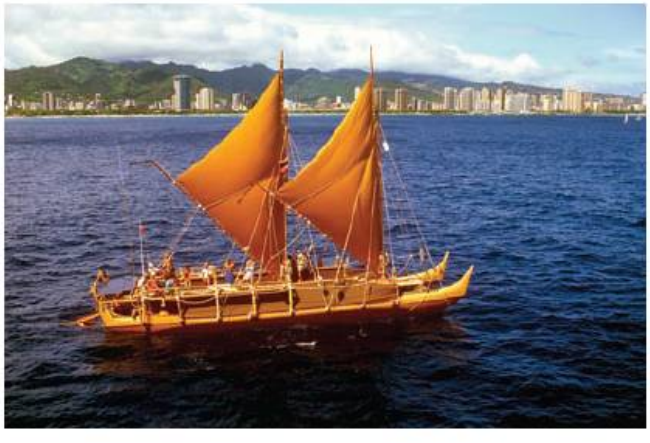
So the Polynesia Voyaging Society was formed in 1973 '*... for scientific inquiry into our history and heritage: How did the Polynesians discover and settle small islands in ten million square miles of ocean, geographically the largest "nation" on earth? How did they navigate without instruments, guiding themselves across ocean distances of 2500 miles?*' ('Mo'olelo').

There was only one problem: there were no Wayfinders left. After an extensive search, the Society finally found one living person who had been trained, literally from infancy (the trainers put infants in tide pools in order to let them absorb the rhythms of the sea practically from birth) to navigate the seas without the aid of modern technology. The man's name is Mau Piailug and he is from a small island called Satawal in Micronesia.

Mau Piailug served as the navigator on the first voyage of *Hokule'a*, the double-hulled canoe built on the model extrapolated from all the old drawings. And since then, he has begun training a whole new generation of navigators, including Nainoa Thompson, who has captained *Hokule'a* from 1978, through numerous deep sea voyages, including journeys to Tahiti, Japan, Raratonga (in the Cook Islands) and Alaska – all using the ancient way of navigating.

So how do they do it?

You must begin with the fundamental elements of the Polynesian world: wind, waves, clouds, stars, sun, moon, birds, fish, and the water itself. Bring to these the raw power of empirical observation, of universal human inquiry. The skills of the traditional navigator are not unlike those of the scientist; one learns through direct experience and the testing of hypotheses, with information drawn from all branches of the natural sciences, astronomy, animal behaviour, meteorology, and oceanography (Davis 52).



Hokule'a

The Wayfinders memorize the positions of hundreds of bright stars. They know how to read the different waves that pass across the bow – understanding that every landmass has its own wave pattern, like an individual fingerprint. They know

Knowledge framework:
Links to personal knowledge

Knowledge in indigenous systems is generally shared among groups – family groups, clans or other structural organizations. It is generally not shared with outsiders.

As we see from the story of *Hokule'a*, however, personal knowledge is crucial to the continuance of the group knowledge. In a system that relies heavily – or exclusively – on oral communication from one generation to the next, the holders of the knowledge are key. In many indigenous cultures, where the younger generations are leaving and assimilating into more Western, technological ways, the elders are the last people to hold the old knowledge, and, as they die, so does the knowledge.

Just as Mau Piailug was able to pass on his knowledge to a new generation, however, and revitalize a dying craft, so have other indigenous people begun to take conscious steps to share personal knowledge in order to keep it alive.

how far from land all the sea birds can fly. They can read clouds. '*There is an entire nomenclature to describe the distinct patterns clouds form as they gather over islands or sweep across the open ocean*' (Davis 55). They know every hallmark of rain. They know how dolphins, porpoises and birds behave if a storm is coming. They use the boat as a compass, aligning the stern to sunrise or sunset, depending on the direction they are going, and aligning the mast to the star they are following. They navigate by dead reckoning that is based on the sea and the stars. '*… as long as one is able to commit to memory all the stars and their unique positions, the time at which each is to appear on a particular night, and their bearings as they break the horizon or slip beneath it, one can envision a 360-degree compass …*' (Davis 57). The Hawaiians have shown that their ancestors could, indeed, deliberately, purposefully, sail thousands of kilometres over an enormous area of open ocean without machinery to determine direction for them; the Wayfinder is the compass; he keeps all the information about where they have come from and the route they took in his head.

32 Have you ever been lost? How did it make you feel? How did you find your way back? Did you do it without using technology (such as your cell phone)? Could you?
33 Do you know how to sail, or do you know anyone who does? How do they read the signs from the waves and other elements of nature?
34 If you live near an ocean, try going to the shore and watching the water for a while. Can you discern any differences in the wave patterns? Why or why not?
35 Compare the paragraphs above to those from *Life on the Mississippi* in Chapter 15 (pages 346–47). What are the similarities and differences between the two passages?
36 What do the paragraphs above tell us about our knowledge of the terms 'primitive' and 'advanced'?

The Polynesian Voyaging Society has resurrected an ancient skill and is passing it along to the new generations. In so doing, they are keeping alive some of the ancient beliefs (knowledge?) about man's relationship to nature – beliefs that are very similar to those we have seen in two other cultures in other distant parts of the world. These are cultures where behaviour is based in a strong religious belief system. The ancient Polynesian civilization was structured to embody that belief system; there were two institutional pillars: the chief, whose authority was derived from control and distribution of food, and the priest, whose role was to manipulate the spirit realm, and to punish those who violated *tapu*, the sacred rules of society (Davis, 'Light'). In the case of the Polynesians, their belief in the unchanging nature of the ocean and the islands, and their trust in their integrated position in the natural world, led them to a knowledge of how to read forces that, despite its having now been thoroughly demonstrated over nearly 40 years of documented travel, seems incredible to most of us born and raised into a world where we count on machines to do our remembering for us.

Indigenous knowledge and the ways of knowing

We have now had at least a brief look at three indigenous cultures widely separated around the world, and we have seen that they share some striking similarities. None has a written language; all convey their history, culture and values through an oral tradition. Those values are based on mythologies, whose details are quite different from each other (they have very different stories and very different gods), but whose gist is remarkably similar, in that they all suggest that man is but one element of a

healthy planet. All have shaped their cultural practices in an effort to safeguard the planet and to take only that which they need. None is driven by a desire to develop better tools or to make their lives easier through time- and work-saving technologies.

37 Our descriptions of these cultures are descriptions from our perspective. Does this pose any problems for the descriptions?
38 To what extent have our descriptions been 'pure' description, and to what extent have they been 'interpretations'? What might be the implications of your answer?
39 If we had been describing common characteristics of indigenous people some 50 years ago, do you think we would have focused on environmental issues so closely? What might be the implications of your answer?

It may be hard to avoid looking at these cultures and finding them 'primitive' in some way. In our modern, technological world, we have chosen a path that is vastly different, and we pride ourselves on the degree to which we value reason as the arbiter of what is right. These people keep alive in the present day mythological belief systems that, at least in the West, we left behind long ago for a model based on one God as creator or, in some cases, for a model that assumes no god at all. Can they be right in their way of thinking?

Certainly the indigenous cultures do not engage in scientific inquiry in the way that we are accustomed to thinking of it. But they do, in fact, employ their senses in an incredibly close observation of the world around them, a process that has allowed the Australian Aboriginal to find water in the hot and dry outback, the Tlingit to know which mushrooms are safe to eat and which are not, and the Polynesians to sail 20000 kilometres (including tacking into the wind) to make perfect landfall on an island 23 kilometres in diameter. These findings seem to be inherently rational, even if they are not generated after a documented process of conscious rational analysis, because they work. Perhaps the problem, then, lies in finding suitable standards of judgement with which to make comparisons.

The chart below contrasts Western scientific knowledge of landforms with Australian Aboriginal knowledge about landform (which uses very similar methods to the other cultures we have investigated):

Concept: Landforms	Australian indigenous knowledge	Western scientific knowledge
Explanation	Results from the effects of religious events in the Dreamtime. For example, the actions of the Rainbow Serpent travelling across the land	Results from the effects of erosion. For example, the effects of wind, the movement of water in rain and rivers and heating from the sun
Evidence	Comes from stories, songs and dance	Comes from observations, theories, predictions and experimental confirmation
Available to	Particular people who are related to that land and own the knowledge. Others can be aware but will not claim the knowledge publicly	Anyone who is able to access it and has some background scientific knowledge
Can be accessed by	Participation in ceremonies; oral transmission; art; singing; dancing. Manipulation of media containing indigenous knowledge: print, video, audio, CD-ROM, internet	Participation in science education. Manipulation of media containing Western scientific knowledge: print, video, audio, CD-ROM, internet

Source: Michie

Notice that in the present day, indigenous cultures have begun to take advantage of modern media. This is a departure from traditional ways, but is a compromise that may help preserve cultural traditions that are in danger of dying out.

For the indigenous people, sense perception is obviously a supremely important way of knowing, as is reason, though in a less overt way than we are accustomed to using it. But at least two other ways of knowing are as important, or more important: intuition and faith.

When we think of what the Polynesian Wayfinders can do, how much information they know and how many factors they have to notice, assess and judge at any given moment over a long sea voyage, it seems an almost impossible task. It could not be done consciously – just as you could not drive a car or hit a tennis ball if you had to think consciously about every single muscle as you did it (and both of those tasks are much simpler than that of the Wayfinder!).

Nainoa Thompson describes his experience this way:

When you have a black night, when the ocean is black, that's when you can't navigate with your eyes anymore. That's when you have to go someplace else, and that discipline is something that is very difficult for me to learn. It's almost as if I have to wash away that dependence on what I can see and what I can believe and trust other senses. That's one level of what I say is knowing without knowing how you know (Davis, 'Light').

This is intuition developed to its highest level of informed mastery – and perhaps resonates with a Western conception of flow that we saw in Chapter 8 on emotion.

And, finally, faith underlies all of the knowledge inherent in these cultures: faith that the world is good, faith that there is plenty to survive on if one is patient enough to work for it, and faith that adherence to spiritual law will preserve the world and ensure a good life.

Most of us are not familiar with indigenous knowledge systems as a way of knowing, but they are systems that have persevered for thousands of years.

40 What role does reason play in the making of knowledge in indigenous cultures? Is it the same kind of reason that you use?

41 Do you think that the polytheistic beliefs of indigenous cultures are viable beliefs, or are they simply old-fashioned and primitive? Are they completely at odds with monotheistic traditions, or are there some compatibilities?

42 What do you think accounts for the ability of indigenous knowledge systems to persist, even in the face of dramatic historical events that nearly wiped them out?

43 The IB mission statement calls for us to learn to recognize that other people, with their differences, can also be right. Can we apply this to the knowledge held by indigenous cultures? How difficult is it for you to do that? Does learning about their ways of knowing make that easier or more difficult? Why?

The role of indigenous knowledge in TOK

'Progress is impossible without change, and those who cannot change their minds cannot change anything.' (George Bernard Shaw)

When we started writing this chapter, we had significant reservations about the place of indigenous knowledge systems in the TOK curriculum. We were worried that as we would necessarily have to describe some such systems to give us a common platform to discuss, the chapter would be overly descriptive. The requirements of the

TOK course might, furthermore, compel us to analyse non-Western systems by what is essentially a Western conceptual apparatus, which is at best problematic.

But perhaps our biggest worry was that labelling indigenous knowledge systems as an area of knowledge seems dubious to us; if indigenous knowledge systems don't investigate different content (which, we argue, they don't), then they aren't really a new area of knowledge – they are just a combination of the same areas we have already seen. So in this chapter we have investigated Aboriginal and Tlingit Art, Wayfinder science, and history and religion in all three cultures. Nor are there different ways of knowing – again, just language, intuition, perception, reason, memory and so on, used in different combinations and valued differently from what other cultures may be familiar with.

We stand by these reservations but, in writing the chapter, we have come to see the objection as misplaced, even if technically correct. The reason we have reconsidered is an interesting TOK point in itself: We have come to see that the issue is less whether indigenous knowledge systems 'really are' an area, and more about us as an IB community of knowers. We know that we make choices when we talk about knowledge – for example; we separate natural and human sciences when we might (arguably) combine them, because we have particular interest in humans. There is a choice to be made about whether or not to highlight the very different and interesting way indigenous cultures use the ways of knowing to study the areas of knowledge that we consider so thoroughly from a modern, largely Western, perspective.

We argue that in the early twenty-first century, the modern Western scientific paradigm is dominant, and that the attendant economic and technological progress is pushing other paradigms and other ways of life to the margins. This means that indigenous knowledge systems, and indeed indigenous people, are in danger of vanishing. We have come to see that this fact is more important (to us) than the intellectual debate about the precise nature of the knowledge systems. That they exist adds something to the richness of the world, whatever their nature, and that they are endangered is (we suggest) good enough reason to study them. Carr said of history, in Chapter 13, '*Study the historian before you begin to study the facts. … Find out what bee he has in his bonnet*' and his message applies more widely, to what we accept as knowledge in the first place, and what is or is not officially included in the TOK course. We value diversity, and we seek to be inclusive; that's why indigenous knowledge systems are in the TOK curriculum. We believe that's reason enough.

44 Do you think indigenous knowledge systems is a combination of other areas or an area in itself?
45 We have tried to explain why we changed our mind about this area. Explain the reason why in your own words.
46 What is gained by including this area in the TOK curriculum? What would be lost by excluding it?
47 Imagine you were a member of an indigenous group. If you had written a book from that perspective, how might you view science, or art, or religion?
48 Why is Question 47 a very difficult question to answer?

Where have we been? Where are we going?

We began with the modern paradigmatic idea that equates knowledge, technological advance and progress, and a possible implication that cultures

which do not develop are, therefore, primitive. We have seen that this might be a flawed conception. Wade Davis, in 'The Wayfinders', puts it this way:

Another way of thinking about this is … I talked about the ideology of communism, but there is also this cult of modernity. We present this idea of modernity as if it exists outside of history and outside of culture. And all the term 'modernity' refers … it just refers to a particular paradigm that we can trace back to Descartes when Descartes said all that existed was mind and material. He sort of swept away all notions of myth, magic, and mysticism. As Saul Bellow says, 'Science made a housecleaning of belief.' And before you knew it, we had de-animated the entire earth, and that explains in a way how we can do what we do to the earth. But that again is a belief system that comes specifically from that place. That's how we think. But you know, the point that I'm always trying to make is it's not that I'm not denigrating my own culture, I'm just trying to say humbly that we're not the paradigm of man's potential. And what we are is just another world view. And so when we export modernity as if it's the inexorable wave of history, I think we're being disingenuous in the extreme.

We have seen that the old paradigm can be seen quite differently – not as primitive, but as valuing different things above technological advancement: memory and tradition, perhaps, above all. While those of us who have lived our whole lives under the influence of the modern and postmodern paradigms may find it natural to see the paradigms of the indigenous peoples as 'simple' or 'irrational', we might do well to recognize that, as we pointed out in the last section, those paradigms have their roots in a deep faith in the invisible world. Religion is not, for the indigenous people, a *part* of their lives, separate from a governing force – religion *is* the governing force; religion shapes their *whole* lives from what they eat to where they live to how they record their histories. It is shared by every member of the culture; there are not multiple religions from which to choose. Their religion is based on different gods than are the Christian, Jewish and Muslim faiths, but the effect and purpose of believing in a supernatural force that brings meaning to life are the same.

Finally, we have acknowledged that our attempt to understand the culture, traditions and knowledge of indigenous peoples has suffered from the same problem faced by all anthropologists trying to learn about cultures in which they were not born, faced by all historians trying to learn about a time other than their own, and indeed faced by all scientists trying to decode the laws of nature: we can only explore the unknown using the conceptual apparatus of our own culture and time. That conceptual apparatus may be provisional, certainly limited and probably incomplete. This is a profound problem, and reflected in and compounded by the fact that we may be trying to learn new concepts through at least one layer of translated language. Since we have seen that language plays a tremendously important role in shaping, maintaining and conveying knowledge in indigenous knowledge systems, the fact that we're working in translation means that our understanding is imperfect – at least to some degree.

Language also poses a tremendous difficulty for indigenous peoples in the present day, because their languages are dying out at a tremendous rate – one every two weeks. Of 270 Australian Aboriginal languages, for example, half have disappeared (Davis, 'Songlines'). Many of these languages are not being taught to young people, who are living lives more and more absorbed into more Westernized culture and so, as the elders die, so does the language. How is it that if a language is lost, a culture is lost, too? If someone is bilingual and can pass the cultural values and traditions on in a second language, doesn't that help preserve that culture? If we now know a great deal about

these cultures and can codify it in, say, English, isn't that good enough? Let us turn, then, to language, and its influence on what we know, and perhaps can know.

Further study


- National Geographic Explorer-in-Residence Wade Davis' lecture series, published as 'The Wayfinders' (House of Anansi Press, 2009), is one of the seminal works of anthropology on indigenous cultures around the world. Additional Davis lectures are also available online at http://tinyurl.com/ndsugk, and links to a number of his videos are available on Vimeo here: http://tinyurl.com/pq8o4ev.
- Robert Wolff's book, *Original Wisdom* (Inner Traditions, 2001) investigates the nature of indigenous knowledge from the personal perspective of a native Malay, trying to learn about his cultural past.

- An excellent source of information about aboriginal art is available at: www.aboriginalart.com.au/. You can take a virtual tour of the totem poles at Sitka National Historical Park here: http://tinyurl.com/obokl9n.

- We have provided only a very minimal explanation of the complex role of the halibut hook in Tlingit culture; it is, in fact, deeply intertwined with the role of the shaman and cultural traditions. You can learn more about it here: http://tinyurl.com/oco7jfv.
- Finally, if you wish to learn more about the mythologies of the world, and particularly about their common elements, there is no better resource than Joseph Campbell's *Hero with a Thousand Faces* (new edition New World Library, 2008).

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17 Language

What's in a name? That which we call a rose By another name would smell as sweet.

William Shakespeare

If thought corrupts language, language can also corrupt thought.

George Orwell

With a knowledge of the name comes a distincter recognition and knowledge of the thing.

Henry David Thoreau

Language is not only the vehicle of thought, it is a great and efficient instrument in thinking.

Humphrey Davy

The limits of my language stand for the limits of my world.

Ludwig Wittgenstein

One of the most powerful aspects of language is the way it is used to make simple classifications: 'animals'; 'courage'; 'blue'. One of the most dangerous aspects of language is the way it is used to make simplistic classifications: 'Third World'; 'fascist'; 'terrorist'; 'communist'.

Anon

Verbosity leads to unclear, inarticulate things.

Dan Quayle

I know more than I can say.

Michael Polanyi

If you can't say it, you don't know it.

Hans Reichenbach

We are getting into semantics again. If we use words, there is a very grave danger they will be misinterpreted.

H.R. Haldeman

We dissect nature along lines laid down by our native language. Language is not simply a reporting device for experience but a defining framework for it.

Benjamin Whorf

A poet is, before anything else, a person who is passionately in love with language.

W.H. Auden

The greatest enemy of clear language is insincerity.

George Orwell

How often misused words generate misleading thoughts.

Herbert Spencer

'When I use a word,' Humpty Dumpty said in rather a scornful tone, 'it means just what I choose it to mean neither more nor less.'
'The question is,' said Alice, 'whether you can make words mean so many different things.'
'The question is,' said Humpty Dumpty, 'which is to be master – that's all.'

Lewis Carroll

I thought: pity the poor in spirit who know neither the enchantment nor the beauty of language.

