CRITICAL THINKING

TOM CHATFIELD

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CRITICAL THINKING

TOM CHATFIELD

YOUR GUIDE TO EFFECTIVE ARGUMENT, SUCCESSFUL ANALYSIS & INDEPENDENT STUDY

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First, if you're reading this – thank you, and I hope you enjoy the book. Please do share any thoughts, comments, queries, corrections or objections with both me and other readers via the hashtag #TalkCriticalThinking – or look me up online and get in touch.

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WELCOME TO THE BOOK!

WHAT THIS BOOK WILL HELP YOU TO DO

Welcome! Whether you are reading this book for work or pleasure, as part of your studies or as an extension of your professional skills, there are two obvious ways in which critical thinking skills are likely to be important and useful.

1 Helping you to become a selective and critically engaged consumer of other people's work and sources of information.
2 Helping you to produce better work yourself, and to express your knowledge and ideas more clearly and effectively.

As a discipline, critical thinking traditionally places a great deal of emphasis on these ideas, in connection with learning to engage critically with arguments and explanations: with the ways in which both you and others seek to explain how things came to be the way they are, and why certain beliefs and courses of action are reasonable.

All of this remains important – but I am also interested in two further areas in which a critically informed approach is becoming more and more significant:

3 Helping you to manage your own time and attention effectively, while becoming more aware of the ways in which thinking itself tends to be biased or flawed.
4 Helping you to be a more confident and critically engaged user of digital information systems, ranging from search engines to websites to social media and beyond.

Like the first two uses of critical thinking listed above, these areas are closely connected.

The moment we begin to study or explore any question or topic today, we are likely to be using a digital device. We type a search query into our smartphone, look up an article on Wikipedia, browse online news and views, search a database of journals, download a lecturer's presentations, hunt on social media for help and inspiration, and so on.

Even before we start typing, clicking or interacting, we are deluged by streams of information about whatever is currently trending or being shared: status updates, news, headlines and comment, disinformation and rumour, the trivial jostling alongside the profound. We gather, reshape and create information ourselves – from media to code, from text to mathematical models. And, increasingly, information systems autonomously create outcomes that shape our world – from artificial intelligence drawing on big data to billions of networked devices tracking our every action.

I struggled with this while writing this book!

Both the significance and sheer volume of this information make the question of how we engage with it a vital one. How can we make the most of the astonishing resources at our fingertips while retaining a sense of control and understanding? How, moreover, can we make the most of the human capacity for reasoning and creativity in an age where technologies like big data and artificial intelligence are encroaching on ever-more areas of expertise?

We need to be equipped to think as critically as possible about thinking itself if we are to succeed in this context – and we need strategies for taking full advantage of our unprecedented interconnectivity through technology, rather than simply finding ourselves swept along by its momentum.

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Metacognition: thinking about thinking itself; the higher-order skills that allow you to successfully keep on learning, improving and adapting.

Definitions like this are set aside from the main text throughout the book — to help you master key terms.

Critical thinking skills are not just about learning information: they're part of **metacognition**, meaning the higher-order skills that equip us to adapt and to continue learning throughout our lives. Given the sheer pace of technological change, and the fact that many of the fields within which people will be working in a few decades' time don't yet exist, I can think of few more valuable capacities to put at the heart of education and work in the 21st century.

This book is divided into two halves. The first half roughly corresponds to points (1) and (2) in my list, setting out what it means to be a critically engaged reader of others' work and confident in applying the principles of reasoning to your own. The second half turns to points (3) and (4), looking at the ways in which all of our thinking tends to be biased in predictable ways – and what it means to make allowances for these biases in a 21st-century environment suffused with information technology.

THINKING CRITICALLY FOR YOURSELF

In the spirit of critical thinking, please don't assume that everything I say is the last word on anything – or that you're obliged to agree with it. Disagree, debate, enquire and question as much as you like. Just make sure you *understand* exactly what it is you disagree with in the first place; try to work out exactly *why* you disagree; and then ask *what* a better explanation might look like.

SMART STUDY: Throughout the book you'll see sections like this, highlighting the connection between critical thinking and study skills, with suggestions on how you might apply them practically to your own work.

THINKING CRITICALLY ONLINE

You're very welcome to share thoughts with me directly about this book on social media at @TomChatfield – and to discuss it both with me and other readers via the hashtag #TalkCriticalThinking. You'll also find online resources such as videos flagged up throughout the book, all easy to find on YouTube and Vimeo channels with the #TalkCriticalThinking hashtag.

THINK ABOUT THIS: Each chapter has one or two questions set out like this, as a prompt for reflection. There's no right or wrong involved. But you'll get the most out of the book if you embrace these opportunities to pause, clear your mind and ask yourself what you think and believe. Here's one question to start you off: what are you hoping to get out of this book – and why? ....

Don't be afraid to write outside the box.

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WHAT IS CRITICAL THINKING (AND WHY DOES IT MATTER)?

FIVE THINGS YOU'LL LEARN IN THIS CHAPTER

1 The difference between *critical* and *uncritical thinking*
2 Practical advice for applying *scepticism* in your work
3 Smart *study tips* on managing your time and attention
4 Why you need to watch out for *confirmation bias*
5 Five key techniques for your *critical thinking toolkit*

THE OPPOSITE OF UNCRITICAL THINKING

The word 'critical' isn't the friendliest of terms. If I'm being critical of you, you may say: Why can't you be more supportive? Why are you criticizing me? People don't tend to like being criticized, or react to it well.

Critical thinking is different. It doesn't mean being critical in the sense of being negative or offering criticism. It's much more interesting (and positive) than this. As a starting point, let's approach it as the opposite of something we are all guilty of sometimes – **uncritical thinking** – in which we take things at face value without pausing to consider whether this is sensible or justified.

Uncritical thinking: automatically believing what you read or are told without pausing to ask whether it is accurate, true or reasonable

Take a look at this email, which arrived in my inbox on 9 July 2013:

> Hello,
>
> I'm writing this with tears in my eyes,My family and I came down here in Manila,Philippines on a short holiday unfortunately we got mugged at the hotel park where we stayed,all cash,wallet,credit card and phones were taken away,but luckily for us we still have our passport back in our hotel room…We've been to the consulate here and the Police but they're not helping issues at all…Our flight is leaving in a couple hours time from now but we're having problems settling our hotel bills.
>
> We're very sorry if we are inconveniencing you, but we have only few people to run to now. We will be indeed very grateful if we can get a quick loan of (£2,450 GBP) from you. this will enable us sort our bills and get our sorry self back home. We will appreciate whatever you can afford in assisting us with via western union. We promise to refund it in full as soon as we return. let us know if you can be of any assistance. Please, let us know soonest. Thanks so much.
>
> Thanks
> David

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IF WE ARE UNCRITICAL WE SHALL ALWAYS FIND WHAT WE WANT: WE SHALL LOOK FOR, AND FIND, CONFIRMATIONS, AND WE SHALL LOOK AWAY FROM, AND NOT SEE, WHATEVER MIGHT BE DANGEROUS TO OUR PET THEORIES.

KARL POPPER

#TalkCriticalThinking

An uncritical reading of this email would simply accept all of its claims. It was sent from my friend David's personal email address. It was July. Perhaps he was on holiday with his family; perhaps he had got into trouble and desperately needed my help. I must help him at once!

This kind of instant, uncritical response would almost certainly get me into trouble. What I needed to do was to pause, step back and think critically for a moment.

First, I read the email again, carefully. Did this sound like my friend: a writer, editor, experienced traveller, someone unlikely to panic? No. The message didn't really read like something written by him. It had odd turns of phrase – 'get our sorry self back home' – and mistakes in punctuation, spacing, grammar and capitalization that David wouldn't have made even if he were upset: 'at the hotel park where we stayed,all cash,wallet,credit card and phones were taken away,but luckily…'.

Also, would he really have emailed me and asked for money like this, even in an emergency? Again, not likely. He would have put things differently, provided more context and concrete details; he would have been in touch with family and closer friends than me.

How could I check? If this was a fake message, it suggested his email had been hacked or spoofed: that someone else was behind it. I launched Google and copied the first line of the email into inverted commas – 'I'm writing this with tears in my eyes' – looking for other examples of the precise phrase online.

Sure enough, plenty came up. Try it yourself: it's a genuine scam email. At the time of writing this chapter, in 2017, I found 21,500 results, the earliest dating back to 2010. One of the top results was a September 2012 news story from Forbes, exploring what I discovered was known as 'the grandparent scam' – because it's most likely to fool older, inexperienced computer users.

'The scam works because it has urgency', noted the article's author, finance expert John Wasik: 'It's an emotional appeal that preys upon lonely moments in which we feel totally vulnerable.'[1] In other words, it's a scam deliberately designed to provoke uncritical thinking: an instant, urgent reaction driven by strong emotion.

Having explored the scam email to my satisfaction online, I quickly sent a text message to my friend, David, explaining that I thought his email address had been compromised, and double-checking that he and his family were OK. He replied, slightly wearily, to say that they were fine – and that I was the tenth person to text him in the last hour to check he wasn't in trouble in the Philippines. In fact, he was at home in Surrey.

This really did happen – although it's targetted 'phishing' that gets most people today.

The kind of critical thinking I engaged in after receiving this email comes easily to most people, so long as they have some experience of the internet and email. It's a vital survival mechanism for a world in which things aren't always as they seem. Without even noticing it, most of us apply a series of critical filters to our thinking about things like unusual emails. They go something like this:

- Is this somehow unusual, out of the ordinary, unexpected or odd?
- If so, it's time to pause, pay attention and ask a few careful questions.
- Who and where did this message come from?
- Why was it sent?
- Is the person sending it who they claim to be?
- Do I believe what the message is saying?

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- If I don't believe it, what might be the hidden intentions behind it?
- What reliable sources can I use to check what is really going on?
- Finally – once I've done all this – what actions should I take?

Of course, most people with any experience of email or technology don't need to go through these steps when looking at a suspicious message. Instead, they simply ask:

- Does this look like a legitimate message – or is it just spam?

This is because, at least when it comes to spam email, most of us are old hands at critical engagement. We've seen hundreds, if not thousands, of spam messages. We know what's going on. We've developed some useful habits and assumptions and short cuts. We're hardened spam critics without even knowing it. This is an important point that we'll return to: if you've handled similar situations many times, and they're not dominated by random noise, you're likely to have developed some meaningful expertise and intuitions. It's when things are strange and new – when you don't have any expertise or information to contextualize them – that your instant reactions are most likely to be misguided.

We engage in critical thinking, or benefit from the lessons of previous critical thought, all the time without being aware of it. If we took everything at face value, we wouldn't get very far in life: we would be deceived, bewildered, manipulated, confused. Imagine if you believed everything you were told by everyone, everything that you saw and heard and read in every advert, every politician's claim.

The art of critical thinking isn't about changing human nature, or pretending we can or should act entirely rationally all the time. It's about learning to recognize our own – and others' – limitations; and knowing when to pause, think again and reach for the right questions in order to work out what is really going on.

Critical thinking: setting out actively to understand what is really going on by using reasoning, evaluating evidence and thinking carefully about the process of thinking itself

Here, then, is my definition of the kind of **critical thinking** we are going to be working towards. When we are thinking critically, we are setting out actively to understand what is going on by using reasoning, evaluating evidence and thinking carefully about the process of thinking itself.

SCEPTICISM AND OBJECTIVITY

Now that we've introduced the idea of critical thinking, try to think critically about each of the eight claims below. Are they reasonable and reliable, or should you think twice before accepting them? Why?

1. They say it's probably the best beer in the world? It must be great: I'll buy some. ....
2. She wrote the world's leading psychology textbook: her views on psychology must be worth taking seriously. ....
3. She wrote the world's leading psychology textbook: her views on the PlayStation 4 must be worth taking seriously. ....

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The TROUBLE with having an OPEN MIND, of course, is that people will insist on coming along and trying to put things in it.

Terry Pratchett

#TalkCriticalThinking

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4. French fries are delicious. I'm going to eat them all the time.
5. My friend has hurt his leg and is lying close to me, in pain: I must rush and help him right now.
6. My friend has hurt his leg and is lying on the other side of that busy road, in pain: I must rush and help him right now.
7. The video my friend posted on Facebook is really funny. I'm going to click 'like'.
8. The video my friend posted on Facebook is pathetic. I'm going to post an insulting personal comment.

Scepticism: not automatically accepting something you hear, read or see as true

Statement (1) – that I should buy something which claims to be the best beer in the world – is a piece of uncritical thinking that needs to be viewed with **scepticism**. Scepticism means refusing to take something at face value, and instead asking questions about its reliability. In this case, sceptical reflection should lead us to realize that this is an advertising slogan, and thus unlikely to embody an expert assessment of every beer in the world.

Statement (2) – in which I suggest that a leading psychologist is likely to know about psychology – is not so suspicious. It seems reasonable to take an expert psychologist's views on psychology seriously, although there may be a follow-up question I need to ask about her particular areas of expertise. When it comes to statement (3) and the same psychologist's views on the PlayStation 4, however, being an expert in one field doesn't necessarily mean she knows anything about games consoles. We should think twice before accepting this.

As for the other four statements, from (5) to (8), you'll notice that what they have in common is that they express rapid judgements about something I am planning to do. I'm going to eat French fries all the time, help a friend, click a 'like' button, make a rude comment. Rapid judgements are sometimes necessary. But they also reflect instant emotional responses that may turn out, upon reflection, to be a bad idea. Rushing out into traffic to help our friend may simply end up hurting both of us; posting an offensive comment online may cause lasting offence to someone else – or give us a bad reputation.