Muriel Barbery

Aims

By the end of this chapter you should:

- appreciate that language is an incredibly rich and complex mechanism for gaining and sharing knowledge
- appreciate the distinction between language as a neutral, transparent tool for communication and language as a value-laden system of persuasion and implication
- understand that language may not map perfectly to the 'real world' and that this can mask a poor understanding of the 'real world'
- understand the arguments for and against the position that language can affect thought
- begin to appreciate the subtleties and difficulties associated with the concept of 'meaning'
- begin to appreciate the way that knowledge (especially knowledge about our relationships, beliefs, hopes and predictions about the world) are encoded into our language
- appreciate the power of language and its strengths as a way of knowing.

Introduction

■ *The Tower of Babel* by Pieter Breugel the Elder

The Tower of Babel, by Pieter Breugel the Elder, depicts a famous Old Testament story showing the importance of language. Concerned that humans were arrogantly striving to build a tower that would take them to heaven, God splintered their single language into a myriad of tongues, so that humans could no longer speak to each other, and could no longer communicate well enough to work together on the tower. And this is not the only place language appears in mythology, religion, literature and superstition; in many creation myths, the act of naming things brings them into existence, and in some religions the name of God is secret and unutterable. In some cultures, people believe that knowledge of someone's name gives a stranger power over them; in some tribes people even have two names – their 'real' one and one for strangers.

Nor are we in the present day immune to this way of treating words with a certain amount of respect. We are offended when people consistently forget our

names, even if they remember our faces. We feel that referring to humans by numbers and not names is cold and unfeeling (though of course in some ways a number is a word just like a name). Some people have words they would rather not use for fear of bringing bad luck – this is why we use terms like 'pushing up the daisies' rather than the word 'dead'. Some even consider it 'tempting fate' to talk too much about a baby before it is born, fearing the words will bring on a difficult or dangerous birth.

So language seems to enter into our beliefs and knowledge in an interesting way, and in the previous chapter we saw that it can be difficult to convey concepts from one culture to another when the concepts don't exist in the latter. This will be no surprise to IB Diploma Programme students, all of whom learn at least two languages. Using language to share ideas is difficult, because there is an integral relationship between words and concepts; if we don't have concepts, we don't have words for them, and if we don't have words for them, it can be hard to understand the concepts very clearly. We can approximate, certainly, but precision is elusive. An inability to share a language may also mean an inability to share a world view, and *that* tends to create divisiveness. We may be wary of the 'other' whom we do not understand.

We'll examine these ideas in this chapter, and also go on to see that there are issues with language even before we try to share knowledge with each other; that even our own thoughts and personal knowledge may be in part shaped by language. But we'll also see some features of language that mean that it is a remarkably effective tool, doing what is close to an impossible job, most of the time with remarkable success. And in doing so, we'll see that the idea of *language as a model for the world and our stance in the world* provides a good working explanation for all these issues.

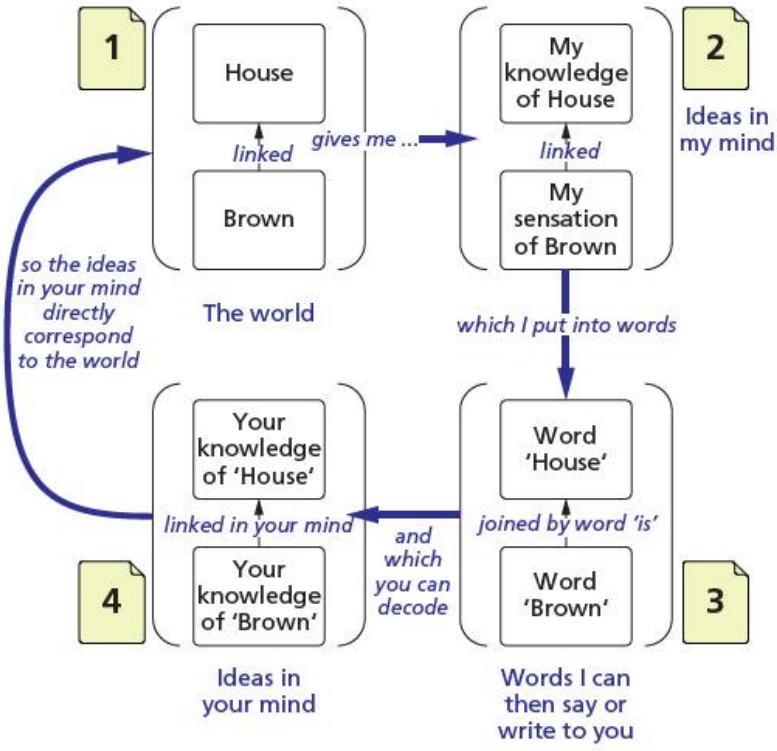
1 When you are trying to solve a problem, or think through a difficult situation, or make an important decision of some sort, to what extent is it useful to think in words? Do you ever find it helpful to read a problem out loud, or discuss the matter? What does this tell you?

What are we talking about when we talk about language?

Obviously, language is a means of communication, and we use it to transmit ideas both orally and in writing. It might be tempting to include body language in our consideration (particularly given the name), to talk about maths as some 'universal language', or to include programming languages such as HTML in our discussion. And indeed in one sense they are languages – they can communicate ideas between people. For our purposes, however, we will be using language in a more refined way – as a spoken or written method of human communication consisting of the use of words in a structured and conventional way. In other words, it is what people 'naturally' speak and write; and if that excludes body or other languages, that is not to denigrate them, but simply to note that they are of a different category to natural languages.

Now, once we have defined the scope of this section of the course, it might appear that things are simple; that language is simply a way of representing/encoding the world or our thoughts about the world. For example, there are houses in the world, and some are brown. By saying 'the house is brown', I am mapping these ideas, which are in my head, into words – 'house' and 'brown' and

using the word 'is' to join them together. I say or write these words, so you can hear or read them, and then you decode them. Thus, you have understood my thoughts. What could be easier?



A very simple, and perhaps misleading, model of language

2 The diagram above shows a model of language which would suggest that it is a straightforward representation of the world, and that communication is transparent. We simply go from stage 1 to stages 2, 3 and 4; and this should map perfectly back to 'the world' in stage 1.
Look carefully at the various stages. Explain carefully where the model is strong, and where it is weak.

3 The model assumes a common spoken/written language, and makes no mention of culture. What complications are introduced when multiple languages are spoken, or when people from different cultures are involved?

4 People often have different competencies in reading, writing, speaking and listening. What complications does this introduce?

Language and values

There may be some truth to the model above, but it's not hard to see that things are much more complex than they might initially appear. To start with, even though we might have the impression that language transparently describes the world, we see that three-quarters of the process above is not about the world, but about our minds, and about words and how we use them. And this leads us to our first issue. Consider these pairs of words:

Devout believers ↔ Fanatics
Black people ↔ Niggers
People of colour ↔ Non-white
Freedom fighters ↔ Terrorists
Strategic pre-emptive initiative ↔ Unprovoked cowardly murder

These words could, according to the model above, simply correspond to people, objects or events in the real world. But which of each pair would you use? Clearly, your choice of words depends on *you* as much as, or even more than, the 'real' person, object or event. The word you use is a projection of your attitudes, beliefs and values, which, we saw in Chapter 15, fuse together to form paradigms that determine how you interpret information and structure thinking.

5 In Chapter 15, we examined the modern paradigm, based around the idea of progress. How would this affect our use of the words 'undeveloped' and 'primitive' or 'ancient' and 'unspoiled' when describing an indigenous tribal people?
6 What words would you use to describe an indigenous tribal people who are living the same lifestyle as they were living a thousand years ago?
7 What are the 'correct' words to use in this case? What issues are raised by even asking this question?

In each of the pairs on page 402, we might distinguish between the object or concept to which the word refers, and the ideas *associated* with it, but not, strictly speaking, in the meaning. Technically, 'black man' and 'nigger' might refer to – that is, the words might denote – the same person, but one is clearly offensive and unacceptable (although it is interesting to note that some black people use the word 'nigger' themselves, and in this context it is not racist). So we say that the **denotation** of the word 'nigger' is a black person, but the word has racist connotations. Many words have **connotations** of this sort; it is an unavoidable feature of language.

8 What are the denotations of the word 'slut' and 'stud' (that is, what do the words stand for)? What are the connotations of the words? What does this tell us about our values?
9 List all the words you can think of that denote 'woman' and write their connotations. Repeat for 'man'. What does this tell us about our values?
10 Here is an account of a fictional historical battle:
The battle of O'mala lasted from August 4th to August 14th. The aim of the Xingchian forces was to divert the invading Wing'tai hordes so that the Xingchians had time to mobilize their citizens and evacuate women and children. Massively outnumbered, defending General Zhang Wei held out for 10 days until he, along with renowned archer Li Jie and Wang Qiang and 222 other defenders were killed.
What is most significant about the last stand at O'mala was not that a small outpost in Wushu province was lost, but that the raiding parties of the Wing'tai first saw the willingness of the Xingchian warriors to resist what they saw as an unjust war of aggression. The battle provided, furthermore, Xingchians with three heroes who had sacrificed themselves and who later provided inspiration in the depths of war.
Rewrite the piece to give essentially the same information but with the opposite bias.
11 Consider the following:
- I am firm; you are stubborn; he is a pig-headed fool.
- I am sparkling and witty; you are talking a lot; he is jabbering on.
- I daydream; you are an escapist; he is totally delusional.

What are the connotations of each item in the sets? 'Conjugate' the following in the same way:
- I am ambitious …
- I have a sense of humour …
- I love my country …

It won't be news to you that we need to be careful with our language, and many groups campaign to adjust language in ways they deem to be better. (Here is an example about people with disabilities http://tinyurl.com/p4fv3e8.) It is tempting to think that language would be a lot easier to use if we could avoid all values, but we can argue that this is simply not possible.

12 Locate and read Margaret's Atwood's short story 'There was once', from her collection *Good Bones* (New Canadian Library, 1997). What does this tell you about the attempt to remove all values, all personal perspective from language?

In our context, the fact that language contains values draws attention to two familiar categories, which we can explore further. First, in using language our ideas are inevitably entwined with our attitudes, beliefs and paradigms – that is, language enters into and is a product of our *personal* knowledge. Secondly, we recognize that an aim of using language is to allow us to get beyond this and to communicate so we can arrive at *shared* knowledge. These are categories we have seen before; and we can, ironically, now understand that the words/categories reflect our own values about the importance of individuals and groups. Let's examine each in turn.

Language and shared knowledge

The first thing we need to acknowledge is that, most of the time, we seem to use language to share knowledge very effectively. For sure, there are times when we have misunderstood each other – often, and for all sorts of reasons, and, while the nature of this section is to look at questions and difficulties, let's not lose sight of the basic fact that even the existence of this book – indeed any book – shows that language is very, very effective. It accomplishes the nearly miraculous phenomenon of transferring very specific patterns of neural activities from the writers' brains to the readers' brains; that is, it communicates ideas. And what's more, it can communicate ideas which have never been previously written, said or even thought before in the whole history of the universe: 'My cat, Phoebe, donned her sparkly purple thinking cap and extemporized an ode on the subject of tuna fish.' Ridiculous situation – indeed an impossible one – but you managed to understand it. Linguists refer to language's ability to use a relatively small number of words to express a near-infinite range of ideas as **productivity** – and it's a crucial feature for sharing, indeed, generating knowledge. Productivity is intimately linked to how we know through imagination; we aren't limited to naming things that everyone can see; nor are we limited in the ways we can arrange our ideas. We can talk about things that are not true, and we can talk about the future, or possible futures. This is a very significant feature of language, and one at the root of our lives as social beings.

Despite this power, using language to generate shared knowledge raises many knowledge questions.

13 Write some sentences you believe have never been constructed before in the whole history of the English language (or the language in which you wrote them, if you wrote in a language other than English). How do you know that they are completely original?

14 Try your sentences out on a friend. Can she understand them? Why? How does she know what they mean?

Miscommunications

For those living in international communities, or learning a foreign language, the complexities of language are often apparent, as translation is so difficult, and occasionally amusing. When the Ford motor company introduced the Pinto car in Brazil, sales were almost non-existent, but when the company later learned

that 'pinto' is Brazilian slang for 'tiny male genitals' all became clear (for similar howlers see http://tinyurl.com/s37s). And even in our own languages, we can talk nonsense (as most politicans' words are recorded, an internet search for their errors reveals a lot). So we know that shared knowledge can be plagued by problems that arise simply because people make mistakes; this applies to any area of knowledge. We acknowledge these, and pass on; our focus will be on issues that would arise even if we make no overt mistakes.

The issues that arise can be seen in puzzles, riddles and jokes which have roots in language. Here are some old favourites:

- What happens when an irresistible force meets an immovable object?
- Question: Which is better – eternal happiness or a bar of chocolate?
  Answer: Nothing is better than eternal happiness, but a bar of chocolate is better than nothing. Therefore a bar of chocolate is better than eternal happiness.

Before you go any further, try to answer the first question and resolve the ridiculous conclusion of the second example.

One obvious difficulty is when a word has several meanings. This is such a persistent problem that logicians talk about the **fallacy of ambiguity** (Kemerling). In the world of physical objects, we are well aware that just because things look the same doesn't necessarily mean that they are the same (we learn this from bitter experience with tomato ketchup and chilli sauce). But this is not always so clear in the world of abstract concepts. A word may appear to be one thing, but turn out to be another.

15 In the following sentences, analyse the different ways in which the bold words are used.
- Speeding is against the **law**.
- Things fall according to the **law** of gravity.
- It's an unwritten **law** that to get big business deals you need to bribe officials.
- If you persistently speed, the **law** of averages says that sooner or later you'll be caught.
- The **laws** of grammar dictate that you should not split infinitives.
- It is the **truth** that a triangle has three sides.
- 'There is ice at the North Pole' is the **truth**.
- There is real **truth** in that painting.
- 'Ain't that the **truth**!'

16 Review your work to date in TOK and find areas where words have had several meanings.

Ambiguity also arises at the sentence level; consider 'Time flies like an arrow.' This looks like a simple sentence – we take it to mean 'Time proceeds as quickly as an arrow proceeds.' But here's another meaning: 'Measure the speed of flies in the same way as you measure the speed of an arrow.' There are at least three other meanings – can you find them?

17 Explain the ambiguities in each of the following sentences:
- I shot an elephant in my pyjamas.
- The car stopped at a rest stop for a coke.
- The driver ran over the pedestrian talking on her cell phone in her car.
- Obama will give an address on Syria in the Rose Garden at 14.00 hours.

18 In each case, you can probably figure out what was intended. How do you know that?

In addition to problems of ambiguity, we can sometimes be led into trouble by the *structure* of sentences. Now structure and **grammar** – that is, the rules that govern

how we combine words to convey meaning – are crucial aspects of a language; without them there would be no language, just unconnected words. But there may be some uncomfortable features that we should scrutinize. For example, a common form of sentence in some languages is 'This chocolate is nice.' It is the structure of the sentence we are interested in here. Similar sentences might be 'The house is brown', 'I am tired', 'We are in love' or 'The rose is red'. This type of sentence may seem innocent enough, but in fact it is clear that the 'niceness' is not attached to the chocolate. 'Niceness' is not a property that can be added to the chocolate like flavouring; it is a part of personal knowledge, not shared knowledge. Now for chocolate this is uncontroversial, but we said in Chapter 14 that the same argument applied to colour; so sometimes language suggests that properties of the mind are to be found in the material world.

19 Each of the following sentences asserts that certain material objects possess certain qualities. In which cases are the qualities properties of the mind, and in which cases are they properties of the objects?
- The drink is sweet.
- She is so sweet.
- This knife is sharp.
- He is as sharp as a knife.
- It is a hot day.
- This curry is hot.
- We are in love.
- The drink is fizzy.
- That is an excellent film.
- Here is a hard chair.
- This is a hard exam.
- He is intelligent.

20 If you found any of the qualities to be in the mind, explain the meanings of the sentences.

21 What does this problem of the relationship between language and reality suggest about language as a way of knowing?

The scope of language in shared knowledge

In light of everything we have seen, it is interesting to ask, then, just what knowledge we can share with language.

22 Assume you have knowledge of each of the following. To what extent can you share the knowledge using language?
- The shape of a spiral
- What 'heat' is
- Good and evil
- The experience of childbirth
- What love feels like
- That La Paz is the capital city of Bolivia
- How to conduct a heart transplant
- How to heat up a can of green beans
- That you ought not to tell lies
- How the scoring works in tennis
- The relationships between polynomial curves of varying degree
- The sensation of embarrassment
- The experience of looking at Vincent van Gogh's painting *Starry Night*

23 Is there any knowledge which you are totally unable to put into words?

24 Is there any knowledge which you can put into words, but which you think might be incomprehensible to others? If so, in what sense is the knowledge 'in words'?

So far the issues we have seen occur when language does not convey what we want it to, or when what it conveys does not seem to correspond to the world, and so perhaps implies something that is not, in fact, knowledge. We turn now to those cases where the power of language is clear – when we manage to actually convey far *more* than is, strictly speaking, contained in the words.

Meaning more than we say

Cartoon from www.cartoonstock.com

One thing that is missing from the diagram on page 402 is the relationship between us and the person with whom we are trying to share knowledge. Often, this is as important as or more important than the actual knowledge itself! We are social creatures embedded in complex and delicate social networks, and so an endless variety of social situations govern whether we actually say literally what we mean, or whether we package up the literal in something else. Imagine, for example, that you are changing a flat tyre on your car on the side of the road on a cold winter's day. Someone approaches and says, 'Got a flat tyre?' What is the psychological meaning here? We might suggest something like:

'Hello. I can see that you have a flat tyre and that you are changing it. It is not good weather to be doing a job like that – I wouldn't want to be doing it by myself! And so perhaps, even though I do not know you, I can help. But I don't really know you well enough just to offer – and I do not wish to be embarrassed by a rejection. Are you approachable and friendly? This is my voice – you can see I am trustworthy. How about you? Will you give me a sign as to whether or not you wish for help?'

Notice that most of this is about the social and emotional needs of the speaker and listener. Very little of it is actually about any 'fact' in the way we sometimes think. Linguists call this kind of language an **indirect speech act**, and we rely on them all the time in our language use in order to negotiate relationships, in addition to conveying content (Pinker). When we get it wrong, it is the stuff of comedy: a child answers a telephone and, when asked by the caller, 'Is your mother home?', responds by saying 'Yes' and then hangs up the phone. Humour aside, this is actually a wonderful piece of evidence for working out what knowledge is conveyed in language and how. The child has behaved in quite a logical fashion; he answered the question that he was asked and, reasonably enough, assumed that the conversation was over. The caller, of course, wanted more – the caller wanted to speak to the mother but did not, in fact, say so. The adult has learnt that the culturally accepted approach is to ease in to the real request by preliminary questions – and, in fact, if an older child or another adult had answered the phone, she would most likely move straight to the next step and fetch the mother without

even realizing that she had not actually been asked to do so. The child has not yet learnt the knowledge implicit in the conventional approach to the conversation.

25 What knowledge does the sentence 'Good morning' convey in these contexts?
- Said by your mother to you on a normal day
- Said by your mother to you at 2p.m. when you have slept in late
- Said to you by your mother at 2a.m. when you have come home late beyond the agreed time
- Said to you by your mother on her birthday
- Said by you to your mother on her birthday
- Said by your teacher to the class at the start of a lesson
- Said by you as you enter the Principal's office on a serious matter
- Texted to you early in the morning by someone you know at school

26 Here are two stories (notice that these are ambiguities, but they depend on conventional usage):
- Mother: Would you like a piece of toast for breakfast?
  Child: No thanks, I'd rather have a whole slice.
- Test question: 'In your own words, explain the formation of the Rift Valley.'
  Student answer: 'xxtewkf dvn tyn s fnwehefwu …'

Explain how these relate to the ideas in the section above.