Objectivity: trying to understand something from a more neutral perspective, rather than relying on a single opinion or the first piece of information that comes to hand

Critical thinking skills usually involve trying to grasp a situation as **objectively** as possible: setting aside our own immediate feelings and preferences, and trying to identify the relevant facts. Objectivity and scepticism are related ideas. Both of them involve a commitment to finding out as best you can what is actually going on, rather than automatically accepting the first piece of information you encounter.

Both objectivity and scepticism are also possible only to a degree. You can never be entirely objective, and you can never distrust absolutely everything you think you know. Thinking is always rooted in who you are, what you have experienced and what you feel. The trick is reaching an accommodation with this: knowing yourself better and practising techniques that help you understand the world as carefully and realistically as possible.

'Don't let the perfect be the enemy of the good.' A great saying to remember

The eight examples I gave above don't divide neatly into two categories of 'yes, this is reasonable and reliable' or 'no, this is completely unreasonable and unreliable'. Instead, they exist on a spectrum of reliability, ranging from highly unreliable to pretty trustworthy. Most of the claims that we encounter in real life are like this. It's not a question of simply accepting or rejecting them – it's about *how* we should judge them.

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In the case of both professional and academic work, it's also about asking about the ways in which different materials may or may not be useful or important. Much like a police investigation, if we are trying to find out what is really going on we need to consider a number of possibilities and use a range of different sources, rather than relying on our immediate feelings or what is in front of us.

This advice might sound so obvious that it's barely worth putting in a textbook, yet you would be amazed at how often all of us – and I include myself in this – form a judgement based on a quick reaction to whatever information is instantly available, or what we feel, rather than even trying to find out whether there is more we need to know.

SMART STUDY: Becoming a better sceptic in four questions

Scepticism entails refusing to take things at face value. You can start practising it in life, work and study by asking four simple questions whenever you need to think twice:

- Why should I trust this claim?
- Why does the person making this claim believe it – or want me to believe it?
- What else has been said, written or reported about this?
- Do I know enough to answer all of the above questions confidently?

If the answer to this final question is 'no', you need to face the fact that you don't know enough to make an informed decision, and you must go in search of more information.

THE BATTLE AGAINST BIAS

If objectivity and scepticism entail trying to understand things as they actually are, then **bias** represents their opposite – looking at things in a way that is entirely dominated by a particular prejudice or perspective. There are many different kinds of bias, and we will explore them in detail later in the book, but all of them fall under the same general definition: approaching something in a one-sided way that distorts your understanding.

Bias: approaching something in a one-sided way that creates a distorted account of the way things actually are

If, for example, I am madly in love with you, I may be biased in my assessment of your skills as a conversationalist or the quality of your jokes. Even if I'm not in love with you, the fact that you're really ridiculously good-looking may bias me towards giving you a job or claiming you sang beautifully in an amateur production of *Phantom of the Opera*. Similarly, if I'm trying to sell you a car, I may emphasize the car's good points and try to cover up its bad ones.

At this point, it's worth making a distinction between two categories of bias: **conscious bias** and **unconscious bias**. Here are a couple of examples; see if you can tell them apart:

Conscious bias: when someone deliberately presents a one-sided view of something, or explicitly holds a one-sided opinion about something

Unconscious bias: when someone's opinions or decisions are distorted by factors that they are not even aware of

	CONSCIOUS	UNCONSCIOUS
1 The prime minister's spokesperson insisted that the prime minister had acted in good faith and from the best of intentions – unlike his cowardly critics.	○	○
2 Voters across the country tended to prefer the taller and the more conventionally good-looking of two candidates when they compared both photographs.	○	○

Example (1) is a case of conscious bias: the prime minister's spokesperson is knowingly and deliberately trying to present the prime minister in the best possible way while implying that his critics are cowardly. Example (2) is a case of unconscious bias. Voters tended to prefer the taller

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and better-looking of two candidates when shown photographs, but they may not even be aware that this is a factor in their preferences – it can affect their judgement without them consciously noticing what is going on.

Unconscious biases can be harder to deal with than conscious biases. If someone actively expresses a biased perspective – arguing, for example, that they would never choose to vote for a woman over a man – then it is relatively easy to identify and to challenge this bias (changing their minds is quite another thing). If, however, a bias is unconscious, it can be extremely difficult even to identify, let alone to challenge, it. For example, someone may not think of themselves as sexist in any way, yet still frequently act in accordance with sexist assumptions they don't even acknowledge.

Just as total objectivity is impossible, none of us can ever be entirely without biases – and we wouldn't wish to get rid of them all. The challenge is to become more aware of them, and to find ways of minimizing the distortions caused by the more troubling ones. We'll be exploring this in more detail in the second half of this book.

THINK ABOUT THIS: What unconscious biases do you most often see in the people around you? Might any of these also affect your own judgement? ....

....

....

....

....

....

Slow down: critical thinking cannot happen in a rush. Before you do anything else, you need to take the time to engage your slow, considering mind rather than relying on instinct

What You See Is All There Is: a phrase used by psychologist Daniel Kahneman to describe the human tendency to pay attention only to what is immediately obvious, and to neglect the hidden complexities that exist in most situations

FAST AND SLOW THINKING

Most of the time, we rely on general intuitions about what to do, say and think. We wouldn't be able to function if we had to think hard about every single action and decision in our daily lives. We do, however, have the ability to pause and to think more deliberately about some things – and it's this 'slow', considered thinking that we develop when we improve our critical thinking skills (and that we can then use as the basis for making better rapid decisions). That's why the first and most important rule of critical thinking is about speed: **slow down**.

In his book *Thinking, Fast and Slow*,[2] the psychologist Daniel Kahneman offers a useful phrase to describe the problem of relying too much on first impressions, feelings and the information we happen to have in front of us. He calls this problem WYSIATI, a not-so-snappy acronym that stands for **What You See Is All There Is**.

This phrase describes something that almost all of us do all the time in everyday life: we form a judgement based on what we know, without pausing to consider whether we actually know enough to justify such a judgement.

If you develop a deep dislike of someone you work with because they have one unpleasant habit – picking their nose constantly, say – this may be a case of assuming that one thing you happen to have noticed means you understand what kind of a person they are. Similarly, if you only read just one article about a particular subject and then assume you can confidently analyse it – if, for

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example, you write an essay about Daniel Kahneman based on a single Wikipedia entry – you are using the most easily available information as if it were all you needed to know.

Do the above errors sound obvious and easy to avoid? Have a think about this:

> How meaningful do you think it is to study a couple of hugely successful technology companies, like Apple and Google, in order to find out what makes technology companies successful?