27 Find some other examples that illustrate the point that we know far more than the words actually say, strictly speaking.

When we were children, we were told that you had to say what you mean, and mean what you say. We have seen that this is asking rather a lot; and that communicating our knowledge is much more complex than simply being precise. As we shall see, however, language influences far more than communication – it enters into the very fabric of what we know.

Language and personal knowledge

We have seen that language is not a neutral means of creating shared knowledge through communicating ideas because issues around stage 3 of the diagram on page 402 arise. But there are other issues too, that arise before and after this stage – issues related to how we even form our ideas in the first place, either as the *originator of language* (before we transfer them to anyone else), or as the *recipient of language*, in how we decode what we hear and construct our own meaning. These are not issues of communication with others; these are issues to do with how language enters into our cognition and knowledge, before we even try to communicate with others.

Language, thought and knowledge

When we looked at the role played by values in language, we saw that apparently neutral terms communicate more than they seem to on the surface. It is possible, however, that the influence of language runs far deeper than this, and that the languages we speak might determine what we can think. Particularly interesting evidence has been found from interviews with bilingual Japanese women living in America. These women were married to Americans and only spoke Japanese when they met each other – they used English the rest of the time. The experiment involved a bilingual Japanese interviewer who visited each woman twice. In the first interview, he chatted with them only in Japanese. In the second interview, he asked them exactly the same questions, but only in English. The results are surprising; rather than giving the same answers but in different languages, as one might expect, the answers that were given seemed to depend on

the language spoken. Here are two examples where the same woman seemed to change her views completely.

- '*When my wishes conflict with my family's …*
  … it is a time of great unhappiness.' (Japanese)
  … I do what I want.' (English)
- '*Real friends should …*
  … help each other.' (Japanese)
  … be very frank.' (English) (Farb 184)

It has been argued that these women lived in different language worlds when they spoke English and Japanese, and this accounted for the difference in their answers, attitudes and thoughts.

28 If you speak more than one language, do you think differently when you are operating in each language? Are there things that you cannot say in one language; is there knowledge that is not accessible in that language?

The idea that our thoughts are completely limited by our language is called **linguistic determinism**, or sometimes the **Sapir–Whorf hypothesis**, after the two anthropologists who suggested it. In its strongest form, it suggests that '*We cut nature up, organize it into concepts, and ascribe significances as we do, largely because [of] the patterns of our language*' (Whorf). The idea was famously extended by George Orwell in *1984*, when he wrote about the government-invented language, Newspeak:

The purpose of Newspeak was not only to provide a medium of expression for the world-view and mental habits proper to devotees of Ingsoc [the ruling political party], but to make all other modes of Language and thought impossible. It was intended that when Newspeak had been adopted once and for all and Oldspeak forgotten, a heretical thought – that is a thought divergent from the principles of Ingsoc – should be literally unthinkable, at least so far as thought is dependent on words. Its vocabulary was so constructed as to give exact and often very subtle expression to every meaning that a party member could properly wish to express, while excluding all other meanings and also the possibility of arriving at them by indirect methods. This was done partly by the invention of new words but chiefly by eliminating undesirable words and by stripping such words as remained of unorthodox meanings, and so far as possible of all secondary meanings whatever. To give a simple example – the word 'free' still existed in Newspeak, but it could only be used in statements such as 'This dog is free from lice' or 'This field is free from weeds'. It could not be used in its old sense of 'politically free' or 'intellectually free', since political and intellectual freedom no longer existed even as concepts, and were therefore of necessity nameless. Quite apart from the suppression of definitely heretical words, reduction of vocabulary was regarded as an end in itself, and no word that could be dispensed with was allowed to survive. Newspeak was designed not to extend but to diminish the range of thought, and this purpose was indirectly assisted by cutting the choice of words down to a minimum. (Orwell 298–99)

29 Orwell notes that 'a heretical thought … should be literally unthinkable'. What does he mean?

30 Do you think that his analysis of the term 'free' is correct? Would people have the concept without the word?

31 Orwell is writing about a totalitarian society where language is under the direct control of the government. Is the passage relevant to us in a more general sense?

In its strongest form, linguistic determinism suggests that language is the way humans solve what we have seen as a fundamental problem with our perception – our need to provide a structure to our sensory inputs. It suggests that people literally think in English, or Spanish, or Kiswahili. Be clear that this has moved well beyond the vague 'French is the language of love' statement – it is a very precise articulation of the notion that our complete conceptual and intellectual apparatus is intimately linked to the spoken language. A little reflection shows that this extreme case cannot be correct. How do we derive new concepts or words if we can never go beyond our linguistic categories? How can an infant learn anything at all? For these and other reasons, linguists no longer consider strong linguistic determinism to be a tenable position; and the question is now more about how much, and to what extent, our thoughts are influenced by our language.

It does seem that there is a role played by language in acquiring skills and learning how to do things. Think, for example, of the surgeon specializing in the human hand who has a vast knowledge of every muscle, vein and joint. Much of this knowledge comes from extensive experience and training, but the training is not just a matter of chance. Training (in which, over the course of a few years, it is possible to pass on what has taken hundreds of years to find out) is only possible because the medical profession has developed a highly specialized and technical sub-language which has the sole purpose of communicating anatomical structure and form. The training of the surgeon must involve learning this dialect, because without it the anatomical facts could not be passed on to her with any degree of precision. You need one to get the other. So, in practice, the knowledge and the language of the knowledge are not distinct, but intertwined.

32 Is there anything that you know where you think the language is inseparably entwined with the knowledge?
33 How do you think the surgeon learnt the vocabulary she needed? Could you sit in your room and learn it? What does your answer tell you about the way language and experience operate together?
34 Explain, in words, how to tie your shoelaces. Do the words make it any easier? Do you use the words when you are tying your laces? Or do words get in the way?
35 To what extent are your skills and thoughts dependent on language?

Knowing what we know of language; intuition

We saw, when considering shared knowledge, that our language communicates much more than a simple message; it conveys relationships, expectations, hopes and invitations. We know how to interpret 'Got a flat tyre?'; and a lot of that comes from a shared context – perhaps of standing over a car on the side of the road. But this issue runs deep in language; and most of the time we do not even realize the huge web of beliefs and unstated rules that are implicit in our language use. As a simple example, consider 'That is a big red balloon'. We instinctively choose it over the equally correct 'That is a red big balloon' – which sounds completely wrong, even though we are unable to say why. Similar cases exist in other languages – in French, for example, you can say 'un grand ballon rouge' but you would not say 'un ballon rouge grand' ('Colorless green ideas'). It is not hard to see that that which seems obvious and natural to us is intuitive, beyond our conscious knowledge (in this context, beyond 'conscious knowledge' is almost a *definition* of 'natural'); but sometimes issues of translation foreground matters surprisingly.

One of my German students once said that 'Hab dich lieb' means 'I love you' in German. I don't speak German, but I had thought that 'I love you' was translated as 'Ich liebe dich'. When I asked the student if there was a difference, she said at first that they were the same. The conversation went as follows:

'So are there any other ways you could say "I love you" in German?'

'You could say "Ich mag dich", but you wouldn't say that to your best friend.'

'Why not?'

'It's not as strong as "I love you" in English. "Hab dich lieb" is friendlier.'

'So "Ich mag dich" is an unfriendly way of saying "I love you"?'

'No! It's just that "Hab dich lieb" would be something between boyfriend and girlfriend, or maybe mother and child, or best friends. "Ich mag dich" is more like "I like you". You would say it to somebody if you wanted to get together with them.'

'So would a husband say "Hab dich lieb" to his wife?'

'Not really,' (*screws face up*) 'It's kind of a teenager thing. Or maybe between best friends, or a mother and child. You have to really know each other to use it, but adults wouldn't use it. "Hab dich lieb" is kind of a cute or a cool way of saying it. Adults would sound pretty funny saying it. A husband would say "Ich liebe dich" to his wife. That's closest to "I love you" in English.'

'What would you say to a really close friend?'

'As a teenage girl, I would say "Hab dich lieb".'

'So boys couldn't say that?'

'Well that would indicate that they were gay.'

'But it doesn't mean that girls who say it are lesbian?'

'No.'

'So how would straight teenage boys indicate that they liked their best male friend very much?'

'"Ich mag dich" I suppose ... But that sounds pretty weird. Guys just wouldn't say that, or maybe they'd just say something like "Du bist cool" – "You're cool".'

'OK. And what about if you love running, or eating chocolate, or something?'

'"Ich liebe rennen" is "I love running". "Ich liebe ..." can be about things or people, but when it's about people it must be about boyfriend/girlfriend.'

'And what about "Hab dich lieb"?'

'That can only be about people.'

'How about I love my pet cat?'

'No. That would be either "Ich lieb meine Katze" or "Ich mag meine Katze" – either would be OK.'

36 The German student who told me all this thought that she knew what 'Hab dich lieb' meant, and indeed she did, though perhaps not consciously until we had discussed it. The sentence meant a lot more than it appeared to, and had more meanings than can be found in a dictionary. Find something that is similar in one of the languages you speak. You are looking for language which appears very simple but in fact has many shades of grey, many hidden rules, and which is doing far more than the simple, straightforward communication of one meaning.

37 How many ways do we use the word 'love' in English? (Aside from its meaning in tennis!)

38 If you speak other languages, how are different kinds of love identified in those languages?

As well as the actual nuances of the language, what is fascinating here was that this is actually a summary of a conversation that took a long time, with the student testing out her ideas by speaking German to herself, and checking with another German speaker. She was not consciously aware of most of the subtleties until I asked her; she didn't know what she knew, and had I been a native German speaker myself, I doubt I would have been able to ask the right questions. So it seems that knowing how to use language properly, in all its subtleties and nuances, is highly intuitive and beyond all conscious rational processes. It is encouraging to see that, despite this, it is possible to discover how we use language, especially in conversation with speakers of other languages, who make us aware of differences. But it does raise the question of whether there's anything beyond the ability of language to communicate, that will remain personal and cannot, in principle, be shared.

Language and experience

We are all familiar with the feeling that we are not understood, that nobody sees the world quite like us, and that we are, in some abstract sense, alone. We have seen in earlier chapters that there may be good reasons for this: we have no way of being certain if, for example, our perception of colour indicates anything meaningful about the world outside our minds, or if our perceptions are the same as those of others. Our individual human awarenesses are located in worlds of experience that are completely isolated from one another. It's a scary thought.

But perhaps language can provide us with some solace. We tend to assume that we can build bridges between the individual islands of our own experience through language. To some extent, this must be true – using conventional *symbols*, we stimulate the senses of other people and hope that they perceive our symbols. But maybe we are not really interested in the transfer of symbols – what we really want to do is transfer something of our world of *experience* to other people, and to receive some *experience* back. It is only because of our profound material limitations that we have to do it via abstract symbols. We long for a way to escape our isolation, for a way to transfer content directly and without distorting intermediaries, which we would love to bypass, if only we could.

As far as we know, all living creatures share our predicament. Like us, animals resort to symbols – they use coloured feathers, complex dances, mating songs, chemical markers and so on. We are fortunate in that our system of abstract symbols is highly evolved and able to represent far more complex information and experiences. With literature, and particularly with poetry, we can do remarkable things. But as far as we know, we are the only species which is capable

of recognizing that we can never transfer experience, or capable of knowing misery because of that fact. For all the remarkable sophistication of our thinking and language, experience will forever remain personal and not shared.

39 Explain what is meant by 'experience' in the context of this passage.
40 Why should we want to transfer experience?
41 Why might we never be able to transfer experience?
42 Do you think we can, in fact, ever transmit experience, despite the pessimism above?

Language and meaning

We have seen that the denotation of a word may have connotations; also that different language users can interpret the ideas put into language differently; and, further, we have seen that language can enter into how we understand and categorize what we know. In each case, the issues have skirted the central concept of *meaning*, and it is to this difficult concept we now turn. The meaning of a word or sentence is the idea that the word or sentence attempts to convey or signify; it is the *content* of the language. Looking back at the diagram on page 402, we can see that if stage 4 corresponds to stage 1, then meaning has been transferred successfully. And we have seen reasons why that might not always be the case, even though it very often is.

We know that a word is not the thing itself, but a symbolic representation of a thing. This is what we mean by 'meaning' – one thing stands for something else; it is a model. This is why a thing can be represented by so many different words in so many different languages. Consider, for example, the word 'chair' – here it is in several languages: silla, stoel, كرسي, рельсовая подушк, cadira, 椅子, židle, chaise, כסא, stol, kerusi, ကုလားထိုင်, mwenyekiti, ಕುರ್ಚಿ, стілець, cathedra, gadeirydd, rooj zaum, کرسی.

One point that jumps out immediately is that the relationship between words and meaning is completely arbitrary. Contrary to the superstitions we discussed in the introduction, words have no intrinsic connections to the object; the word is simply the combination of sounds that long ago became associated with the object, and the written word is the arbitrary combination of marks that has been developed to represent the sounds.

43 Take a word or phrase which seems firmly 'attached' to its meaning – perhaps your name, the name of your school or a common object. In a quiet room by yourself, slowly repeat the word/phrase, for a few minutes. Observe the experience you undergo. What does this tell you about the nature of words, and the nature of perception?

The words listed above are clearly very different words, yet if you put a set of objects in a room, one of them a chair, and asked, in his native language, a speaker of each of these languages to pick out the chair, each one would unerringly pick out the same object. No surprises there. But what is surprising, even puzzling, is that the word does not, contrary to a simple model of language, refer to any *specific* thing. The word 'chair' may conjure up in your mind an image, and different readers will have different images. But almost anyone will be able to identify chairs which look utterly different to the ones they were imagining, and which they have never, ever seen before. This fact, based on commonplace observation and reflection is a remarkable one; and reflects the astonishing ability of language to be both specific and precise, but also general, flexible and constantly open to revision.

44 Do an image search for 'strange chairs'. How is it that one word can mean something which covers such a variety of objects, when these objects are so different, unique and new to your senses?

If the problem of what a word means is this difficult with a concrete object such as a chair, that everyone can see and point to, touch and feel, then things get even harder with abstractions. The philosopher Ludwig Wittgenstein gave a now-famous example:

Consider for example the proceedings we call 'games'. I mean board games, card games, ball games, Olympic games and so on. What is common to them all? Don't say there must be something common, or they would not all be called 'games' – but look and see whether there is anything common at all. For if you look at them you will not see something that is common to all, but similarities, relationships, and a whole lot of them at that. To repeat: don't think, but look! Look, for example, at board games, with their multifarious relationships. Now pass to card games; here you will find many correspondences with the first group, but many common features drop out and others appear. When we pass to ball games, much that is common is retained, but much is lost. Are they all 'amusing'? Compare chess with noughts and crosses. Or is there always winning and losing, or competition between players? Think of patience. In ball games there is winning and losing but when a child throws his ball at the wall and catches it again, the feature has disappeared. Look at the parts played by skill and luck; and at the difference between skill in chess and skill in tennis. Think now of games like ring-a-ring-a-roses; here is the element of amusement, but how many other characteristics have disappeared. And we can go through the many, many other groups of games in the same way; we can see how similarities crop up and disappear (31–32).

It certainly seems strange that the only thing that all games have in common is that we call them 'games', but that we cannot find necessary and sufficient conditions for a game to be a game. However you define 'game', something is either excluded when it should be included, or included when it should be excluded. Wittgenstein suggests that this is true about words generally – they are far more complex than they appear to be. This is perhaps more obvious with abstractions and once we move beyond nouns. What do 'different' or 'perhaps' or 'wonderful' label? They clearly do not refer to any object at all, even an abstract one. And we can go further to combine the words into sentences that have no reference whatsoever to physical objects in the world: 'Perhaps love would seem more wonderful if it didn't entail great responsibility'. No native speaker of English has any real difficulty in knowing what those words mean: they refer to emotional and mental experiences, and to our attitudes towards those experiences – that is, they are about things that happen inside our minds.

The lack of correspondence with the real world is an obvious feature of words that represent abstractions, but linguist Noam Chomsky has argued that it is actually true of language generally, including those words that apparently do directly correspond to the world. He asks us to consider the example of the phrase 'brown house'. This seems to directly refer to a building of a precise colour. Now, let's ignore any issues of sense perception, or what constitutes a house rather than a home, apartment, bungalow, duplex and so on (difficult though these are). Let's imagine we agree on a specific building of a particular hue, and let's examine what we know when we use the phrase 'brown house'. We know that only the outside is intended to be brown, but not the inside, which is probably many different colours. In this sense, we use the word 'house' in the sense of a surface, or a covering. A little thought shows that we use 'mountain', 'igloo' and many other words in much the same way. (To show this, consider the following observation: when you are in a cave inside a mountain you would probably say that you could no longer see the mountain, even though you could see the interior cave walls; 'mountain', therefore, must refer to the exterior of the object.) The assumption works for imaginary objects as well – 'the golden castle floating in the air' is understood to have a golden exterior, not interior. So the 'brown house' seems to refer to something beyond a house which is brown: it means something about the geometric surfaces which are brown (though probably not all of them, and not, for example, the windows).

This might be slightly surprising, but in fact it's even more complex because it doesn't always mean that; we do not always think of the 'brown house' as the geometric surface. If I am *inside* a brown house I would never say that I am near it; nor, if I were in the middle of the house, would I say that I am further from the house than someone standing at the front door, which would be a logical thing to say if we really thought of the house as a surface. Now the brown house is not a surface, but more like a volume.

So in some contexts the house is a surface, but in others it is not. What, then, does 'brown house' really mean? Does it have many meanings?
So much for the meaning of 'house' referring to some physical object in a straightforward way …

45 I have half a litre of milk which is in a carton in a shopping bag. I also have 5 litres of blood in my body. I arrive at my car, put the shopping in the back and sit in the driving seat. Would you describe the milk as being in the car? Would you describe the blood as being in the car?

46 Most people would describe the milk, but not the blood, as being in the car – even though from a spatial point of view, the blood is in the car just as certainly as is the milk. So why do we use language differently in each case? What do we know, but (almost) never need to state about blood and about milk that makes a difference here?

47 Find a phrase that appears simple, and analyse it like we analysed 'brown house' or 'the milk is in the car' above.

48 Why is the task in Question 47 so very difficult? What does this tell us about language and the personal knowledge we have? What does it tell us about language and its use to create shared knowledge?

To analyse this further would lead us into difficult linguistic areas. For our purposes, we simply note the complexity of even simple phrases such as 'brown house', or 'the milk is in the car'. Even these simple two phrases clearly show that language does actually rely on, and indeed encode, a staggering amount of knowledge into the meanings of words.

It may be, in fact, that all this encoded knowledge is not a bug, but a feature of language. It may be *precisely and only because all this knowledge is there* that we can understand each other nearly all the time. The world is such a complex place that without these shared understandings we would be having to ask 'did you mean the surface of the house, or the interior of the house?' and a hundred other such questions every time we wanted to talk (and of course, we'd need to clarify each word in each question too). Under these circumstances language would be useless as a tool; and perhaps it is just our initial model (page 402) that needs revising so that we do not have unrealistic expectations. Perhaps it is only because the shared understandings (paradigms) are below conscious awareness that it seems problematic at all. Chomsky writes:

About all we can say at a general level is that the words of our language provide complex perspectives that offer us highly special ways to think about things – to ask for them, tell people about them etc. … People use words to refer to things in complex ways, reflecting interests and circumstances, but the words do not refer; there is no word–thing relation … (Chomsky 22).