The answer is: it's not necessarily very meaningful. You might find this surprising. Many people would think that looking at the world's most successful organizations is a perfect approach to understanding success. Indeed, plenty of people have indeed made successful careers precisely out of this kind of business analysis. Yet there is a problem with this kind of thinking. When you look only at successful companies, you are looking at a tiny and extremely lucky fraction of all the companies that exist or that once existed.

Literally thousands!

For every giant like Apple, there are thousands of smaller and less successful companies. For each of these, there are thousands of companies that no longer exist because they failed. For each of these, there are thousands of potential companies that never even made it to day one. For almost any 'principle for success' you come up with, based on looking at Apple and Google, it's likely that thousands of unsuccessful companies also adhered to exactly the same principle. It's just that you don't see these companies, because you are only aware of the tiny percentage of companies that happen to be hugely successful.

This is known as **survivorship bias** – one of a host of unconscious biases that can distort almost everyone's thinking and decision-making. As the name suggests, this bias involves forming a general judgement by looking only at successful outcomes, and completely ignoring failures. Successes are rare, but striking; failures are numerous, but almost invisible. People thus tend to act as though a small number of famous successes are all that matters – when in fact they represent a mere fraction of cases.

Survivorship bias: the tendency only to think about successful examples of something, failing to consider the bigger picture in which the vast majority of all cases are failures

When conducting experiments and assessing research, being able to minimize bias of all kinds is a vital skill. When reading, writing and speaking critically, it's equally vital to be as aware as possible of potential sources of bias in both other people's and your own thinking.

There are many forms of unconscious bias, but perhaps the most important form it takes as an obstacle to critical thinking is **confirmation bias**. Confirmation bias describes the near-universal human tendency to use new information only to confirm existing beliefs, rather than to challenge them. If you only remember one kind of bias to watch out for, make it this.

Confirmation bias: the universal human tendency to use new information only to confirm existing beliefs, rather than seeking to improve and clarify your understanding

Confirmation bias is the enemy of objectivity and scepticism. It's the kind of thinking in which someone treats their existing assumptions as sacred, rather than as something to be tested, improved and, if necessary, abandoned in the face of new evidence. Confirmation bias is the difference between looking at fossilized dinosaur bones and saying 'I know that the world was created 6,000 years ago by God; He obviously created these to test us' and saying 'Here is something that cannot satisfactorily be explained if the world was created 6,000 years ago; I wonder what a better explanation might be?'[3]

It is also impossible to entirely avoid this kind of bias. We all bring assumptions with us wherever we go; we cannot be sceptical of everything. We can, however, train ourselves to be more alert. Here is an example for you to explore. Try to think sceptically and to identify how confirmation bias may be getting in the way of critical engagement in this scenario, taken from a fictional student research project:

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> An extended macro-economic investigation brings some fascinating news that bears upon my research project exploring weather conditions and economic output: in two leading global economies, rain in one summer month appears to have successfully predicted increased productivity over the last two years!

Although the result may sound impressive, someone who is combing through large amounts of information looking for any kind of relationship between weather and the economy is likely to eventually find something – especially if they pluck out one particular month in just two countries. This is the nature of looking for confirmation: you allow yourself to ignore all those occasions on which there is no evidence. Think of the person who points to a particular piece of good luck as evidence that they are blessed – ignoring all those other occasions on which they were not lucky (not to mention all the other people just like them who have been unlucky).

Dogmatism: the claim that certain principles or ideas are both absolutely true and immune to any form of critical scrutiny or discussion

Critical thinking does not argue that there is no place for tradition or belief, or that we can understand or explain everything. But it does demand that we set out to test what we think we know, and the boundaries of what we do not. It is, in other words, opposed to **dogmatism** – the laying down of certain principles as both absolutely true and immune to scrutiny – whether this dogmatism is practised by priests, scientists or politicians.

ALLOCATING YOUR ATTENTION

The phrase 'pay attention' is surprisingly accurate. Our attention is a limited resource: not just because there are only so many hours in the day, but also because it takes a great deal of effort (and practice) to pay focused attention to something. Truly paying attention doesn't just mean concentrating – it means noticing, engaging, grasping something with your mind. Slow, focused thinking is difficult. It's tiring. It involves using up a resource that is in limited supply.

Being honest with yourself about when and whether your mind is wandering is an important skill – as is knowing what kind of working conditions and preparation put you in the best frame of mind for attending effectively. When I was an undergraduate, I worked mostly from the desk in my room. By the time I was a postgraduate, I had started to use libraries far more – not so much for the books as for the effect that the space had on my level of attention and commitment to my work. It helped me shut out distractions.

Attention vs distraction: the art of allocating not just time but focused engagement to the task in front of you, while shutting out other tasks and irrelevant information

The enemy of attention is **distraction**, and this is a word you'll surely have heard a great deal about in the context of technology. Perhaps you have checked social media or your email inbox already while reading this book, or have them open in a browser tab or on your device? How long can you manage to pay careful attention to a single text or idea?

Dealing with distraction and spending time wisely is one of the single greatest challenges for anyone studying today – and that's before you get to the question of what materials deserve your precious attention in the first place. What should you read, watch, listen to and do, given just how much is out there – and how little time you have?

As with everything else in this book, the answer isn't superhuman willpower: it's about strategy, planning and habits. You'll need to decide in advance which materials deserve close reading in order to grasp the key ideas – and which simply need scanning. Having a strategy for how best to spend your precious time and energy is one of the most important practical steps you can take towards better thinking.

Really does matter –
when, how, where you work.

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SMART STUDY: Ten tips for managing your time and attention

Taking control of your time and attention is more important than ever in the context of always-on technologies and the sheer volume of information that's out there. Here is a top-ten list of study techniques to help lessen distraction in your working life:

1. Create a calm, uncluttered workspace – and log out of social media
2. Put your phone into 'do not disturb' mode (or turn it off) for an hour of focus
3. Write out memory cards with the key points and terms summarized
4. Make mind maps on paper – scribble and scrawl by hand to help open up ideas
5. Use digital tools like MindView to map your thinking too
6. Use browser extensions like Concentrate to shut out distractions
7. Set up study groups with friends to bring multiple perspectives together
8. Look into mentoring and being mentored by other students
9. Buy at least one core textbook to keep and to annotate as you work through it
10. Experiment: try to find what space and setup best suits your own work style

YOUR TOOLKIT FOR CRITICAL THINKING

Now that we have introduced it in some detail, how confident are you in your abilities to think critically? Try these five questions, scoring yourself in each case out of ten, where ten represents total confidence and zero represents no confidence at all.