49 In light of the discussion above, how would you amend the diagram on page 402 to reflect the role of language?

Language as a model

We have thoroughly discredited the idea that there is a direct correspondence between objects and the world. Here we support Chomsky's point in the section above, but we phrase it slightly differently. We suggest that language provides a model for the world that reflects our interests – we might even call it a paradigm in itself.

50 How many things are in this picture? Three – one table, two benches? Or 12 planks, 36 screws, 800ml of varnish and a kilogram of glue? Or one dining set? Or around 10^{28} atoms?

51 Who would use which description? Are any descriptions better than others? See this site discussing the re-naming of Pluto from a planet to a dwarf planet: http://tinyurl.com/466rftl. Explain how this change in name relates to the idea of language as a model for our knowledge.

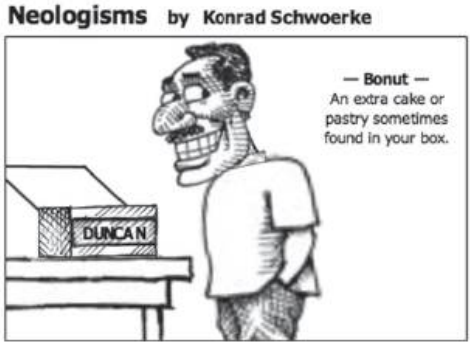
The picture above could show one place to eat for a family in search of a picnic, a number of pieces of wood for a carpenter about to disassemble it, and three things to us when asked to count. This may seem a trivial example, but in fact the words

matter. After 9/11, it made a difference of billions of dollars: was this one attack, or two separate ones – one on each tower? The insurance policy covered one incident, not two – so the difference between the singular and the plural ('attack' or 'attacks') was a weighty one. We see again that the language is not just about the world, but how we choose to conceptualize it; that is, what we say and know depends on us, how we view the world, and what we want the world to be; and if language is to be an effective tool, we would not have it any other way.

Our language shows us that we dissect nature along lines that suit us, and in ways that fit the words we have. But we do not have words for every concept or thing, and some ideas only have specific words in particular languages.

Word	Language	English meaning
Geram	Portuguese	unbearably cute
Verfremdung	German	the act of making something strange or alien
Mamihlapinatapai	Yagha	the state of mind in which two people regard each other, and both want something done, but neither of them wants to be the first to do it
Koev halev	Hebrew	empathizing with someone else so deeply that it causes your heart to ache

When we read these words we generally think 'Aha! I know that!'.



Cartoon from www.funnytimes.com

These words are, therefore, strong evidence that speakers of the two languages share common mental models – which is, in this case, the world of universal human emotion. But it is true that having the word makes the feelings slightly more accessible – it's easier to think about, and certainly to discuss, something when you can name it. And this is a strong reason to develop a large vocabulary, preserve languages, and embrace new words (**neologisms**); they enlarge and enrich and deepen our models of understanding, of which language is one prime example. In *The Meaning of Liff*, Douglas Adams takes things one step further by inventing words which do not, but which should exist. Here is a selection:

corriearklet (n) *The moment at which two people approaching from opposite ends of a long passageway, recognize each other and immediately pretend they haven't. This is to avoid the ghastly embarrassment of having to continue recognizing each other the whole length of the corridor.*

elbonics (n) *The actions of two people manoeuvring for an armrest in a cinema.*

oughterby (n) *Someone you don't want to invite to a party but whom you know you have to as a matter of duty.*

sconser (n) *A person who looks around when talking to you, to see if there's anyone more interesting about.*

scaptoft (n) *The absurd flap of hair a vain and balding man grows long above one ear to comb it to the other ear.*

shoeburyness (n) *The vague uncomfortable feeling you get when sitting on a seat which is still warm from somebody else's bottom.*

52 Observe your own internal reaction to 'corriearklet'. Now you have a word for it, does it sharpen your understanding of the experience? What does that tell you about your model of language?

53 Identify some more mental concepts for which there should be words. Why is it difficult to do so? What implications does this have for the relationship between language and thought?

54 Explore the hilarious http://tinyurl.com/oz2f5em and find some neologisms which you think really should become common because they capture a general stance or attitude or approach to the world. Discuss your choice with others, and note that the words you choose say a lot about you and your priorities.

In Chapter 4, we looked at René Magritte's painting *The Treachery of Images*. Just as his image of a smoker's pipe is an *image* of the pipe and not the pipe itself, language is a representation of the world and its objects and human ideas and experiences, not the things themselves. The disappointment, if we want to call it that, is that language, too, turns out to be unable to give us certainty about the world around us. The advantage – and it is a huge one – is that because language is a model, it is abstract, and it allows us to think abstractly.

Because language itself is abstract, we seem to be led to think abstractly. Because we can think abstractly, we don't have to talk about what is in our immediate physical environment. We can plan for the future, we can create art, we can create complex social organizations. All of these things are possible because we can think abstractly ('Colorless green ideas').

Like all other models, this one is flexible and open to reinterpretation when it turns out to be problematic. We use language to conceptualize to ourselves the vast data streams we encounter every moment, to structure the reasoning that we use to operate based on that data stream and to shape our emotional responses to the data stream. We also use it to share with each other a vast portion of our beliefs in all areas of knowledge, and, so long as we are willing to remain open to revise our language when it is found wanting, it is an extremely effective tool. Language is the mechanism of our personal interrelationships, and it is the mechanism of our shared cultural memory.

The power of language

The central role of language in creating and communicating knowledge is clear, and we can now see why language issues have arisen throughout the whole Theory of Knowledge course. We close with a brief review, and a reminder that despite the issues we have encountered, this central role means that language provides an extraordinary tool which we can use to acquire and share knowledge, and also to motivate and move others, and hence to change the world for the better.

Language, the areas of knowledge and the ways of knowing

Even before this chapter, we came across language issues several times, and we are now in a position to look back and review. We know that the natural and human sciences have their own technical language and use words in precise ways that are not always the same as in everyday conversation. 'Force' and 'energy', for example, mean very precise things in physics; their technical definitions are intentionally designed to remove from them all the ambiguity and networks of associations that we have seen in natural language. And now we can see why; the sciences attempt to describe the world as it is (the scientific method can be seen as a systematic way of removing the individual scientist from the picture) and so there is no room to encode our hopes and wishes into the technical language; the model of science is not the same model that we need to negotiate our daily lives, and so it uses the tool of language differently. This is even more true of mathematics, where we try to strip out any connection to the physical world, and to derive a skeleton set of logically consistent, unambiguous theorems. That the language of maths is so remote from our everyday experience of language and the world, is one reason why some find it so impenetrable; the gain of clarity and precision in mathematics comes at a cost. So maths and sciences are both, in a sense, looking for the 'correct language' to describe facts about logical relationships and facts about the world, respectively. That is a far cry from a natural language which allows us to negotiate relationships with other humans, in all their complexities.

The contrast with ethics, history and religion could not be more stark; these are areas *all about* relationships, intentions and human actions. And so the everyday languages we use work more effectively. They bring the multi-faceted approach we need, and they convey nuance and possibility, but they do not bring precision or certainty. And we can see that much religious language is about mediating relationships between believers (cementing solidarity and shared faith) or between believers and God; the literal truths are truths about these relationships.

We have also seen, and will see again, that the arts, and literature particularly, can be seen as attempts to rail against the fundamental human condition of isolation. Most of the time, this isolation is masked by our extraordinarily successful use of language; but our exploration has also demonstrated that language is simply not up to the task of transferring experience; the best it can do is point, and show how things look to others. While the basic problem of experience is unassailable, this can be remarkably powerful, and it is to this power we now turn.

55 Explain in your own words the different roles that language plays in the various areas of knowledge. In your answer refer to the idea of language as a model, and also to the specific details, methods and aims of each area of knowledge.

Language to change the world

We have seen that there are many difficulties with using language as a way of knowing. Whether we are talking about personal or shared knowledge, language gives us a model of, not direct access to, the mental experiences of other people, or to the unalloyed truth. But it would be wrong to deny the power of language, because we have all had language experiences which inspire high ideals and motivate difficult actions.

In Chapter 13, you read the Sullivan Ballou letter and saw how the words of one individual to another have the power to express the value of their personal relationship in a way so deeply felt and memorable that the letter has become an object of historical importance. This is because that letter expresses a feeling that we can relate to in a visceral way 150 years later – either because we know what it is like to love or be loved like that, or because Sullivan Ballou's words give us hope that human beings are capable of such love, and, since they are, we have a better self that might, at any moment, help us rise above some of the problems we have wrought in the world. Indeed, throughout history, words have been the catalyst for huge social and moral changes. Consider Martin Luther King, Jr.'s most famous speech:

I say to you today, my friends, that in spite of the difficulties and frustrations of the moment, I still have a dream. It is a dream deeply rooted in the American dream. I have a dream that one day this nation will rise up and live out the true meaning of its creed: 'We hold these truths to be self-evident: that all men are created equal.' I have a dream that one day on the red hills of Georgia the sons of former slaves and the sons of former slave owners will be able to sit down together at a table of brotherhood. I have a dream that one day even the state of Mississippi, a desert state, sweltering with the heat of injustice and oppression, will be transformed into an oasis of freedom and justice. I have a dream that my four children will one day live in a nation where they will not be judged by the color of their skin but by the content of their character.

From the UN Declaration of Human Rights, to Emmeline Pankhurst's 'Freedom or death' and Nelson Mandela's 'An ideal for which I am prepared to die' speeches, language well used has the power to shape the world for the better. And this means that language has not only been understood – it has taught, unified and inspired. While we can hold in our minds the *problems*, therefore, let's not ever underestimate the *power* of language.

History is not, of course, the only area of knowledge in which language is a powerful force. All the literature of the world has a basis in words, and the great works of literature span centuries. To take just one example: we analysed in Chapter 4 Macbeth's soliloquy from Act V of Shakespeare's *Macbeth*, believed to have been written sometime between 1604 and 1607. Let's take another look at it:

Tomorrow, and tomorrow, and tomorrow,
Creeps in this petty pace from day to day,
To the last syllable of recorded time;
And all our yesterdays have lighted fools
The way to dusty death. Out, out, brief candle!
Life's but a walking shadow, a poor player
That struts and frets his hour upon the stage,
And then is heard no more; it is a tale
Told by an idiot, full of sound and fury
Signifying nothing.

Macbeth (Act V, scene 5, lines 17–28)

Four hundred years later, we sit in a dark theatre, or read the words on a page, and we are amazed at the perception of a playwright who saw so clearly, and expressed so beautifully, the sense of utter meaninglessness to which the soul of a greedy, insecure, egomaniacal man may be driven. We are connected, by those words, to a mind that saw piercingly into human nature in its worst moments,

who understood that the despair was self-inflicted, and who is still telling us, all these centuries later, that it doesn't have to be that way. And for all the problems of language, it is not a barrier; we can hear him. It is hard to overstate the possible implications for our lives.

This is the miraculous bounty of language: nothing can give us direct access to the mental experience of the mind of any other human being, but language can serve as a window that gives us enough of an entry to each other's minds that we connect to each other and are not alone in an unbounded universe.

56 Find a piece of language that you find to be meaningful and powerful; perhaps that has inspired you. Share it with the rest of the class.

Where have we been? Where are we going?

We have seen that if we want absolute certainty, language as a way of knowing is not going to give it to us. Language is full of pitfalls that can lead to misunderstandings – some of them small and easily resolved; others large and extremely troublesome. But before we give into the temptation to throw up our hands and consign language to the realm of virtually useless tools, we should stop and realize that, in fact, despite all of the potential problems, we can, and do, rely on our language every day to help us to communicate to others and to learn from others myriad things. We have seen that we can use language as a way of knowing basic information – what happens in some given situation – but also as a way of knowing what people value, what things we have not experienced are like, at least to some degree, and, as Stephen Pinker puts it, as a window into human nature, and we use it to shape our personal relationships.

Obviously, we have pretty high confidence in the power of language to convey ideas; we are, after all, writing this book using language, and so we must have some faith in the idea that you will understand what we are trying to convey. Admittedly, in the end, we cannot prove that you will understand perfectly everything we say, so that the mental experience we are having as we put down the words is conveyed in exact form, with all its emotional colouring and linguistic nuance, but past experience tells us, as no doubt your past experience

has taught you, that we can understand each other well enough to make progress in the world. We have faith.

We have already seen that religious systems require faith in a world that we cannot see, and that reliance on our sense perception requires faith in the existence of a real world that we cannot prove exists. Now we see that our ability to communicate also requires faith. Faith, clearly, is a potent force in our lives, and so it is to faith that we will turn for the last chapter in our quest for certainty.

Further study

- The most profound and wide-ranging introductions to a wide range of language issues are Stephen Pinker's *The Language Instinct* (William Morrow and Co., 1994) and *The Stuff of Thought* (Allen Lane 2007) – in fact, they are, in our view, the best two TOK books you will find (after this one, obviously). Narrower, but still excellent, is S.I. Hayakawa's *Language, Thought and Action* (Allen & Unwin, 1974). A very readable and practical source is David Crystal's *How Language Works* (Avery, 2007). This book also includes a detailed discussion of the biology of language. The wonderful video collection *The Human Language Series* (1995), directed by Gene Searchinger, provides a fascinating investigation into all aspects of language, and is available on the Boston University YouTube channel here: http://tinyurl.com/q4f47hr.
- If you are interested in a more detailed look at how we use language to negotiate human relationships, then you can view Stephen Pinker's talk at the RSA: 'Language as a window into human nature' available here: http://tinyurl.com/pyn5vzt. There is a very good RSA Animate version here: http://tinyurl.com/ogntd9z.
- For an entertaining guide to deceptive language try William Lutz's *Doublespeak* (Harper and Row, 1989). The problem of meaning is well covered in many philosophy texts. We can recommend as a very brief introduction Thomas Nagel's *What Does It All Mean?* (Oxford University Press, 1987), Chapter 5. Two more general overviews are provided in Reuben Abel's *Man is the Measure* (The Free Press, 1976), Chapter 7, and John Hopper's *Introduction to Philosophical Analysis* (Prentice Hall, 1953). A fascinating, less philosophical and more comprehensive guide is found in David Crystal's *Cambridge Encyclopaedia of Language* (Cambridge University Press, 1992), and Geoffrey Pullman's *The Great Eskimo Vocabulary Hoax and Other Irreverent Essays on the Study of Language* (University of Chicago Press, 1991) remains an entertaining and informative peek at some areas and characters in linguistics.
- Umberto Eco's *Mouse or Rat? Translation as Negotiation* (Weidenfeld and Nicolson, 2003) is a marvellous account of the problems of interpretation/translation (and it is one of Eco's more accessible books). Howard Rheingold's *They Have a Word For It* (Sarabande Books, 2000) is a light-hearted look at words that exist in one language but not another – very funny! As an introduction to the subtle and controversial aspects of language it is hard to beat Noam Chomsky's *Language and Thought* (Moyer Bell, 1993) or the early chapters in *Powers and Prospects* (Pluto Press, 1996). These are difficult but very rewarding.

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18 Faith

I believe in Christianity as I believe that the sun has risen: not only because I see it, but because by it I see everything else.

C.S. Lewis

I am fundamentally an optimist. Whether that comes from nature or nurture, I cannot say. Part of being optimistic is keeping one's head pointed toward the sun, one's feet moving forward. There were many dark moments when my faith in humanity was sorely tested, but I would not and could not give myself up to despair. That way lays defeat and death.

Nelson Mandela

None of us knows what might happen even the next minute, yet still we go forward. Because we trust. Because we have Faith.

Paulo Coelho

Faith is about doing. You are how you act, not just how you believe.

Mitch Albom

Extraordinary claims require extraordinary evidence.

Carl Sagan

When you get to the end of all the light you know and it's time to step into the darkness of the unknown, faith is knowing that one of two things shall happen: either you will be given something solid to stand on, or you will be taught how to fly.

Edward Teller

Faith is the license religious people give themselves to keep believing when reasons fail.

Sam Harris

Some things have to be believed to be seen.

Madeleine L'Engle

Say what you will about the sweet miracle of unquestioning faith, I consider a capacity for it terrifying and absolutely vile.

Kurt Vonnegut

Faith is when you believe something you know ain't true.

Mark Twain

I have been driven many times upon my knees by the overwhelming conviction that I had nowhere else to go. My own wisdom and that of all about me seemed insufficient for that day.

Abraham Lincoln

Faith consists in believing when it is beyond the power of reason to believe.

Voltaire

Faith is universal. Our specific methods for understanding it are arbitrary. Some of us pray to Jesus, some of us go to Mecca, some of us study subatomic particles. In the end we are all just searching for truth, that which is greater than ourselves.

Dan Brown

I know of no society in human history that ever suffered because its people became too desirous of evidence in support of their core beliefs.

Sam Harris

Because you believed I was capable of behaving decently, I did.

Paulo Coelho

Aims

By the end of this chapter you should:

- be able to define faith
- be able to explain how faith functions in both religious and secular contexts
- be able to identify problems of faith as a way of knowing
- understand the important role of evidence in justifying faith
- understand why we need to be able to have faith in order to have knowledge
- understand the relationship between faith and certainty.

Introduction

There is an age-old story about a man who, having been told that if he had faith in God he could face tigers, walked into a cage with a full-grown Bengal tiger and held out his arms in a gesture of peace and welcome. The tiger, it is perhaps not even necessary to say, killed the man. There are two points here: one is that the man clearly didn't understand the nature of metaphor; secondly, and more importantly, the story illustrates that faith cannot alter reality. This is not an isolated incident. Another man, believing predictions that the world was going to end on a certain date, cashed in his life savings in order to pay for billboards warning others of the impending apocalypse. When the end of the world did not happen, he found himself destitute, without means to support himself in his retirement (Campbell). We might say that these people's faith was misplaced, at best.

On the other hand, we hear stories that reveal just the opposite effect of faith: in Georgia, in the USA, quite recently, the receptionist in a school, faced with a gunman armed with a machine gun and 500 rounds of ammunition, began talking to the man as if he were any other human being, empathizing with him, sharing her own personal story about struggling with dark forces in her life, and ultimately talked him into surrendering himself to the police. No one was hurt. Her faith in his essential humanity and the power of empathy averted who knows how terrible a tragedy (Botelho *et al*). An athlete, against all advice from family and friends, persists in training for the Olympics and eventually comes away with a gold medal. A soldier, captured during the Second World War, manages to survive his incarceration in a Japanese prison camp, withstanding torture and refusing to give up information his captors wanted, because he had faith that there was a good life waiting on the other side of the horrific experience. All of these people, based on their faith in a positive outcome, undertook actions that might be considered just as crazy, in their own way, as the actions of the first two people, whose choices did not turn out so well.

How do we know when to have faith in something? Why do we rely on faith rather than on other ways of knowing? When do we need to have faith – is it just for our personal lives and religion, or does faith serve us in other contexts? These are questions that we will examine in this final chapter about the ways of knowing.

1 List ten things in which you have faith.
2 Have you ever had faith that you could accomplish something that others thought you could not accomplish? What gave you that faith? Did you turn out to be right?
3 How important is faith as a way of knowing for personal knowledge, and for shared knowledge?
4 In the examples on page 426, are we using the word 'faith' in the same way in each case, or are there any language issues here?

What is faith?

To have **faith** is to believe something – or to believe that something exists – despite the fact that you cannot offer a complete and unassailable guarantee that you are right; that is, despite the lack of utter certainty. Faith is most commonly associated with religious belief, but, as we shall see, we often rely on faith in other areas of knowledge, sometimes without acknowledging that we do so. In the context of religion, the term used is nearly always 'faith'; in the secular world, 'faith' is a synonym for 'trust'. Faith is, in fact, so closely allied with religious belief that the connotation of the word tends to be religious, and so some people can be reluctant to admit that the same way of knowing operates in non-religious areas of knowledge.