1. I am able to pay close, detailed attention to information and ideas ______ /10
2. I can summarize and explain information I've come across ______ /10
3. I easily understand others' points of view and why they believe what they do ______ /10
4. I can clearly express my own point of view ______ /10
5. I am willing to change my mind and modify my beliefs when I learn new things ______ /10

Total score: ______ /50

If your total is over 40, congratulations: you're either very confident, very critically adept in your thinking already, or both. If you scored below 20, never mind – you may lack confidence now, but practice and focus have the ability to transform your attitude. Now try these five questions, exploring your thinking in the context of study and research:

1. I am able to compare and to evaluate multiple sources of information ______ /10
2. I can locate and research sources of relevant information by myself ______ /10
3. I can clearly summarize and explain others' work, including its limitations ______ /10
4. I am able to justify my own conclusions and to outline the evidence behind them ______ /10
5. I am aware of and able to explain to others the limitations of my knowledge ______ /10

Total score: ______ /50

Again, you should end up with a total score out of 50. For most people, this second score will be lower than the first. My first five questions were about thinking skills in general; the second five relate more specifically to study, reading and writing – turning general skills into something specifically related to work.

If you scored over 40 in total this second time, I'm impressed. If you scored below ten – well, that's what this book is all about. I'll ask you to do this same self-assessment again during the course of this book. If you've worked through it carefully, you should see a huge improvement.

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THINK ABOUT THIS: Look back over your answers above. Where are your own particular strengths and weaknesses? Take a few minutes to interrogate yourself honestly. ....
....
....
....
....
....

Reflecting on your own thinking is an important element of becoming a more effective thinker. It can also be extremely difficult. Even the most brilliant thinkers aren't actively engaged in critical thinking most of the time; even they suffer from the same vulnerabilities and fallibilities that affect us all. Improvement is often a matter of insight, honesty and good habits rather than sudden inspiration.

This is why critical thinking is best thought of as a set of techniques rather than something you either can or cannot do. What we need is to develop and keep practising a particular set of skills: a toolkit for critical engagement. There are five key techniques that we will be developing during the course of this book, all related in their way to the art of **reasoning** – thinking about things in a sensible or logical way, and then presenting this thinking to others in a way that permits meaningful debate, disagreement, comparison and collaboration.

Reasoning: thinking about things in a sensible or logical way, and then presenting this thinking so as to permit meaningful debate, disagreement and collaboration

You still need knowledge & a context to train your thinking within, though.

SMART STUDY: Five key techniques for critical thinking

Learning to understand and to evaluate reasoning (Chapters 1–4): reasoning entails providing convincing, rigorous support for a claim or belief, or offering a convincing explanation for something. It's this business of providing, comparing and criticizing chains of reasoning that allows us to test different arguments and ideas meaningfully, rather than simply accepting or rejecting them based on how we feel. Confidently evaluating reasoning is a vital study skill, and means ensuring that we understand precisely what someone is claiming – and why. Throughout any process of critical thinking, you will find yourself returning to a deceptively simple question: 'Is this a reasonable thing to say or to believe?'

Learning to understand and to evaluate evidence (Chapters 5 and 6): evidence is information gathered to support a point of view or to offer a particular account of the way things are. It comes in many forms, and sifting through these is one of the greatest challenges of most programmes of study. Understanding evidence involves: finding useful and relevant materials; recognizing the conventions of the many different kinds of source you'll encounter; and knowing how to extract from them the information you need. It also involves assessing just how far any source is reliable and relevant.

Learning to understand and to account for bias (Chapters 7–10): people and sources are all biased in their own ways – as are you. There's no such thing as a perfectly objective perspective, but understanding the ways in which you bring particular biases to your work is just as important as accounting for others' biases. You'll learn how to spot them, how to make allowances for them, and how to reframe concepts and questions in order to make them less vulnerable to distortion.

Becoming a critically engaged user of technology (Chapter 11): from reading and writing to researching, discussing and collaborating, digital information systems touch almost every part of our personal and professional lives. Chapter 11 deals with what it means to be a confident, critically engaged user of technology. Throughout the other chapters, you will find opportunities to explore ideas online, and reflections on the particular significance of topics and themes in a digital age. You

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I will be checking & responding — I promise.

can also use the hashtag #TalkCriticalThinking at any time to share thoughts and comment with other readers and the author.

Developing a clear, confident approach to reading and writing (Chapters 6 and 12): reading others' writing closely and critically is closely connected to developing clarity and confidence in your own work. The final chapter in each half of the book looks at what it means to read and to write well – and how you can develop effective structures, habits and practices to support this. By the end of this book, you will have gained skills that allow you to explain your ideas with precision and force; to engage with others' work clearly and helpfully; and to keep on improving and clarifying your own thinking.

WHAT IS CRITICAL THINKING FOR?

Consider these rival accounts of the Earth's position in the universe. Tick off the account you think is best, and jot down why.

- The Earth is a flat disc carried on the back of a giant tortoise..... ○
  ....
  ....
- The Earth is a giant egg laid long ago by a massive bird........... ○
  ....
  ....
- The Earth is a sphere located at the centre of the universe..... ○
  ....
  ....
- The Earth is a rocky planet orbiting our sun, Sol, in the Milky Way galaxy.. ○
  ....
  ....

Obviously, the last account is the best. But why? Because none of the first three accounts can satisfactorily explain many of the things we know about the Earth. We have plenty of images taken from aircraft and satellites clearly showing the planet's curvature; we have amassed huge amounts of information about the movement of the planets and stars in the universe around us. Stories about flat discs, tortoises and giant eggs may once have been sufficient to explain what people knew – but they are no longer the best account we have for addressing the sum total of our knowledge.

The last account, however – that the Earth is a rocky planet orbiting our sun – fits in with the best current information we have. It does not require us to deny what we know or to make special excuses. Moreover, it is precise enough that we can test it rigorously.

This doesn't mean we now know everything or that we are entirely correct in a way that nobody has ever been before. Quite the opposite. Our understanding will continue to change as we learn new things, and it is the task of critical thinking to keep challenging us to come up with better explanations.

This is an important point: rigorous critical thinking means not only explaining why we believe something to be the case, but also being obliged to change our minds when our knowledge about the world changes. In this sense, it is related to a **purpose** that it shares with all scientific and philosophical investigations: searching for the best account we can currently offer of the way things actually are.

The purpose of critical thinking: critical thinking helps us to search for the best account we can find of the way things actually are

This is how progress works, if and when it works: we attempt to find a clear and precise account of the way things are, then we test our thinking not by seeking confirmation, but by looking for things

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we still cannot explain. It is those things we cannot explain that point the way forward; that sketch the outlines of new theories and ideas which may, in their turn, push back the frontier of human ignorance a little further.

Hunger for confirmation at any cost that holds us back – in study & politics alike.

SUMMARY

Uncritical thinking entails automatically believing what you read or are told without pausing to ask whether it is accurate, true or reasonable.

Critical thinking means actively setting out to understand what is really going on, by carefully evaluating information, ideas and arguments – and thinking carefully about the process of thinking itself.

Underlying critical thinking are the connected principles of scepticism and objectivity:

- **Scepticism** entails not automatically accepting that something you hear, read or see should be taken at face value.
- **Objectivity** means trying to identify the facts of a situation as seen from the outside, rather than relying only on your own – or someone else's – particular feelings or point of view.