You might argue that faith is different from the other ways of knowing – perhaps even that faith is not a way of knowing at all; but rather just a word we use when we want to believe something for which we have no evidence. Indeed this is the position of some who dismiss religious faith. Of course few religious folk would agree, and the trouble here is that the word 'evidence' is not transparent. If you regard someone's evidence as far-fetched, you may say that person has *no* evidence; but he might disagree; and so you would regard his faith very differently to the way he regards it. But this might not be a difference of view on *faith* – it might be a difference of view on what makes *good evidence*. To someone who has experienced what she believes is a personal revelation, the evidence for God may be very strong; but because this cannot become shared knowledge, it is not likely to convince a sceptic. Faith is, therefore, tied up with other philosophical issues.

One thing, however, is clear; the more evidence we have for something, the less faith we need. So having faith is not a yes or no matter, but a matter of degree. This does not mean, however, that faith requires no evidence at all.

5 Do you believe in God (or a god or some gods)?
6 If so, on what evidence do you base your belief? If not, on what evidence do you base that belief?
7 Can you think of something that people used to accept as a matter of faith, but which has subsequently been validated with other ways of knowing so that faith is no longer the main source of knowledge?
8 What led to that change in perspective?

Arguments over faith as a way of knowing

Let's use religion to review some familiar ideas. We noted in Chapter 9 that rational arguments for and against the existence of God do little more than confirm opinions which are already firmly held. For people who aren't sure, reason does not seem to be sufficient for a decision either way. The belief requires a leap of faith, and hope that there is something on the other side to meet us. Miguel de Unamuno explained his experience of God this way: '*God goes out to meet him who seeks Him with love and by love, and hides Himself from him who searches for Him with the cold and loveless reason*' (194).

For atheists this is simply absurd. They argue that emotion plays no part in establishing reality; that desperately wanting something has no impact whatsoever on its existence, and that whenever faith has stood against reason, reason has prevailed. From this point of view, the whole concept of the leap of faith makes little sense – the seeker has acknowledged that the evidence does not warrant belief, but then goes on to believe anyway! Atheists see this as blind dogmatism – the determination to believe no matter what the evidence says – and do not accept the leap as in any way valid.

Many believers, on the other hand, argue that the dogmatism comes with the insistence to cling to reason. They do not argue about evidence one way or another, and they feel that the whole application of reason is simply inappropriate. For them, their faith is as natural as their sense of wonder when they look at the stars, and they argue that once the leap of faith has been made, things make sense again; they say that believing does not mean irrationality! They suggest that it is as if you want to cross a river; if all you have is a ladder which won't reach across, you have to get wet to reach the other side. Once you are on the other side, you can dry off again. St Augustine put it like this: *Faith is to believe what we do not see, and the reward of this faith is to see what we believe* (Grassi 92).

The Danish philosopher Kierkegaard was a powerful proponent of the need for faith. He argued that philosophy should begin not with doubt, but with wonder, and said that the scepticism that arises from doubt cannot be resolved by reason, but only by a resolution of the will. He believed that we can, and should, *decide* to have faith.

9 Explain the differences between having religious feelings, religious beliefs, religious faith and religious knowledge.

10 The atheist might say that faith is simply believing when there is no reason to, and that therefore faith in God is no different to faith in Santa Claus. What arguments might be made against this?

11 The believer says that in many cases you can only see what is there once you know it is there; that 'seeing is believing' should be 'believing is seeing' (we have seen this idea over and over again in this course). The leap of faith, he argues, is therefore hardly controversial. Is he right?

Arguments against faith as a way of knowing tend to centre on religious belief and ignore the role of faith in the other areas of knowledge. At first glance, faith as a way of knowing seems opposed to scientific inquiry, which values close observation and carefully reasoned analysis. Critics might argue that faith

simply undermines science. There are, on the other hand, aspects of scientific inquiry which do seem to require faith. An unproven hypothesis requires faith to believe it on the basis of inconclusive evidence; we do not develop scientific hypotheses solely with reason. We make an educated guess, based on intuition, imagination, emotion and reason, about what we believe is going on. If we had no faith in our hypotheses, we would have no reason to investigate them. So perhaps faith and reason are not totally opposed after all. That said, as far as shared knowledge goes, until we have investigated and amassed 'sufficient' evidence to constitute proof, the hypothesis is not considered knowledge. George Ellis, Emeritus Professor of Mathematics at the University of Cape Town, argues for the necessity of faith:

Essential features of a full human life are faith and hope, driven by the need to make life choices in the face of uncertainty and adversity (and we note here that even atheism is a faith). Rationality, based on impartial analysis of repeated experience and carefully collected evidence, is what gives us our ability to plan sensibly and successfully in the face of reality and its inherent limitations, but hope is often needed in order to continue surviving and functioning in the face of desperate situations – to fight against the odds …

This process has an element of faith … faith is needed anyhow to provide a basis for thought, values, and action, for a number of reasons, even though it is itself guided by thoughts and values …

Thus there are important roles for both rationality and hope in human life, but there is an ongoing tension between them, for rationality is based on logic and proof, but faith functions where there can be no proof. We cannot live without it. Thus in many ways the concept of a purely rational, securely evidence-based approach to life is an illusion. Life is much richer than that.

12 Restate in your own words the point Ellis is making about the role of faith in our lives, as well as the relationship between faith and hope.
13 Do you agree with Ellis's position? Why or why not?
14 Ellis mentions the 'ongoing tension' between reason and faith. Think of some situations in which these two ways of knowing are in conflict with each other. What are the pros and cons of each in those situations?

In the end, perhaps it is unfair to say that faith as a way of knowing is problematic because it is not reason; faith is the predominant way of knowing precisely in those cases where our other ways of knowing do not suffice. Faith, despite its inability to deliver certainty, is sometimes necessary.

Faith and evidence

A recent Theory of Knowledge prescribed title asked students to analyse the strengths and weaknesses of faith as a way of knowing, and a good many students argued that faith is a belief for which there is no evidence. This reflects a misunderstanding, however, of the nature of faith – or perhaps a misunderstanding of the difference between 'evidence' and 'proof'. Faith is not completely irrational; people have faith in something because, based on the evidence they have, it makes sense. The reason it is called 'faith' is that they do not have 'proof' – that is, virtually unassailable evidence and logic to demonstrate their assertions.

15 What are the relationships between evidence and proof?

Let's consider the belief in God. This is a matter of faith because we cannot point to any physical evidence and assert compellingly that it is evidence of the existence of a being we cannot see or hear. Believers may point to physical evidence, such as the beauty of nature, and use it as evidence of God's existence, but nature is not direct evidence of God. It might be indirect – that is, it might be evidence of God's work, but it is not evidence of God Himself. Additionally, there is a vast network of highly developed explanations, including geology, botany, astronomy and physics – that explains how natural objects came to be as they are, so there is a significant challenge to 'God's work' as an explanation for anything we see in nature.

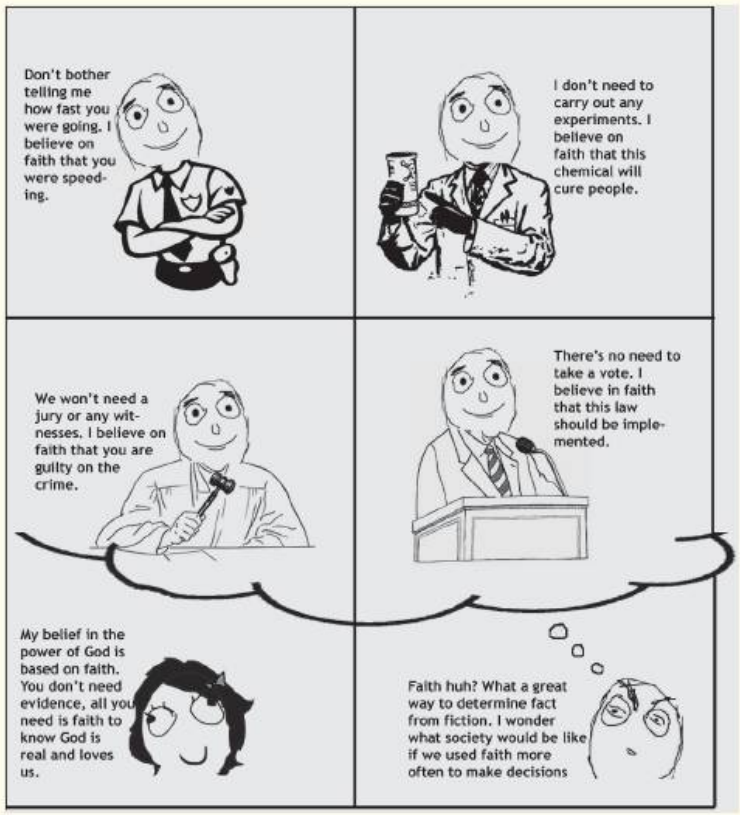
But there are other kinds of evidence to justify faith in God: there are religious texts, there is the authority of theologians, there is the belief of one's family and one's neighbours, there is a long cultural history – shared memory – of faith in God. As we noted in Chapter 9, many people also have personal spiritual experiences, deep and intuitive feelings that justify their belief in God. These experiences cannot be transferred to other people, so they do not constitute proof, but they are very often sufficient to justify religious faith as personal knowledge. Much or all of this evidence can be challenged, and it is at least theoretically possible that some or all could one day be demonstrated to be wrong, but that does not mean that it is not evidence, nor does it mean that considering it to be evidence for the existence of God is unreasonable.

If we turn to science, as a contrast, we undertake a similar process of drawing conclusions from available evidence. We have dropped objects many thousands of times, and every time the object or objects fell. This collection of observed falls constitutes at least part of our justification for the existence of gravity, a force which we cannot see. Similarly to the way that religious believers use induction to conclude from the beauty of nature that God must exist, scientists (and anyone who accepts the notion of gravity!) use induction to conclude from the observability and predictability of falling objects that gravity must exist. And so again, we see that perhaps any differences are based as much in philosophical questions about what constitutes proper induction as in religion itself.

There is a fundamental difference, of course: the theory of gravity is less controversial than the existence of God because the connection between the observable and the theory is closer. Each of us can test the hypothesis quite easily, by observation and, if we like, rough calculations. The theory of gravity also has a great deal more evidence to justify it than simple observation: Newton, Einstein and other physicists have developed complex theories involving gravity that make astonishingly precise (and in some cases counter-intuitive) predictions which have subsequently been confirmed. The evidence for gravity is, therefore, compelling; there is a great deal of it, it has been repeatedly and publicly tested and there is no alternative explanation that accounts for all the facts. But still, the truth is that we do not actually observe directly gravity acting on objects. Gravity, like God, is invisible, and we cannot see it at work. Does that mean we need to rely on faith to believe it?

The gap between evidence and theory is smaller and less tenuous in the case of the existence of gravity than it is in the case of the existence of God, but it is still there, and so a leap of faith is required in order for us to accept the theory. Even a small leap is still a leap!

Consider the cartoon below, which criticizes faith as a way of knowing.



16 What assumptions about faith does the cartoon make?
17 Do those assumptions seem reasonable? Why or why not?

Faith and the areas of knowledge

Let's review, just briefly, some examples of conclusions in each area of knowledge which require a leap of faith to bridge a gap between the evidence and the conclusion.

We have considered the role in religion in some depth, and the fact that the content of religion is a world invisible to the senses means that faith is the foundational way of knowing, and that it is in this area of knowledge where faith plays the largest role. The same observation holds for indigenous knowledge systems, where religion plays such a central role in the shaping of culture and the nature of knowledge.

We already saw how faith is required for knowledge about gravity; the same principle applies elsewhere in the natural sciences, a phenomenon we acknowledged when we talked about the problem of induction on pages 130–32 in Chapter 7. We trust that processes we have documented will not change: photosynthesis, the activation energy of atoms, the reproductive

behaviour of salmon, the creation of black holes and the process of the recovery of the land in the wake of glaciation are all examples of systems that we believe we understand, and we expect them to continue to function the same way into the future (even though we recognize that there is always room for error and subsequent improvement in the scientific process). We have faith that they will, that the fundamental laws and processes of nature do not alter.

The human sciences, as we saw in Chapter 12, suffer from some difficulties that are not features of the natural sciences, since the subject matter is human beings. Since humans are involved in all experiments in this area of knowledge, all experiments are subject to such problems as observer effect (as in the Hawthorne experiments discussed on page 272). Human scientists must have faith in the same way as natural scientists, but there is an added element; as human sciences are often concerned with our minds, we have to have faith in the existence and similarities of all human minds. This is a cornerstone of human investigation.

In history as an area of knowledge, we have faith that it is possible, through diligence and patience, to evaluate primary sources and physical artefacts effectively so that we can come to a reasonable understanding of not only what happened in the past, but why. And as the evidence is rarely, if ever, conclusive, there is always a gap between the facts as we know them and the conclusions we draw from them – a gap that only faith can cover.

In the arts, we put faith in the belief that it is possible for an artist and an audience member to come to a meeting of the minds, even though they usually do not – and may never – come face to face. We believe that we can read *King Lear* and, through the medium of the text, gain access to a vision of some part of human experience through the eyes of Shakespeare. We believe that we can look at a photograph of a spectacular scene in nature and, through our emotional reaction, know something of the emotional reaction of the person who made the photograph.

View of Denali by Timothy J. Henly

18 Examine the photograph of Denali. What do you experience looking at the photograph?
19 Do you think that your reaction to the photograph helps you to understand what the photographer experienced when he stood in that place and composed the photo?

Ethics requires faith, because it is so difficult to predict the outcome of our actions. When we try to behave ethically, we try to predict the future, and we have to take an action without being able to demonstrate with any real degree of certainty whether our faith in the outcome is well founded. This is not an irrational process, but it is one in which reason cannot strongly establish the truth of our conclusions. Only the action can – and will – eventually do that. We must also have faith in the core axioms of our ethics; whether it is 'do unto others as you would have them do unto you' or some other belief – ethical beliefs are, almost by definition, beyond proof by reason or evidence. Faith is embedded in our acceptance of these beliefs.

We have saved mathematics for last because it provides a particularly apt model of how we use faith on a day-to-day basis. While mathematics, because it is essentially the development of the logical implications of existing mathematical knowledge, is perhaps the least reliant on faith of all the areas of knowledge, it does, nevertheless, play an important role. Mathematical proofs begin with a conjecture – the equivalent of the scientific hypothesis. A conjecture remains tentative until it has been proven absolutely, but, in the meanwhile, mathematicians very often proceed as if the conjecture were true, and they develop mathematical ideas that will also prove to be true *if* the original conjecture upon which they are based is eventually proven. If the **foundational conjecture** (a key premise in the deductive argument) is eventually disproven, then all the mathematics that rest upon the assumption of its truth will also fail. On page 110 we talked about the Tanayama–Shimura conjecture, which remained a conjecture for 40 years until Andrew Wiles proved Fermat's Last Theorem. For 40 years, then, mathematicians had faith in that conjecture, and much significant mathematics was developed on the basis of that faith.

We operate on these terms not only in the other areas of shared knowledge, but also in our personal lives on a regular basis. We conjecture that a certain approach to studying will be effective preparation for a test, and we act on that conjecture. We conjecture that we can trust our friends to support us and not to betray our confidences, and we have faith in that conjecture until we have to abandon it because a friend disproves it by his actions. We have faith that the other drivers on the road have been well trained, are not drunk and are paying sufficient attention to the task at hand to keep themselves – and us! – safe. We have faith until such time as we have to abandon it, and if we did *not* maintain this faith, if we refused to take any action until we had sufficient material or logical evidence that it was a wise course, we could not function.

Bridging the gap

We have argued, therefore, that we often commit to a belief in the absence of utterly convincing evidence. So there is a gap between our experiences and the beliefs or knowledge we have on the basis of our experiences. For example, we experience the content of our own minds, and on the basis of

this experience we tend to assume that other minds exist and are more or less the same as ours in important ways. And we tend to think that if we experience absolute certainty then we have probably discovered something about the rules of logic:

What we know about our own minds ↔ What we believe about other minds
What seems compelling logic to us ↔ The rules of logic

Most of the time we do not even acknowledge that there are gaps. But the gaps are there, and we should ask how big they are before we attempt to jump across them! If the amount and quality of evidence we have is vast then the jump is probably reasonably safe – though, as we have seen, 'evidence' is not a straightforward term. In any case, even when the gap seems small, we know we are fallible, and so appearances may be deceiving, and in all cases, we would argue that some degree of faith is needed to bridge the gap.

20 Below are 20 categories. Match up the numbers to reflect the links between our experiences and the inferences we make:

Our experiences ↔ The inferences we make

From above, we know **3** ↔ **10** and **4** ↔ **15**.
Once you have done this, you will have ten pairs. Then order them with the pairs with the biggest gaps at the top, and the pairs where the gap is smallest at the bottom.

21 Compare your list to someone else's. What is the basis for any difference?

22 Can you add any further pairs to this list?

1 Beliefs, perspective, paradigms	**12** What happened in the past and why it happened
2 Our impressions of ourselves	**13** The records from the past
3 What we know about our own minds	**14** Data from experiment
4 What seems compelling logic to us	**15** The rules of logic
5 The data from our senses	**16** The fact that we have a word or category for something
6 General laws of science	**17** Truth
7 Ethical principles	**18** That the word or category corresponds to the world in a meaningful way
8 The supernatural and God(s)	**19** Our experience of nature
9 What we see and feel about events in the world	**20** The material world
10 What we believe about other minds	
11 Our own wishes, hopes and desires	

What do we know from faith?

Perhaps most fundamental of all faith-based beliefs is the existence of a reality outside of our own minds. As we have seen in Chapter 14, it is theoretically possible that the world and all its objects, all the people around us, and all of our sensory experience exist only as a construction of our minds. This is where Descartes began when he decided to try to accept only that of which he could be absolutely certain: I think, therefore, I am.

This rather bleak and lonely hypothesis might be theoretically possible (and possibly even, according to your approach, logically unassailable) but it does not match our intuitive understandings. We believe in reality because we cannot escape the overwhelming feeling that our senses provide ample evidence

to believe it, and because believing in reality generates predictable results. So this is one example where no matter how wide the chasm, we jump it every waking moment.

As far as the areas of knowledge go, we may feel rather differently. In history, mathematics, human sciences, religion, indigenous knowledge systems, mathematics, the arts and natural sciences we rarely come across inescapable and overwhelming feelings of certainty. There is always a sceptical gap, and we need some leap of faith to cross it. Of course, the gap is bigger in some cases than others, and so the leap correspondingly plausible or implausible. But in a sense, the whole TOK course is equipping you with the tools to estimate the size of the gap, and then to take a flying jump …

23 Which areas of knowledge do you think require the greatest leap of faith?
24 Has your study of all the areas of knowledge and ways of knowing made you better able to recognize when a leap of faith is required?
25 Has it made you better able to take that leap and not be eaten by the metaphorical tiger?
26 Which of the TOK skills are the most useful in helping you judge when relying on faith is a good judgement?

Faith in shared knowledge

One more way in which we rely on faith – probably the most common way – is that we accept the authority of a great many people on a great many subjects. We accept the authority of our parents, grandparents and other people in our lives when they teach us right from wrong, the meanings of words and a myriad of facts about the world. We trust trained experts for medical advice and legal advice; we accept the word of coaches about the best way to improve our sports skills and we accept the word of teachers regarding the content, purpose and underlying values of every area of knowledge that we study in school.