There is no such thing as perfect objectivity – you will always bring your experiences and perspective with you – but it is possible to know yourself better, and to practise using tools and techniques for seeing things more clearly. This includes dealing with the difficulties of **bias**, which comes in two general forms:

- **Conscious bias** is when someone deliberately presents a very one-sided view of something, or explicitly holds a one-sided opinion about something.
- **Unconscious bias** is when someone's opinions or decisions are distorted by factors that they are not even aware of.

In particular, it's important to be alert to the problem of **confirmation bias**: the universal human tendency to use new information only to confirm what you already believe, rather than seeking to improve and clarify your understanding.

It's vital to **allocate your attention** effectively if you want to think critically – and to remember that the first rule of critical engagement is to **slow down**, and to set aside your first impressions and prejudices.

Critical thinking is best thought of as a set of techniques rather than something you either can or cannot do. Improving your critical thinking means developing and practising a particular set of skills: your **toolkit** for critical engagement. These tools will help you:

- understand and evaluate reasoning.
- understand and evaluate evidence.
- understand and account for bias.
- develop clear, confident, critical writing.
- become a critically engaged user of technology.

When we think critically, we are searching for the **best account** we can currently offer of the way things actually are – and this means being obliged to change our minds when facts and reason demand that we do.

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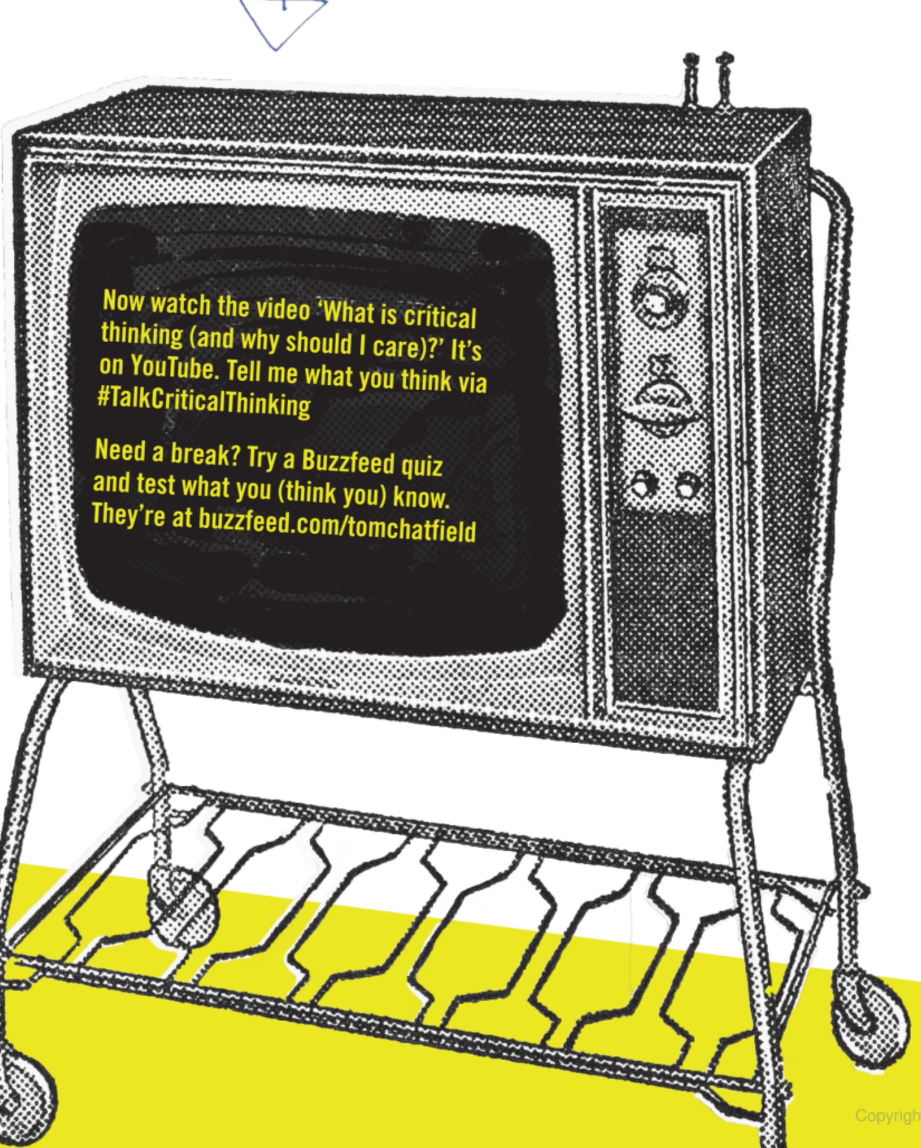
Remember I told you
there would be digital goodies?

Whenever you see this, it's a
reminder to take a break &
watch a video.

Also — try my
critical thinking
Buzzfeed
quizzes!



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PART I

THE ART AND SCIENCE OF BEING REASONABLE

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UNDERSTANDING THE REASONS BEHIND THINGS

Why does reasoning matter (and how can you spot an argument)?

↓

How do you spell out the reasoning behind an argument?

↓

How do you draw out a logical conclusion from your premises?

↓

How do you draw out a probable conclusion from your premises?

↓

How can you select and test the best explanation of something?

↓

How should you assess evidence and plan your reading strategy?