27 How do you know each of the following?
- How to solve algebraic equations
- The chemical formula for water
- That if supply goes down and demand stays the same, prices tend to go up
- A common plot structure for a short story
- Picasso's intended purpose in painting *Guernica*
- The causes of the Second World War
- That murder is wrong
- How to drive a car
- How to ride a bicycle
- How to make a sandwich
- That your best friend is trustworthy
- Which of two candidates for prime minister (or president) is better
- That global warming is a problem
- That the Earth is a globe
- That the Earth orbits the Sun

28 If you did not know some of the items listed, how would you find out?

29 Could you find out the information for any of those items entirely on your own, without consulting any expert or any expert's written source? Which ones? How?

30 Imagine that you decided that you were going to figure out how to prove $x^2 + y^2 = z^2$ entirely on your own, without consulting any source. You would first have to define all the terms – including '+' and '='. What other pieces of information are prerequisite to this equation? List as many steps as you can think of that you would have to first derive all by yourself before you could prove the equation without relying on shared knowledge that someone else developed before you.

If we really stop and think about it, the vast majority of our knowledge comes from our accepting as true ideas and facts established by other people working before us – often decades or centuries before us. Since we rely so heavily on the word of others – since we put our faith in them – we would do well to have some evidence to justify that faith. We can't *prove* that the people we trust are trustworthy, but neither do we have to simply trust them blindly. We can find out about their credentials, for one thing, and we can determine how much experience they have with the subject for which we are going to trust them. Failure to do so can lead to significant problems and terrible consequences. In the USA, for example, actress Jenny McCarthy started promoting the idea that giving infants vaccines (against diseases such as smallpox and Rubella) caused autism. Thousands of people decided to put faith in her authority – despite her lack of any academic qualifications – and decided not to have their babies vaccinated.

McCarthy has repeatedly asserted that the rate of autism has grown rapidly alongside the number of vaccines children receive, which is not true. It is understandable that people would suspect vaccines are a cause of autism; parents often first notice developmental problems when their children are about eighteen months old, the same time they often receive several vaccinations. Causation and correlation are often confused, however, as many studies have demonstrated (Specter).

The purported relationship between autism and vaccines has been thoroughly debunked (Bradford), but the faith in the word of the public figures persists. There is now a website that publishes the body count – that is, the children who have become ill and/or died from not being vaccinated since McCarthy and her compatriots began the anti-vaccine campaign. Checking the facts and evaluating the sources instead of just blindly trusting someone are critical steps in knowing who deserves our trust.

In writing this book, we have relied on knowledge gained over many years as well as on research done specifically for the book. Some of our knowledge is personal – Carolyn has travelled to Alaska, for example, and spoken directly with members of the Tlingit people and seen at first hand their tools, while Nick's own mathematical experiences formed the basis of much of that chapter. But most of our knowledge is shared – the result of learning from authorities. We have made conscious choices about who to trust, and, since we are asking you to trust us, we have taken the additional step of providing, with each chapter, a bibliography so that, should you wish to do so, you too can evaluate the quality of our sources. We feel confident that you can have faith in what we have told you here, but we also think that we should provide the evidence of why we have put our faith where we have.

Throughout our lives, we must have faith that other people – both those we know personally and experts we will never meet – know what they are talking about when they try to teach us something. We can more easily have faith in their authority if we know something about how their knowledge was made, and it is one of the goals of TOK to provide you with a thorough understanding of the tools and methodologies used by the experts to develop their knowledge. You have seen that experts in the various areas of knowledge approach things very differently, and we hope you now have a clear understanding of the potential weaknesses and a clear appreciation of the myriad strengths of the knowledge systems to which you are exposed every day.

Where have we been? Where are we going?

We set out to try to find what areas of knowledge or what ways of knowing might be most reliable, and we ran into trouble everywhere we looked. The world of knowledge turned out to be less solid than we might have thought. Truth and certainty seem to be mutually exclusive, and we found few fixed points on which to build solid platforms for knowledge.

Some things we can know for certain: those things which are under our control to create and define. We can be certain about such things as anything we name, and the rules of any process (such as games, rituals or indeed perhaps the whole of mathematics) we invent. There are many more examples. We cannot, however, be absolutely certain about the nature of any object or process not of our invention – which is a great deal. And so in our search for The Truth we might even have to admit that we have gone backwards in some places; that where we once had certainty, conviction and confidence, we now have scepticism, reservation and perhaps even confusion. To some, this is a sign that we should never have started on our quest. 'Why have we just confused ourselves?' ask the sceptics as they point to the inconclusive debates, unsettled questions and unsettling ideas.

In response we argue that even though we cannot be certain we have acquired The Truth, we do not need to resort to total scepticism; some beliefs really are better than others, and it makes no sense to go back to treating the world as an illusion. We have encountered important questions, and while we cannot answer them all, even asking the questions can make a difference to how we experience our lives.

On the grand level, if you have grasped the problems of free will, or perception, then the world will be a more subtle, slippery thing for you. Your awareness of paradigms will affect all your relationships, and your stance on political, religious and ethical matters will determine the values by which you live your life. On the practical level, if you are sensitive to the value-laden nature of language, then you will be less likely to be a credulous and gullible consumer. If you know how to reason, then you will be less vulnerable to fraud. If you are aware of paradigms, then you will be more creative. So what we have attempted to do in TOK is important for us as individual human beings, and even if they do not provide the certainty we sought, these ideas should stay with us, inform our thinking and be guides to action.

Someone once described education as the 'progressive discovery of our own ignorance'. If this is correct, then we have been well educated by our quest and we can call it a resounding success. We have been on a philosophical journey where the sceptics would have had us stay at home. If on our journey to date we have raised more doubts than we have dispelled, so be it. Real, honest doubts are worth more than the illusions we once took for truths. Voltaire was correct when he said, '*Doubt is not a pleasant condition, but certainty is absurd. (Buckingham 146)*' Perhaps the problem is not that we cannot find certainty in places where we want it to be, but that we expect to be able to find certainty in the first place. In *Being Wrong*, Kathryn Schulz writes:

Far from being a sign of intellectual inferiority, the capacity to err is crucial to human cognition. Far from being a moral flaw, it is inextricable from some of our most humane and honourable qualities: empathy, optimism, imagination, conviction, and courage. And far from being a mark of indifference or intolerance, wrongness is a vital part of how we learn and change. Thanks to error, we can revise our understanding of ourselves and amend our ideas about the world (5).

A desire for certainty is a desire to be right – absolutely and unerringly. If we approach the world of learning instead, with a willingness to be wrong and an understanding that being wrong is not a moral failure, and if we are able to commit to our models of how the world works but, at the same time, keep an open mind about where they might need to be amended when new information and understanding comes along, we need not fear uncertainty.

Further study

- Some of the most moving investigations into faith as a way of knowing are personal accounts from people who have found that their faith got them through difficult crises. Two such accounts are C.S. Lewis' *Surprised by Joy* (Harcourt, Brace, Jovanovich, 1966) and Karen Armstrong's *Spiral Staircase: My climb out of darkness* (Anchor, 2005).
- Michael Shermer's book *The Believing Brain* (St Martin's Griffin, 2012) provides a more technical look about how the brain is structured for faith and reason.
- If you want to get a perspective that challenges the validity of faith as a way of knowing (and, concurrently, religion as an area of knowledge), Sam Harris' *End of Faith* (W.W. Norton, 2005) is an impassioned but highly contentious read. Harris is a dedicated and aggressive atheist, so some readers find his work offensive.
- TED.com has amassed a playlist of nine different TED talks dealing with a variety of aspects of the question of faith as a way of knowing. You can access the list here: http://tinyurl.com/b7pczjf.

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Assessment

I practised open-ended questions, the kind that seek no specific answers but rather build a chain of ideas without the need for closure. It was not easy.

Vivian Paley

In conversation, 'facts' appear, only to be resolved once more into the possibilities from which they were made; 'certainties' are shown to be combustible, not by being brought into contact with other 'certainties' or with doubt, but by being kindled by the presence of ideas of another order; approximations are revealed between notions normally remote from one another.

Michael Oakeshott

I can write better than anybody who can write faster, and I can write faster than anybody who can write better.

A.J. Liebling

You go to a great school not so much for knowledge as for arts and habits; for the habit of attention, for the art of expression, for the art of assuming, at a moment's notice, a new intellectual position, for the art of entering quickly into another person's thoughts, for the habit of submitting to censure and refutation, for the art of indicating assent or dissent in graduated terms ...
... And above all, you go to a great school for self-knowledge.

William Cory

...
[to] encourage students across the world to become active, compassionate and lifelong learners who understand that other people, with their differences, can also be right.

IB mission statement

You cannot teach a man anything; you can only help him find it within himself.

Galileo

The reserve of modern assertions is sometimes pushed to extremes, in which the fear of being contradicted leads the writer to strip himself of almost all sense and meaning.

Winston S. Churchill

Note that all advice here is fairly general and is intended to last for several years. Nevertheless, the constant process of curriculum review means that the information may become out of date. The TOK Subject Guide and the Coordinator's Handbook remain the authoritative sources for all details, and the Teacher Support Material contains a great deal of useful exemplar materials which we do not attempt to duplicate here.

Introduction to the assessment model

The current situation is that to be awarded the International Baccalaureate Diploma you must submit for assessment one essay and perform one oral presentation. They are both done as coursework – which means that there are no external exams in this subject. The oral presentation will be assessed within your school, and the essay will be marked externally. Submission of Essay and Presentation is a necessary condition for the award of a Diploma.

The presentation and the essay grades are combined to give a TOK grade between A and E. An 'A' grade is difficult to achieve, requiring real sophistication and genuine insight into the knowledge issues; historically fewer than 10 per cent of candidates have achieved this level. An 'E' grade is also rare, and even weak students or those struggling to write in a second language usually achieve at least a 'D' grade if they have followed the course and have put some effort into their learning.

The TOK grade is then combined with the grade awarded for the extended essay (also A–E) to give an overall number of *Diploma points*.

		Theory of knowledge					
		Excellent A	Good B	Satisfactory C	Mediocre D	Elementary E	Not submitted
Extended essay	Excellent A	3	3	2	2	1 + Failing condition*	N
	Good B	3	2	1	1	Failing condition*	N
	Satisfactory C	2	1	1	0	Failing condition*	N
	Mediocre D	2	1	0	0	Failing condition*	N
	Elementary E	1 + Failing condition*	Failing condition*	Failing condition*	Failing condition*	Failing condition*	N
	Not submitted	N	N	N	N	N	N

The essay

Administrative details

The current situation is that you must write an essay on a title from a list of six 'Prescribed Titles' published by the International Baccalaureate (IB) for each examination session. The titles are available a few months before the

deadlines, so you can look at them well in advance. There are different titles for the November and May exam sessions. You may not make up your own title or modify the prescribed titles in any way whatsoever. Taken as a group, the titles will cover most aspects of the course. The essay must be a maximum of 1600 words in length, not including footnotes, bibliography or illustrations of any sort. Although 1600 is presented as a maximum, the intention is that you should come as close as possible to that target; an essay which is significantly shorter than 1600 words is unlikely to be of high quality.

Your teacher will of course help you, but the essay must be your work, and you and your teacher are both required to sign a declaration to this effect. The IB regulations regarding plagiarism apply to both the essay and the presentation, and there may be serious consequences for any student found guilty of plagiarism.

Sample titles

November 2012 Session

- Can we have beliefs or knowledge which are independent of our culture?
- '*It is a capital mistake to theorize before one has data. Insensibly one begins to twist facts to suit theories, instead of theories to suit facts*' (Arthur Conan Doyle). Consider the extent to which this statement may be true in two or more areas of knowledge.
- '*Imagination is more important than knowledge. For knowledge is limited to all we now know and understand, while imagination embraces the entire world, and all there ever will be to know and understand*' (Albert Einstein). Do you agree?
- What counts as knowledge in the arts? Discuss by comparing to one other area of knowledge.
- '*Habit is stronger than reason.*' To what extent is this true in two areas of knowledge?
- '*The ultimate protection against research error and bias is supposed to come from the way scientists constantly re-test each other's results.*' To what extent would you agree with this claim in the natural sciences and the human sciences?

General points

It is *very difficult* to write a good TOK essay. As you can see from the list above, the titles themselves are often abstract, and even the more accessible titles quickly lead to abstract and difficult issues. Unlike some other subjects where there is clearly 'material' to cover, there is often no obvious way to tackle the titles, and even getting started can be difficult. There are three things to remember here:

- Coursework is formative in nature, as opposed to examinations, which are summative in nature. That means that the essay is not primarily a place where you summarize what you have learnt in the course; it is very much a place where you develop, refine, test and perhaps even refute your ideas. You do not have to come to a definite answer.
- It may be helpful to think of writing the essay as a *conversation* with the ideas you are writing about; it is not a research essay where you passively recount the opinions of others but a personal and intellectual account of your *interaction*

with the ideas. So while it is an academic piece of writing, it should hold *your* opinions and *your* judgements and be shaped by *your* interests.

- It will take a good deal of time to write a good essay; there are difficulties at several levels. At the sentence level it may be difficult to avoid ambiguity or unintended implications; at the paragraph level it may be difficult to develop and make a point clearly without getting sidetracked; and at the level of the whole essay it may be difficult to have an overall narrative that takes the reader through your thoughts in a meaningful way. For all these reasons it is important that you work on at least one preliminary draft, and that you give yourself time to develop your ideas as you go.

As with many things, what appears quite painful at the time can appear quite different afterwards. Most students struggle with the ideas at one point or another, but afterwards many feel pleased and even proud that they have managed to shape their ideas and say what they wanted to say. After all, it is not often that we get the chance to take genuinely profound issues, compare, contrast and mould them as we want, and then try to persuade someone else that we are right. It is sometimes said that modern education does not give much opportunity for individual thought and opinion. Whether or not this is true in general, it is certainly not true here.

Specific tips

There is no 'correct' method for writing good TOK essays, and what we can suggest here is certainly no substitute for a meaningful dialogue with your teacher. You can probably ignore some of this advice and still write a good essay, but it may help to read and consider the following points.

1. **Familiarize yourself with the assessment criteria in detail.** Unless you have a very clear idea as to what is required it is unlikely that you will do as well as you are able. If possible, read some old essays, mark them yourself and compare your marks with the actual marks awarded. This will give you a good feel for what the criteria actually mean. A few general points:
   - Additionally, read half a dozen excellent essays (IB published these in *50 Excellent TOK Essays*) to soak up the feel of a great essay.
   - To show your own *knower's perspective* you do not have to use 'I' and lots of examples from your own life. Rather it means that the essay has to be your own ideas, and shaped in your own way – and this will generally come across very strongly if you have thought about them and worked on a draft rather than simply researched from a philosophy book. Variety of examples does not mean that you must include, for example, some obscure tribe of cannibals from the third century. Rather it means that the examples are not all from one perspective or source, that they show an awareness of other ways of thinking and a sensitivity to other approaches.
   - *Organization of ideas* is, in our experience, probably the biggest problem for students. Note that there are no points for style/fluency; this should be reassuring to those who write in a second language – you do not need to adopt difficult vocabulary to do well. Your writing does need to be clear enough, however, for the reader to understand your ideas. One particular problem exhibited by many students is the failure to use conjunctive adverbs carefully. Conjunctive adverbs are the words that create relationships between ideas. A partial list is: *therefore*, *however*, *thus*,

because, *moreover*, *additionally*, *accordingly*, *likewise* and *meanwhile*. One good resource on conjunctive adverbs can be found here: http://tinyurl.com/yc6xlku. Many students use these words as if they are substitutes for 'and'. Each one has a very specific meaning, and if you are not precise about your choice, you can easily end up with sentences that are very confusing.

2 **Do not get bogged down in definitions.** While it is important to know what you are talking about, you could take a whole essay in trying to define, say, 'truth'.
   - Avoid dictionaries!
   - You may find it helpful to make a tentative working definition while acknowledging that it may not be the whole story, thus showing you are aware of subtleties: '*I will take "truth" to mean those statements which have been thoroughly tested and not falsified (though of course this scientific definition may not be applicable to other areas of knowledge such as the arts). Using this (limited) definition …*' This qualification of ideas is a useful technique when you want to recognize that there is more to an issue than you can address in the space you have without getting sidetracked.
   - If you need to define 'knowledge' in the course of writing your essay, avoid the glib assertion that 'Knowledge = Justified True Belief'. Review Chapter 1 if you need some help with ideas.

3 **Make distinctions between different areas of knowledge and different ways of knowing.** Avoid making claims that apply to all aspects of knowledge – because different areas of knowledge or ways of knowing 'work' differently. For example, what is true for maths is unlikely to be quite right for biology. The term 'knowledge' often needs breaking down in essays; there are key distinctions to be made in this respect. Whenever you use the word, ask yourself if what you are saying really applies to all forms of knowledge. If not, then you might want to be a little more precise.

4 **Do not make grandiose but rather meaningless claims.** Starting and ending essays with profound statements may be stylistically appealing, but avoid pretentious vacuousness. Introductions like '*Since the dawn of the universe, truth has haunted mankind*' are not helpful. Consider, for one thing, that that sentence is not a true statement! The same sentiment (if we understand it correctly, which we may not) would be much better put as '*Humans are a curious species, always seeking the truth*', which may still be an exaggeration but which is at least clearer and more believable.

5 **In your introduction spend a few lines explaining the question, perhaps giving some concrete examples, and clarifying how you are going to interpret it.** You may want to offer a position that you know is wrong, and explain why it is wrong, perhaps developing it into a better one. For example, one essay title was based on a quote from Lewis Carroll: 'What I tell you three times is true'. A possible introduction might be:

   Carroll's quote seems, at first sight, to be ridiculous. If I tell you three times that I am an alien, or that 1 + 1 = 5, you are unlikely to believe me. Mere repetition is not enough. However, if I ask you how you know that Canberra is the capital of Australia, it may well be that you know it simply because you have heard it several times. In other words in this case, repetition is *enough. So perhaps there is some merit in the claim, depending on the particular area of knowledge in question.*

6 **In your introduction try to provide some 'signposts' that indicate what you will be trying to do in your essay.** It is much easier for a reader to follow an argument when he/she has a basic idea where it is headed, but you should not spell out the whole thing. One excellent way to help keep your reader properly orientated is to attend to the transitional sentences – the last sentence of one paragraph and the first sentence of the next. A really good transition connects the idea from one paragraph to the idea in the next paragraph, rather than just relying on single-word transitions such as 'Next' or 'Secondly'. One helpful resource on writing transitions can be found here: http://tinyurl.com/38cjbb4.

7 **Use your own original examples to make your points concisely – remember that the essay should be largely analytical rather than descriptive.** Examples can be taken from your IB subjects, your everyday life, newspapers and so on, but they should be thoughtfully chosen so that they reveal that you have a good grasp on the nuances of the questions.

- Remember, however, that this is the assessment on which you are demonstrating your mastery of TOK concepts, so the focus should be on the ways of knowing and the formal areas of knowledge – shared knowledge more than personal knowledge.
- Do not use the rather tired examples of geocentric theory as an example of error, or Hitler as an immoral person.
- The best essays do not give a great deal of space to describing examples, but use them almost in passing to make an analytical point which can then be developed. So, for example, if you were making the point that, when a scientific theory is 'refuted', a new theory will sometimes *include* the old theory, you could spend a paragraph describing Newton's theories and Einstein's theories and then explain the link. It might, however, be more effective to make the example very brief – this then focuses on the analytical point:

  When a scientific theory is 'refuted', a new theory will sometimes include the old theory. For example, Einstein's General Relativity did not so much replace Newton's theories as expand them – and so the model of one theory being found to be 'wrong' and another one found to be 'right' is misleading. In fact in order to understand the way science progresses we need to revisit 'obvious' assumptions about the distinction between true and false – because, for example, neither Einstein's nor Newton's theories are purely true or purely false.

- Your essay will be stronger if you include a variety of examples that make different points with regard to the title. If all your examples support one position, your essay may suggest that you do not understand the knowledge questions well.

8 **Remember that analysing a statement can mean both looking 'behind' it, at its underlying assumptions, and 'beyond' it, at its implications.** For example, if you were discussing the merits of utilitarianism as an ethical theory, you might consider problems such as measuring the utility of something, making comparisons between different people and so on. These are all very valid but an underlying assumption in utilitarianism is that reasoning is the best way of determining ethical behaviour. Now this may be right – but it is certainly worth questioning (does emotion have a role to play? Or intuition?). Similarly, we can 'test' utilitarianism by seeing what the

implications of the theory are – and if they are abhorrent (e.g. is it really OK to murder 1000 people to save 1001 others?) then we might say that there must have been something wrong with the theory. These are standard tools of analysis that extend well beyond TOK.

9 **Remember that your essay is an extended argument – not a collection of several loosely related points.** Your essay should move from point to point while always extending the argument and clarifying the nature of your answer.
- The essay should be focused on knowledge questions, which means that you are constantly trying to say something insightful about how we make knowledge in different contexts. The question or prompt is itself very likely to *be* a knowledge question, so you do not necessarily have to think up more. Any additional questions you raise must arise naturally and necessarily from the original prompt or question so that you do not wander off-task. Under no circumstances should you generate a lot of knowledge questions just for the sake of showing that you know what a knowledge question is!
- Try to develop a narrative or theme that will link paragraphs and points together smoothly. This may not be a simple matter and is likely to require a great deal of thought, but it does mean that you can make the essay your own. Find your own theme and address the issues in a manner that interests you and means something to you.
- One excellent way to develop a theme is to begin your writing process by considering a wide variety of examples relevant to the prescribed title and analysing them to see what they suggest as an answer to the question. Then select those which show the most sophisticated and interesting ideas. You can then create your first draft by organizing those examples into a logical progression.
- Your theme will likely develop as you discuss your ideas with your peers and teachers, and you may in fact find that you cannot even properly *identify* the theme until you are well into writing the essay.

10 **Try not to use rhetorical questions in your essay.** While you should certainly make it clear where there is uncertainty or doubt in your essay, rhetorical questions are unlikely to help your analysis; a clear statement of a problem is likely to be more helpful. Thus:

So to summarize; what is right and what is wrong? How can we know? Are there absolute truths or does it all just come down to personal beliefs? What role does culture play? And is religion a good guide to right and wrong? One thing is for sure – there are lots of different opinions to contend with.

Might be better phrased as something like:

So we have seen that determining ethical behaviour is highly problematic. Religious believers interpret their Holy Books differently, different cultures have conflicting traditions and there are logical and practical problems with both absolute and relativist approaches.

11 **In your conclusion try to summarize (very briefly – one or two sentences) what you have said, and try to end with a forward-looking view.** This might be an explanation of exactly why you were unable to answer the question, or what you would need to know in order to answer the question. Do not just reiterate your arguments. The final paragraph should 'feel' like a conclusion and not leave the reader hanging in mid-air. For example, if your essay looked at empirical knowledge, a possible ending might be:

It seems then, that the nature of our senses implies that we will never have access to the 'real' world (though as we have seen, 'real' is a debatable term). Some people may feel this is a great disappointment, while others may not care, but it is certainly humbling to note that even in our apparently advanced age, for all our scientific expertise and high-tech machines, we will never completely know reality.

12 **If you have a bibliography or a works cited page then make sure it consistently follows a standard style.** The extended essay guidelines are probably the best source of a suitable style – ask your teacher if you do not have a copy. But also remember that TOK essays are not research essays – you can get top marks without using any references. References are usually only relevant for documenting the accuracy of the facts that you assert in support of your claims. If you use the web you must give the date accessed as well as the URL. If you use a text source, you must include the page number to which you referred.

The presentation

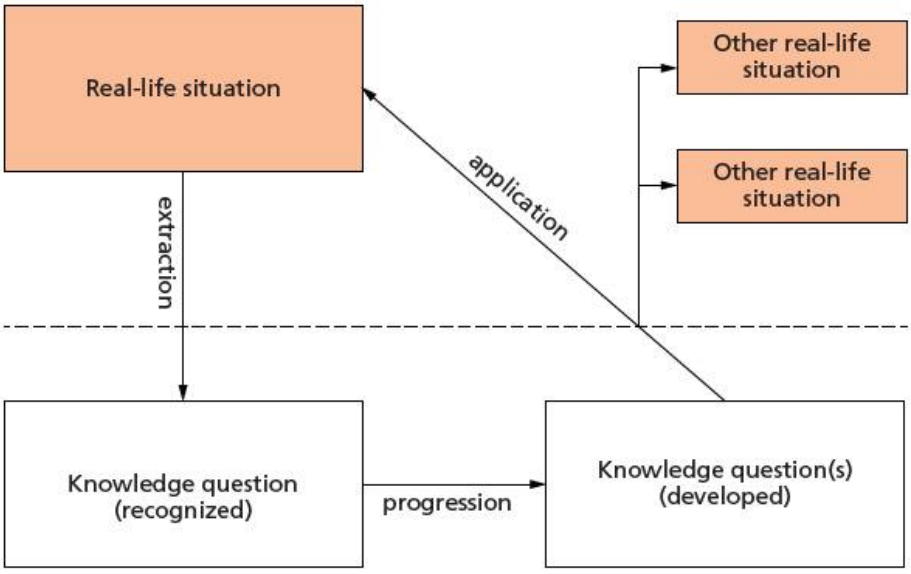
Administrative details

The TOK presentation differs from the TOK essay not just in medium but also in approach. Where the essay begins with an abstract question, the presentation begins with a real-life situation and you are asked to delve deeply into that situation to consider what it reveals about knowledge. You can think of the TOK presentation as the in-depth examination of one TOK example.

The current situation is that you must make an oral presentation of about 10 minutes to your class. Each presentation should have three stages:

1 An introduction, briefly describing the real-life situation and linking it to one or more relevant knowledge issue(s)
2 An extraction of a knowledge question embedded in that real-life situation, along with an analysis of what the situation reveals about the knowledge question
3 The application of the same central question about knowledge to other real-world situations in order to demonstrate its significance.

The following diagram shows you how to structure your presentation:



The line in the centre of the diagram represents the division between real-life situations (facts and description) and analysis based on one or more knowledge questions. You can see that you begin your presentation above the line, with a description of your real-life situation. You then shift your focus to the *extraction* and *analysis* of at least one knowledge question which is *embedded* in the real-life situation. It is vital that the knowledge question is explicitly stated in your presentation, so your audience knows exactly what your focus is. Once you have identified and explored your knowledge question in the context of your chosen real-life situation, then you must move back to the real world, by exploring how your analysis might have implications in other real-life situations.

One recent excellent presentation featured two students contrasting their views of whether or not God exists. The presentation was structured according to the three sections shown on the diagram:

Introduction *(above the line)*

The students explained that they had been having an ongoing discussion all year over the existence of God, because one student took the position that God does exist, and that He is both creator and director of the future, while the other student took the position that God does not exist. This is a concrete and interesting real-life situation.

Identification and analysis of knowledge question *(below the line)*

The central knowledge question was: 'What role does faith play in substantiating a belief in either God or the natural sciences as the best explanation for the creation of life?' The students explored the roles of emotion, intuition and faith in authority as the basis for a belief in God, and then they explored the roles of sense perception and reason as the basis for an atheist position. At the end, they acknowledged that neither position is superior to the other, because both positions ultimately require faith. The religious believer has faith that God is the explanation for the creation of the universe; the atheist has faith that science will one day provide the explanation, now lacking, for what caused the formation of the universe (beyond the Big Bang).

They concluded that neither position is provable, and that, ultimately, belief and non-belief arise out of complex familial and cultural influences.

Application of the knowledge question to other real-life situations *(above the line)*

The students finished the presentation by discussing the fact that there are many other real-life situations in which people make choices about what to believe when there is no absolute answer available. Some examples are the question of abortion, controversy over the use of stem cells, and arguments over which economic theory has the best chance of helping to stage a worldwide economic recovery. They suggested that if we could learn to acknowledge that, in many situations, no one has sufficient proof to demonstrate that his or her position is *correct*, and that different choices based on different experiences and different values are equally reasonable, then we could have more respect for each other and less conflict in the world.

So you must choose your own real-life situation, (you cannot use a prescribed essay title). If you work in pairs or groups of three, then the timing will be adjusted accordingly. Everyone in the group will earn the same mark. You must complete a planning sheet and also give a score out of 20 to your own presentation, which your teacher may or may not accept.

General points

By requiring a presentation, the IB is trying to influence the style and form of lessons. We think this is good thing – your TOK classes should be full of conversation and ideas from you as well as from your teacher. This gives you a great opportunity and a good deal of responsibility to make the presentation meaningful and interesting. There is nothing more dull than a superficial analysis of, say, the pros and cons of abortion when the students doing it are clearly not engaged in the topic. And there is nothing more interesting and educational than the same topic, and maybe even the same arguments, addressed by students who really want to make some progress and who really care about deepening their understanding of other opinions (and of their own!). So please find a topic that interests you and is important to you.

You can be creative in how you deliver your presentations. Lectures, skits, simulations, games, dramatized readings, interviews, debates, experiments are all fine; the only forbidden format is the reading out of an essay.

Specific tips

There is no method or formula which is 'correct'. You can probably ignore some of this advice and still do a good presentation, but following it may help. Note also that much of the advice on the essay applies here too.

1 **Familiarize yourself with the assessment criteria.** Notice, for example, that whatever your topic, the focus must be on *knowledge questions* and that you should choose any which have some meaning to you. A few general points:
   - You must clearly *identify at least one knowledge question*. We strongly recommend that you explicitly state the TOK issues – using the vocabulary and ideas that you have learnt in the course. See tips 2, 4, 7 and 8 below.
   - Your *analysis of what the real-life situation suggests as an answer to your knowledge question* is the key academic part of the presentation. The crucial

thing is to analyse not describe. See tips 3, 4 and 5 below. A presentation might consider what ways of knowing and which areas of knowledge inform the position that abortion is wrong; this could be contrasted with those that inform the position that abortion is acceptable – this would be a TOK presentation. A description of the pros and cons of abortion would *not* be a TOK presentation.

- You must *show your own perspective* and seek to ensure that you find something relevant to yourself or your community. Avoid remote philosophical issues. See tips 2 and 8 below.
- You must *make connections*. Consider things from several points of view and make links between and within areas of knowledge and ways of knowing. See tips 3 and 5 below.

2 **Choose a concrete situation and find the TOK in it.** TOK can be found almost anywhere, so use the opportunity to do something which you will enjoy doing. Good presentations often start with a brief film clip, a newspaper cutting, a cartoon or a recent event in your school, and go on to draw out the TOK aspects. In the introductory stage you can briefly describe the issue; in the main body of your presentation you will go on to discuss the TOK points.

- Choose a topic about which you have a lot of knowledge, otherwise you will have to spend a great deal of time doing research. Remember that it is not just the facts that you have to know, you must also understand how at least two perspectives on the question were developed. See tips 3 and 4 below.
- Although you can choose something fairly abstract ('How do reason and emotion influence the scientific method?'), such a question is often very difficult to manage in 10 minutes per person. The difficulty comes in trying to identify two clearly different perspectives – two different ways that people make knowledge in this situation. It is often much easier to choose a very specific situation with real people to whom you can talk, or whose ideas and beliefs you can read in their own words, so that you know how they came to hold their position. So a better topic might be, for example, the case of the school board in Georgia (in the USA) which directed that stickers be put in all biology textbooks stating that 'Evolution is only a theory'. The decision was overturned by a judge who pointed to the fact that the word 'theory' was misleading in this context. The presentation could evaluate the emotional influence on the decision to use the stickers, contrasted with the rational decision to order them removed. The use of language can be evaluated in both positions.
- A situation in which you were personally involved is often the easiest one to work with, because it doesn't require you to do a lot of reading and research in order to analyse knowledge questions. In one recent excellent presentation, for example, a student analysed the question of whether personal testimony ought to be considered in a scientific study. The real-life situation was that pilots in a certain kind of military plane were complaining that they were not getting enough oxygen at high altitudes; the military scientists tested all the equipment and said that there was no problem. This situation was known to the student because her father was one of the pilots. The topic worked very well because it was of high interest to her, and because she had plenty of access to the relevant facts and opinions of the two perspectives involved.

3 **You should be exploring an issue.** This means that you should *present different points of view* – even if they contradict each other and even if you disagree with them. You can try to reconcile different points of view or explain precisely why they are incompatible. You do not have to choose one point of view as 'correct',

but keep away from the rather vacuous 'so there are different points of view; make your own mind up' approach, which avoids personal input. Do not be afraid of giving your own opinion; you can point out that there are strengths and weaknesses with your opinion, but be honest and say what you really think!

4 **Try to cover the facts quickly and get on to the abstract TOK principles.** If there are important facts that the audience needs to know then you should get through these quickly in the introductory stage – there are no marks for dissemination of information. The focus of the main body of the presentation must be *analysis*, not *description*. If you cannot summarize the facts in a couple of minutes then give out a summary to read beforehand.

5 **Once you have drawn out the abstract TOK principles, try to see what the implications of these principles are.** Perhaps then use these implications to reflect on the validity of the principles. A great way to do this is to link your analysis back to some other real-life situations. For example, if you are considering the knowledge basis for an argument in favour of the death penalty that states 'murderers lose the right to life', the ethical principle seems to be an emotional or intuitive desire for 'an eye for an eye'. But you could ask 'what do we do with a thief? Steal from him? Or a rapist? Rape him?' If you find these punishments unacceptable, then there is a problem with the logic of the argument, and you might need to revisit the principle or perhaps even reject it (or you could question the need for logical consistency …).

6 **Consider carefully how you communicate the structure of your presentation.** It may be clear in your mind, but the audience may not find it so easy. It can help to have one or two overheads or PowerPoint slides with the main points only in bullet form, using a large font. This will help you stick to the topic, and the audience to follow what you are saying. In general, though, audience members will look before they will listen (we are a visually-oriented species!), so be sure that whatever you put on a slide does not detract from what you are saying. Definitely do *not* put a lot of text on slides and read from them!

7 **If appropriate use a prop.** You may find it helpful to use suitable props to help engage the audience and to assist you to make your points clearly. Short video clips can be very effective, but don't go overboard – some props may distract from what you are saying.

8 **In your conclusion try to summarize (very briefly – one or two sentences) what you have said, and try to end with a forward-looking view.** This might be a summary of the main principles you have identified or some issues which have arisen and which have not been answered. Do not just reiterate your arguments. As with an essay, the end should 'feel' like a conclusion and not merely be a 'well that's it'.

9 **If you are working in pairs/groups do not agree to work with someone who does not do their fair share of work.** For one thing, you are going to get the same grade, and the group grade may suffer if you agree to work with someone who lets you down. Alternatively, you may end up doing a lot of extra work to make up for the lack of effort on one person's part. You are also likely to find it hard to do well if you are unable to rely on your partner for support and ideas.

Further study

★ An excellent and very readable guide to writing well is William Zinsser's *On Writing Well* (Harper Perennial, 2006). We can especially recommend Chapter 2 on 'Simplicity' and Chapter 3 on 'Clutter'.

The following pages offer some examples from students' essays of introductions, knowledge questions, examples and conclusions. If you study these examples, and read the comments from senior examiners which follow each, they should help you understand how better to shape these elements of your essay.

Essay tips 1: Introductions

Read the four introductions, and think about how effective you think they are in terms of identifying important knowledge-related ideas about the prescribed title for which each was written. After you have done so, read the examiners' notes on the following pages to see how well your judgements matched those. Remember, however, that this is a harder task than when you have the whole essay to read!

Example 1

Mathematicians have the concept of rigorous proof, which leads to knowing something with complete certainty. Consider the extent to which complete certainty might be achievable in mathematics and at least one other area of knowledge.

When I handed in my HL Maths portfolio which examined whether or not a certain animal population would reach more than 10 000 in 5 years, I had to check and re-check my calculations to be sure I had the answer right. The feeling of how much you trust the conclusion is what we call 'certainty', and I will be exploring this idea in three areas. Firstly, I shall explore the rigorous mathematical proof where the connections between steps are explicitly laid out in order to achieve certainty within the closed system of mathematics. Secondly, in science it seems to be impossible to achieve complete certainty, and so it's more about degrees of certainty, which are, most of the time, sufficient to apply science to everyday life without definitive proof. Lastly, in ethics there exists a potential conflict between reason and emotion in order to achieve certainty, making universal certainty impossible. I shall attempt to show that while it appears that there is a contrast in certainty in different areas of knowledge, there are still often significant similarities.

Example 2

Evaluate the strengths and weaknesses of reason as a way of knowing.

Reason is defined as the 'capacity for rational thought or inference or discrimination' (www.dictionary.com, accessed 09/09/09) or as 'a fact that logically justifies some premise or conclusion' (www.wordnet.princeton.edu/perl/webwn, accessed 10/10/10). It is one of the four methods by which humans try to compile knowledge about the world and its truths, along with perception, emotion and language. Benefits certainly ensue from reasoning, for it is employed regularly in daily life and we rely on it for much of our knowledge, but it has limitations. Thus by analysing the method of reasoning, comparing it to other ways of knowing and examining its uses, we can properly evaluate reason as a way of finding knowledge.

Example 3

'The knowledge that we value the most is the knowledge for which we can provide the strongest justifications.' To what extent would you agree with this claim?

- Smoking causes almost 90% of lung cancer deaths.
- If 3 people are photographed together, the one in the middle will die first.

The former claim is an official statistic issued by Cancer Research UK, justified inductively through empirical evidence; the latter is a mere superstition. Logically, we are more inclined to trust and value the first statement, and thus upon first glance, this claim seems to be true. However, coming from an Oriental background, I grew up with my parents decorating the house with a vast quantity of red banners and 'festive' flowers for Chinese New Year, with the purpose of deterring demons and bringing fortune and prosperity into the household. I know these beliefs are rooted within ancient Chinese myths, which I do not take to be strongly justified, but these practices are extremely common and this form of cultural knowledge is highly valued by me and my family; this seems to disagree with the claim. Furthermore, what we determine to be valuable is influenced particularly through our religious and cultural paradigms. In this essay, I will, therefore, not be discussing whether valued or justified knowledge is in fact true, but rather whether valued knowledge must be strongly justified and whether justified knowledge is necessarily valuable.

Example 4

Our senses tell us that a table, for example, is a solid object; science tells us that the table is mostly empty space. Thus two sources of knowledge generate conflicting results. Can we reconcile such conflicts?

Our role as critical thinkers is to examine complex situations from several points of view in order to come to a conclusion that we, as individuals, can justify personally. However these different points of view sometimes conflict with each other to give seemingly contradictory results. When I came across the foul-smelling durian fruit in Sri Lanka, the smell (reminiscent of rotting sewage) was enough to satisfy me that it would be inedible. It took the persuasive power of my parents, our guide and the stallholder to convince me to try a piece and I was surprised to find the fruit delicious. Human nature makes us uncomfortable living with inconsistencies and paradoxes, and in this essay I shall explore how such conflicts arise, and how we can resolve them should we want to.

Advice from senior examiners

The following suggestions may be helpful – though note that you really need to read the whole essay for the points to fully make sense.

Example 1

This is a very good introduction.