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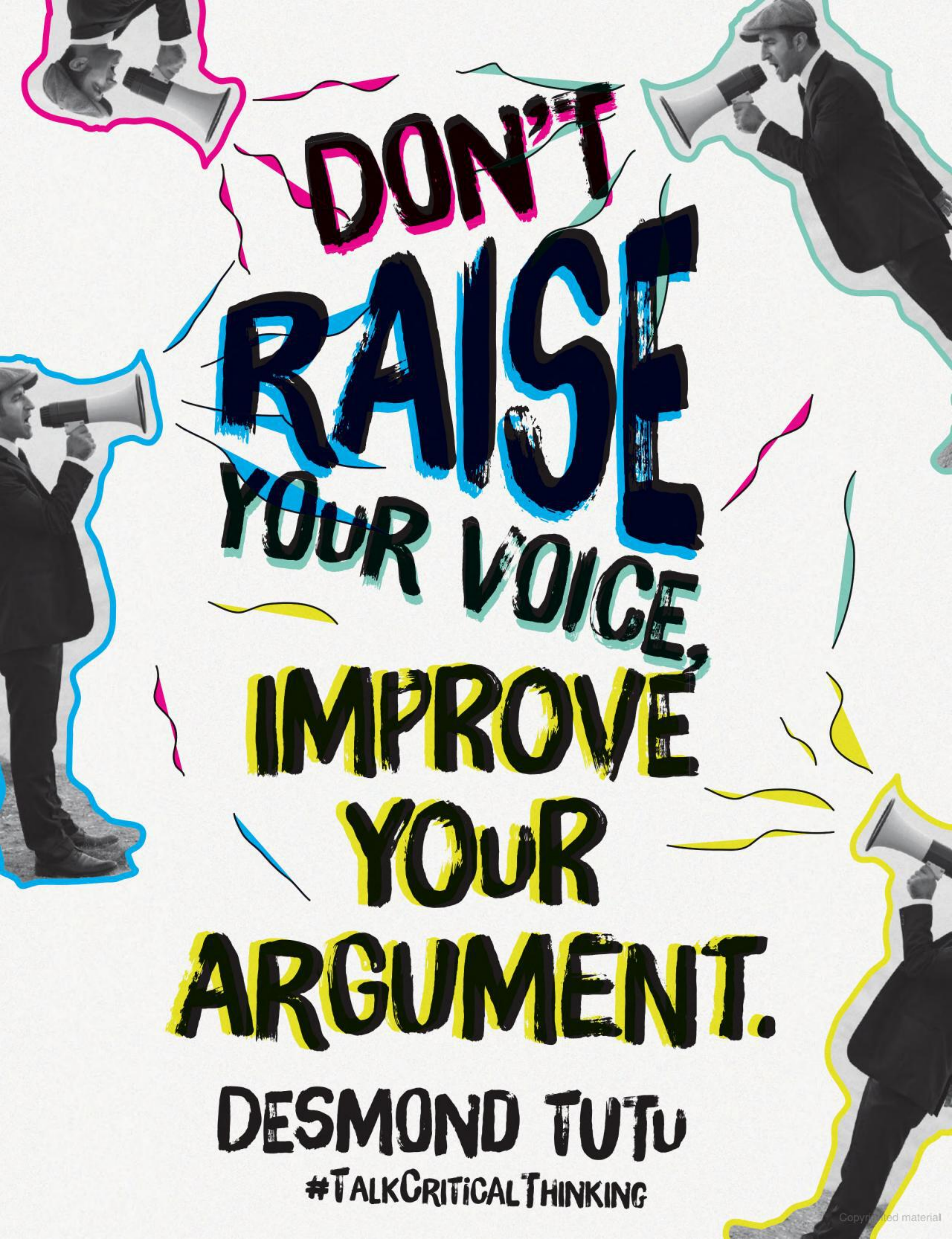

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FIVE THINGS YOU'LL LEARN IN THIS CHAPTER

1 The significance of *reasoning* in work and research
2 How to identify *arguments* and their *conclusions*
3 How to improve your ability to create *clear descriptions*, *summaries* and *examples*
4 How to tell the difference between *arguments* and *explanations*
5 How to distinguish between *better* and *worse explanations*

We have defined critical thinking as the opposite of uncritical thinking. Rather than automatically believing what you read or are told, it entails pausing and carefully evaluating what is really going on. When we think critically, we are searching for the best account we can currently offer of the way things actually are. This involves two related questions:

- **Why** we should accept something as true, and…
- …**How** things came to be the way they are.

Another way of putting this is that we are interested in identifying and making good arguments, coming up with reasonable explanations – and rejecting bad examples of both.

Critical-thinking books often place a great deal of emphasis on arguments – and we'll explore why in this chapter – but they are far from the whole story. We also need to be able to think critically about other kinds of communication and expression – and to be especially alert to the kind of reasoning that lies behind explanations, theories and the scientific method of investigation.

WHAT IS AN ARGUMENT? PERSUASION THROUGH REASONING

Why does reasoning matter so much? To answer this, let's first look at something different: assertions. Here is an **assertion** about keeping animals as pets:

Assertion: a statement of fact or belief, provided without support or justification

> It is wrong to keep animals as pets.

An assertion is a statement of fact or belief, provided without support or justification. It's also something that, on its own, does little other than impart information.

By contrast, an argument does something more useful. Consider this line of argument about keeping animals as pets:

> It is wrong to keep animals as pets, because this means they are not free and cannot lead dignified lives. All living creatures deserve the dignity of freedom.

Now, we are looking not only at a claim about the way things are, but also at a line of reasoning seeking to justify this claim. This attempt to provide reasonable justification for a particular conclusion is important. When someone asserts that 'it is wrong to keep animals as pets', we have no way of knowing why they think this. They might have an amazingly convincing reason that would change our lives if we heard it. They might simply be saying it because their mother used to say it. We don't know. As soon as they make an argument, however, we can start to do all kinds of interesting things. We can:

- Gain a fuller understanding of their view of the situation.
- Work out whether or not we agree with their reasoning.
- Compare different arguments to see whether something else is more convincing.
- Investigate to see whether they have ignored important information or ideas.
- Debate with them and attempt to change their minds – or change our own.

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Argument: an attempt to persuade someone through reasoning that they should agree with a particular conclusion

When someone makes an argument, they are attempting to persuade you that you should accept a particular conclusion – and they are doing so by presenting a series of other propositions that (they claim) support it. Here, then, is a working definition of an argument in critical thinking: an **argument** is an attempt to persuade you of the truth of a particular conclusion using reasoning.

We can break this down into two key elements:

- You are presented with a line of reasoning that…
- …seeks to convince you to accept a particular conclusion.

Conclusion: the final point that someone making an argument is trying to convince you of

The **conclusion** of an argument is its final point: the point that everything else leads towards. One argument's conclusion can be the starting point of another; but each argument only has one final conclusion.

Below are three different ways in which I might talk to you about a job you are looking to fill. Only one of them is an argument in the sense I've just described: presenting both a conclusion and a line of reasoning. Try to identify which one:

		YES	NO
1	Hi! My name is Tom, and I'm the right man for this job!............	○	○
2	I'm the right person for the job. I'm the best qualified and I'm available now..........	○	○
3	I have plenty of work experience from around the world; I'm a great worker..........	○	○

Let's go through them in order, seeing whether they have both reasoning and a conclusion:

(1) This definitely has a conclusion – 'I'm the right man for this job!' – but no reasoning is provided to support it. I may have provided a cheerful introduction, but I haven't offered any reasons in support of my conclusion: I have simply asserted it.

(2) This has both reasoning and a conclusion: it may sound informal, but it still counts as an argument. The first sentence provides our conclusion – 'I'm the right person for the job'; while the second sentence provides two reasons supporting it – 'I'm the best qualified' and 'I'm available now'.

(3) This presents what you might think of as a line of reasoning – 'I have plenty of work experience' – but there is no explicit attempt to link it to a conclusion, or indeed to persuade you. I'm simply making an assertion about my experience and abilities.

Note, however, that if this third example came in the context of a general conversation about jobs, you might decide that what I would like you to conclude is so evident that my words *do* count as an argument. If, for example, you had just said 'I really need a new employee with global experience' and I instantly replied 'I have plenty of work experience from around the world', then the conclusion I wanted to convince you of would be obvious enough for this to qualify as an argument. In other words, explicitly presenting a line of reasoning may be enough for something to qualify as an argument, if the concusion is self-evident from the context.