- Clear focus on KQ: 'does certainty mean different things in different AOKs?'
- Clear language

- Structure is easy to follow and there is a clear sense of direction.
- The example is personal, original (could be better used) and reasonably used.
- The distinctions that are to be made in the essay are clearly indicated, and in the final lines there is a clear thesis which is, presumably, to be explored in the body of the essay.
- The term 'certainty' is clarified concisely without a dictionary.
- It is interesting.

Example 2

This is a very poor introduction.

- This could be said to be focused on the KQ of the question, but as it is simply reiterating rather than exploring the issues, there is little credit; one would need to see some development.
- The use of a dictionary adds nothing to the essay; there is no indication that the student understands what these quotes mean.
- There is no specific direction for the essay. It says little more than 'I shall answer the question'.

Example 3

This is a good introduction.

- Clear focus on the KQ in the question
- The initial juxtaposition is thought-provoking and original, though the smoking example needs a reference.
- Clear language
- Original, personal example is very well used.
- It is certainly possible to use the term 'true' in addressing this title, but using this problematic term in line 4 as if it were clear, only to say in line 13 that it will not be discussed in the essay, is unwise and confusing.
- The direction of the essay is clearly outlined in the last three lines, but these really say no more than 'I shall investigate the question'. Some more detail, or a thesis, would help.
- It is interesting.

Example 4

This is a good introduction.

- Clearly focused on the KQ of the question, but while it does explore (cf. Example 2), it does not explicitly develop the ideas (cf. Example 1). Of course, this development may come later in the essay.
- Clear, simple language
- Excellent personal voice
- Shows a clear and direct understanding of the title
- It is interesting.
- The last sentence does hint at a direction '… should we want to …' but there is room for a little more in this respect.

Essay tips 2: Knowledge questions

Read the five paragraphs and consider what, if any, knowledge questions are addressed. As you read, attempt to distinguish between the clarity of the knowledge questions addressed and the success in analysis. It is perfectly possible to excel at the former but not the latter. The paragraphs are taken from various points in essays; as such it is quite hard to judge them out of context. However, some general pointers should emerge from the evaluation of these samples.

Example 1

Are reason and emotion equally necessary in justifying moral decisions?

. . . There can be little doubt that emotions are developed and influenced through our cultural paradigms; the mental frameworks by which we organize our reasoning and knowledge. They determine when, where and to what extent it is appropriate to experience an emotion. Therefore, solely through using emotions, what we perceive to be morally correct in one society is different to what the inhabitants of another society would accept to be morally correct. The dispute between England and the United States in 2002 proves a worthy example. Four Britons were held in Cuba and sentenced to the death penalty after committing crimes; however, the UK government made its opposition to the death penalty clear and requested they be punished back in England. The contrasting cultural paradigms between the two societies caused conflicting opinions as to what was morally correct. Consequently, when justifying moral decisions using emotion we must continuously be aware of the dangers and bias that paradigms present and remember that theories must be supported by well-reasoned evidence.

Example 2

'Seek simplicity and distrust it.' Is this always good advice for a knower?

. . . When approaching, for example, a complex social situation, many responses are oversimplified, thereby causing more problems. This was something I encountered first hand when researching my Extended Essay on the efficiency of Sri Lankan aid in the wake of the Asian Tsunami. Many organizations and donors reacted in an oversimplified manner. In the district of Trincomalee, many fishermen lost their boats and livelihood to the Tsunami. Foreign NGOs entered the area and took a census to determine how many men had previously been employed; many listed 'fisherman' on the census, and foreign agencies then gave each fisherman a new boat. Though this seemed to be a simple and practical solution it was a complete failure; the agencies had failed to recognize that there were several types of fishing and so the boats they had donated were only appropriate to one type. Due to this oversimplification, many fishermen were still left without a boat and many boats were left rotting away on the shore. The simplification of a complex situation was, in this case, to be strongly distrusted.

Example 3

Are reason and emotion equally necessary in justifying moral decisions?

. . . Inductive logic is a method of justifying moral decisions. The method seems reasonable at first; if something happened often in the past, then it is likely to occur again. However, the 'general' conclusion cannot be relied on in justifying a moral decision; as the example illustrates, past opinions can be distorted by context. For reasons that are not relevant, I believe euthanasia is wrong, but in twenty years if I was to be in the situation myself with my mother pleading me to end her misery, I would definitely have to reconsider my point of view. Using inductive logic you would expect me to let her live, demonstrating how perspectives on moral issues can contradict one another when one is personally involved, proving that inductive logic cannot validate a moral decision.

Example 4

Are truths obscured by the languages in which we express them?

. . . Language is an important factor, which can effectively hinder our knowledge and pursuit for truth. Misinterpretation of words either in one language or in translation, due to how you choose to define and understand them, can make us wonder if languages play a vital role in the search for truth. If we consider the language we speak to be a way of communicating truths, then truth between cultures is potentially unattainable, due to the difficulties faced when translating. I often find, when reading aloud a French text straight into English, that a direct translation is not possible, not due to the structure of the sentence but rather due to the grammar and different kinds of meanings of the words. This is not to say that a translation cannot be made, but it is evident that the same definite meaning cannot be acquired in both languages, which suggests that the language does have an effect when sharing knowledge with others.

Example 5

'We will always learn more about human life and human personality from novels than from scientific psychology.' Would you agree?

. . . Language is an important way of knowing in both literature and psychology, but it is used differently is each area. When Esquivel writes of 'an endless silence in which Tita's soul shrank . . .' she does not mean that Tita's soul *literally* shrank. To many atheists, Tita does not even have a soul, and yet the words have meaning to any reader, whatever their philosophy. The words say more than their precise physical meaning; in literature, words do more than express simple fact — hence the cliché 'read between the lines'. Authors convey much 'deeper' meanings which humans understand, and which provide insight into another person's point of view, by using words more artistically than scientific psychologists. This is how the game of language is played in literature.

Advice from senior examiners

The following suggestions may be helpful – though note that there are other possible knowledge questions that might be considered; this is not meant to be an exhaustive analysis. Note also that these paragraphs are not meant to be exemplars for detailed analysis and development of ideas, even when the paragraph is clearly addressing a knowledge question; analysis and development often takes several paragraphs and cannot be shown in a brief document like this.

Example 1

The paragraph has a response to a knowledge question embedded in it, but it is not clearly expressed or easy to extract.

- The paragraph addresses issues centred on culture, emotions and moral knowledge. It is not entirely clear what these issues are, and the paragraph does not stay 'tight' on an issue but gestures towards issues rather vaguely.
- The example is potentially excellent, but it is not used to develop analysis effectively.
- It is not entirely clear how emotion and moral decisions are linked; the terms are used but no real progress is made.

Example 2

The paragraph does not address any knowledge question.

- This is superficially a very good paragraph which has details of a fine example, and a clear student voice. However, none of the many possible knowledge questions has been addressed even implicitly.
- Issues that could have been addressed using this as a platform might be:
  - To what extent can someone from one culture understand knowledge about another?
  - Do language issues prevent us from knowing another culture? (This refers to the apparently single meaning 'fisherman' in English, which did not match up with the Tamil language).
  - How might our interpretations about unfamiliar situations in the social sciences be undermined by hidden assumptions in the premises of our reasoning?
- Despite its general attractiveness, this is barely a piece of TOK writing, though it has considerable potential for analysis.

Example 3

The paragraph addresses a good knowledge question.

- The knowledge question is 'To what extent can we justify moral decisions through inductive logic?' which clearly fulfills the criteria for a good knowledge question.
- Despite the clear focus on the knowledge question, the issue is not developed in a useful way, and the example is not explained in a way that supports the analysis.

Example 4

The paragraph has a knowledge question embedded in it, but it is not clearly expressed or easy to extract.

- The paragraph addresses an issue centred on language and meaning. It is not entirely clear what the question is; perhaps something like 'what impact do problems of translation have for sharing knowledge with speakers of different languages?'
- The knowledge question does not clearly fulfil the criteria for a good knowledge question, but it is nevertheless couched in the language and ideas of TOK.
- One wonders if the student would be able to identify the question; it is rather implicit.

Example 5

The paragraph explicitly addresses a good knowledge question.

- The paragraph addresses the question 'What kind of "truth" can be conveyed by non-literal language such as that found in literature?' This fulfils the criteria for a good knowledge question.
- The knowledge question is not treated in the abstract but embedded in a specific situation via an original example.
- Despite the clear focus on the knowledge question, further detail and development is needed.
- There is an awareness of multiple perspectives built into the analysis (even though the 'atheist' perspective is rather throwaway and unnecessary).

Essay tips 3: Examples

Read the following five paragraphs, each of which contains an example in support of a response to the prescribed title provided. Read the paragraphs and consider how appropriately each example has been chosen and how well it has been analysed. These paragraphs are taken from various points in the essays; as such it is quite hard to judge them out of context, but some general pointers about good examples should emerge from discussion.

Example 1

Can literature tell the truth, better than other arts or areas of knowledge?

First we must determine what is meant by truth. Truth is different in different areas of knowledge. Mathematical truth is different from the truth in literature. In mathematics it is true that $1+1=2$, because if you have one book, and then another book, you will always have two books in total. All of mathematics is based on truths such as these that are definite and factual. In literature truth is not definite. Literature can be ambiguous and subjective. It can hold a different truth to different individuals as they relate to the piece differently. For example, the line from the poem 'After Apple Picking' "*there may be two or three / apples I didn't pick upon some bough*", which remembers wasted opportunities in the lifetime, may convey different truths about life to an old man than to a youth.

Example 2

Mathematicians have the concept of rigorous proof that leads to knowing something with complete certainty. Consider the extent to which complete certainty might be achievable in mathematics, and at least one other area of knowledge.

There is more to Mathematical certainty than rigorous proof; we come to certainty gradually, with use and over time. I was taught in middle school that $\sqrt{-1}$ does not exist. This was certain for me. But I now know from my higher-level maths course that $\sqrt{-1}$ does exist, and it is i. I initially had problems believing my teacher, and I was very uncertain about this 'truth', but now, I'm using i so often and in so many mathematical calculations that it has taken on its 'own life' for me and I feel certain about it. So in maths there is a psychological and emotional component to certainty as well as a strictly logical one. While I am only a low-level mathematician, this idea is supported also by the mathematician G.H. Hardy, who believes that '*there is strictly no such thing as mathematical proof . . . proofs are . . . designed to affect psychology . . . devices to stimulate the imagination of pupils*'. We shall return to this point about imagination and psychology later, when we examine ethical knowledge.

Example 3

Is it an oversimplification to claim that some ways of knowing provide us with facts, others provide us with interpretations?

The universe depends on Quantum Theory, Buddy Holly is a good musician and squares have four corners. All of these are pieces of information from different areas of knowledge, which involved the use of different ways of knowing. But are they facts? Are they interpretations? Or might it be possible that they are both?

Example 4

Our senses tell us that a table, for example, is a solid object, science tells us that the table is mostly empty space. Thus two sources of knowledge generate conflicting results. Can we reconcile such conflicts?

Damien Hurst described his art installation of a tiger shark in a tank of formaldehyde as the 'Physical Impossibility of Death in the Mind of Someone Living'. In biology, I would describe the tiger shark as *Galeocerdo cuvier* (family *Carcharhinidae*). Here two different areas of knowledge, art and science, apparently conflict as the same object is not only being labelled in different ways, it is 'being' two different things at once. This is more than just a straight linguistic conflict. The two different users of language actually want us to see the object in two different contexts. As art, the shark is a metaphor for mortality both as a predator capable of causing death and as an animal that was itself once alive. From a taxonomical point of view, however, it has a place in the natural kingdom, with a specific family, genus and species descriptor, from which we infer certain physical and behavioural characteristics — not metaphorical ones. Once we appreciate that language is being applied to different areas of knowledge in order to understand the different aspects of a single entity, the conflict does appear to be resolved.

Example 5

Are reason and emotion equally necessary in justifying moral decisions?

Often reason and emotion conflict when we justify our ethical beliefs. 'Thou shalt not steal' is an example of ethical knowledge that most of us believe in, and we would probably say that we have good reasons for believing in it. However, there are cases when this belief is very difficult to apply. Suppose you were the father of a family and your children were starving. You are out one day looking for food, when you pass a baker's shop. There is nobody in it and you have the chance to steal a loaf of bread. What do your reason and emotion tell you about how you should behave? Your reason would tell you that stealing is wrong, but your emotional love for your family would tell you that it's more important to feed your family than to worry about right and wrong. Under such circumstances, you would probably use emotion to justify the moral decision that it was right to take the loaf of bread and reason would not be such an important way of knowing. Thus emotion can overpower reason in justifying ethical knowledge.

Advice from senior examiners

The following suggestions may be helpful – though note that examples can be used in different ways for different purposes and need to be adapted to the forms and structure of the essay.

Example 1

This is a weak use of examples – *even though the basic point may be sound.*

- The mathematics example, 1 + 1 = 2 is clichéd; worse, it does not really tell us anything about mathematical truth. It does not support analysis.
- While it may be true that 1 + 1 = 2 is always mathematically definite and factual, the example of the books is not helpful; we can find examples from the physical world, where such truths do not hold (one raindrop plus one raindrop equals one bigger raindrop). So this example seems to have been chosen without actual care for the complexities of the situation.
- The line from the poem, while fresh and presumably from the student's own reading, is used to support the claim that literature is 'ambiguous and subjective' , but it does not really allow the reader to understand the claim any better. That is, it too does not *support* analysis but simply acts as description.

Example 2

This is a good use of an example.

- The example is clearly from the student's own educational experience.
- As well as original, the example shows a clear sense of reflection and self-awareness on the part of the student.
- The use of the quote is good; it bridges from the example in maths to ethics, via the concept of 'imagination'.

Example 3

You cannot really tell how good these examples are.

- This was an introductory paragraph; the examples have clearly been chosen to contrast and to immediately illuminate the problem of distinguishing between fact and interpretation. As such they are successful, but if these are not referred to again then they are undeveloped and have rather a 'throwaway' feel to them.
- If the essay revisits these examples and develops them then they might provide a narrative thread on which to hang analytical points; this might be an excellent structuring device for a very open essay title.

Example 4

This is a very good use of an example.

- What immediately stands out is the way the student does not say 'here's a TOK point and here's an example of that point'. Rather the example is *integrated* into the point being made, and it is not clear where the example ends and the analysis starts.
- The example is used as a mechanism to compare different areas of knowledge; as such it supports and furthers the analysis, and is used to move the essay forward, rather than just punctuate it.

Example 5

This is a very poor use of an example.

- It is hypothetical, not real.
- It is an extreme example, and lacks all nuance and understanding of subtlety.
- The example is completely contrived to support the point that emotion can overpower reason.
- Even though contrived to do so, the example completely fails to demonstrate that emotion can overpower reason. One might equally argue from this example, that the father's reason told him to steal the food, and his emotion (fear of being caught?) told him not to steal it.

Essay tips 4: Conclusions

Read the four conclusions, and think about how effective you think they are in terms of summing up ideas about the prescribed title for which each was written. After you have done so, read the examiners' notes on the following pages to see how well your judgements matched those. Remember, however, that this is a harder task than when you have the whole essay to read!

Example 1

Consider the meaning of 'justification' in different areas of knowledge. Is any one kind of justification more compelling than any other?

With all the pondering ways of knowing, or the justifications of knowledge; history, art, natural science, human science, ethics and maths, it is clear to see that maths has the most justification of knowledge. True maths has its flaws, but it has the least amount of flaws within the justification of knowledge. Through using the laws, axioms and ratios you can gain the uttermost amount of knowledge conceivable to man.

Example 2

Our senses tell us that a table, for example, is a solid object; science tells us that the table is mostly empty space. Thus two sources of knowledge generate conflicting results. Can we reconcile such conflicts?

In conclusion, it seems that conflict and contradiction are natural consequences of living in a world where there are different ways of knowing, each having its own different perspective. Whether or not we can reconcile these conflicts depends on the nature of the conflict itself and the degree to which we are prepared to accept it or work harder to resolve it. Some conflicts are resolved simply by understanding the limitation and idiosyncrasies of the different ways of knowing, others by appreciating the different context of the knower. However, some conflicts are best left unresolved, like the paradoxical durian, extending and enriching the totality of human experience.

Example 3

'To understand something you need to rely on your own experience and culture. Does this mean that it is impossible to have objective knowledge?'

Originally I did not believe that it is impossible to have objective knowledge. However, following my research I have concluded that it is increasingly likely to be the case. Even an area such as Mathematics appears to now contain less objective knowledge than I had suspected. This may result from my view of objective knowledge; it is not, as I first thought, simply something that is commonly accepted, but is, rather, something which is unaffected by individual experience — and often culture prevents this. In Mathematics, although there are accepted, recognized axioms, cultures within the subjects have entirely different ideas about how knowledge is gained. At least in Mathematics the axioms could be considered objective, but in areas such as History, particularly with sensitive events, it is hard to see how total objectivity could ever be achieved. The most positive conclusion that I can hope to come to is that Areas of Knowledge such as Art or Ethics do not necessarily require objective knowledge. Ethics, in particular, governed as it is by our moral values, does not have any need for objectivity. Culture and experience are an integral and essential part of our moral laws, and I believe they should stay that way.

Example 4

When should we trust our senses to give us the truth?

The answer to the question depends on how we define the word 'truth'. I think that we can trust our senses to give us certain types of 'truth'; the word 'truth' has different meanings in different areas of knowledge. If I am seeking to gain an objective truth then I do not think I can ever be sure, by using just my senses, that it is the truth. This does not matter greatly in everyday life, because I manage to avoid the everyday hazards well enough by trusting my senses. But I think it is possible to gain an artistic truth through our senses (or an emotional truth, based on art). Artistic truth can be given to us through our senses because it is by its nature a subjective truth.

Advice from senior examiners

Example 1

This is a very weak conclusion.

- The argument of the essay is clear; that though it is imperfect, 'Maths has the most justification'; so there is, at least, a knowledge issue addressed.
- Poor use of language means it is vague: 'most justification', 'pondering', 'ratios', 'uttermost', 'conceivable'.
- There is no sense of stepping back from the content and looking (critically) at the arguments (it might be worth asking students what that might be; possibly that 'this conclusion is surprising given that we rely on justifications all the time and tend to take them for granted'. Obviously this point could be made at varying levels of sophistication).
- The final sentence attempts a flourish, but slips into pomposity and the grandiose.

Example 2

This is a very good conclusion.

- Clear, simple language
- Good summary of the argument; directly addresses the knowledge issue in the question. Notice that though the answer is complex (it depends on the nature of the conflict and how we approach it), the points are not simply reiterated at length (cf. Example 3). This is an example of stepping back from the essay, though there is room for more in this respect.
- The durian example was made in the introduction and has been used to make the flourish that wraps up the essay.

Example 3

This is a good conclusion.

- Clear personal voice; the way she is aware of how she has come to see things differently after writing and thinking about them
- Clear knowledge issue focus
- Rather verbose
- Reasonable summary, but in contrast to Example 2, there is too much detail. Lines 3–8 ('Even an area … is gained') get into too much detail.
- The final five lines do address the big picture; they step back and address the 'so what' question. She is saying 'OK, so I agree it's impossible to have objective knowledge in Art or Ethics, but you know, that's OK; I believe that Culture and Experience *should* play key roles in these areas.'

Example 4

This is a good conclusion.

- Clearly addresses the question, but qualifies the question by referring to specific distinctions. Note that this sort of original distinction is an analytical way of showing personal voice (examples are a more obvious but often less effective way of doing this).
- Summarizes the argument clearly
- Clear focus on the knowledge issue in the question
- There is some evidence of stepping back from the arguments of the essay ('This does not matter greatly …', though there is room for more in this respect.

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