In other words:
Beware of evaluating things outside of context.

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In real life, it can be quite an art to identify whether an argument is being made. For each of the examples below, try to identify whether an argument is being made or not. If one is, tick, and pick out what reasoning and conclusion is being presented:

		YES	NO
1	Come on in, the water's lovely!...	◯	◯
2	Beware of the dog: he's angry and might bite your hand...........	◯	◯
3	You wouldn't want to meet my brother when he has a hangover	◯	◯

Although (1) sounds informal – 'come on in, the water's lovely!' – it does qualify as an argument once we spell it out. It's an effort to persuade you of the conclusion that you should come into the water, using the reasoning that the water is lovely. As to whether you find this convincing – you may want to dip a toe in to test the temperature before diving.

Example (2) also contains an argument. It's an effort to persuade you of the conclusion that you should beware of the dog, using the reasoning that he is angry and might bite you. Again, the informality of the tone means we need to paraphrase things to be clear about what is going on.

Finally, example (3) is not an argument, although it sounds similar to one: 'You wouldn't want to meet my brother when he has a hangover.' No attempt at persuading you of a conclusion is taking place: you are simply being told some information about my brother that you may choose to believe, or not.

If, instead, I had said 'my brother has a hangover: you should just ignore him because he's bound to be in a bad mood', then this would count as an argument because I would be trying to persuade you of a conclusion (that you should ignore my brother) using reasoning (that he has a hangover and is bound to be in a bad mood).

SPOTTING ARGUMENTS BY SEARCHING FOR A CONCLUSION

You may have noticed that, in each of the examples above, I began analysing all of them by **searching for a conclusion**. This may sound like doing things backwards, but – as we will explore in more detail in the next chapter – this is the most useful way to begin when trying to work out whether you are dealing with an argument. Tick off any you believe are arguments and note why.

Searching for a conclusion: when you're trying to work out whether someone is making an argument, begin by seeing if there is a particular conclusion they want to convince you of

Look at the three passages below and try using conclusion-spotting as a technique to help you determine whether they are arguments or not Tick off any you believe are arguments and note why.

1 You should definitely let me look after your cat while you're on holiday. I love cats. And cats love me. I have lots of cats at home and know how to look after them. I have 12 cats, and I talk to them all the time. I'm a real cat expert.......................... .... ◯

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2 For a surprisingly large number of clinical trials, scientists cannot reproduce the original result when a study is repeated. This suggests that something may be seriously wrong with the system of peer review and publication around clinical trials..........

....

....

3 I have a large number of friends who work in the finance industry: horrid people, insecure profession. But we do go out for some excellent dinners..

....

....

Example (1) is an argument. Here, the conclusion comes in the first sentence: 'you should definitely let me look after your cat while you're on holiday.' The rest of the paragraph then provides some reasoning as to why you should accept this conclusion – the fact that I love cats, have lots of cats and know how to look after them – alongside some less relevant (and frankly alarming) information about my cat-related habits.

Example (2) is also an argument. The first sentence sets out a line of reasoning around the fact that scientists cannot repeat the results of some clinical trials. The second sentence presents a conclusion supported by this line of reasoning – that something may be wrong with peer review and publication. Spotting the conclusion allows us to work backwards and see that the first sentence comes before it, and that an argument is being made.

Example (3) is not an argument. The ideas presented do not fit in any particular order, and one is not the conclusion of a line of thought suggested by another. It may very well be the case that I have reached the conclusion that finance is an 'insecure profession' – but in this case it is simply asserted, without any reasoning in support.

Language is slippery. v. few consistent rules. More like conventions.

In real life, you will be dealing with longer and more confusing arguments than these examples – making it useful, as in the case of reasoning, to bear in mind a number of indicator words that point towards a conclusion. There is no firm rule about using indicator words, and sometimes there will not be any. Often, however, a final conclusion will either be indicated by words like 'because' and 'since' or will appear prominently at either the start or end of a piece of writing.

Now try reading the following passage. Does it contain an argument, complete with reasoning and conclusion? If so, see if you can spot any indicator words that show where each is to be found.

> Expenditure on early childhood education varies greatly from country to country. By some measures, the UK spends more than any other country on this first educational stage – but then drops behind when it comes to primary and secondary education. Given that there is a lack of direct evidence around the impact of spending on educational outcomes, and that evidence-based policymaking is especially important in the educational space, detailed comparative research into the impact of spending on attainment at each level across different countries would thus make a valuable topic for rigorous investigation.

Close reading is vital for teasing out the key points being made here. As the phrase 'given that' indicates, the main reasoning of this argument is that 'there is a notable lack of direct evidence around the impact of spending on educational outcomes' and that 'evidence-based policymaking is especially important in the educational space' – while, as the word 'thus' indicates, its conclusion is that 'detailed comparative research into the impact of spending

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Any human power can be resisted and changed by human Beings.

Ursula K. Le Guin

#TalkCriticalThinking

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on attainment at each level across different countries would thus make a valuable topic for rigorous investigation'.

Did you come up with the same analysis? If not, don't worry. Arguments aren't always easy to spot – and doing so means paying as much attention to what *isn't* an argument as to what *is* one. In the next sections, we're going to look at several key types of **non-arguments** – types of writing that do not count as arguments, because they don't involve trying to persuade you of a conclusion through reasoning.

Non-argument: any element of a piece of writing that does not attempt to persuade you of a conclusion through reasoning, and thus doesn't qualify as part of an argument

SMART STUDY: spotting the words that indicate conclusions and reasoning.

Certain words and phrases often indicate where an argument's reasoning and its conclusion are.

When trying to identify a line of reasoning, look for phrases such as 'given that,' 'based upon', 'considering', 'since', 'because' and other words that mobilize information in support of an idea rather than simply presenting it as fact. When trying to spot a conclusion, look for indicator words and phrases like 'thus' 'therefore', 'and so', 'overall', 'which shows that'.

WHAT ISN'T AN ARGUMENT? INFORMATION WITHOUT REASONING

We've said that an argument means using reasoning to support a particular conclusion. If this is not taking place, something other than an argument is being presented.

When we are presented with information but no explicit reasoning, the crucial question is how far we believe this information to be **accurate** and **relevant** to the particular topic we are engaging with. This section explores four different types of information that we commonly find in writing and speech:

- Descriptions.
- Summaries.
- Opinions and beliefs.
- Clarifications and illustrations.

Descriptions

Consider the following statements. Are any of them arguments?

		YES	NO
1	According to the World Health Organization, the world's leading cause of death is coronary heart disease.	○	○
2	My grandfather died of coronary heart disease at the age of 90.	○	○
3	Coronary heart disease affects more men than women.	○	○

As you probably guessed, none of the statements above is an argument. Instead, they are **descriptions**: they report information about something, but they don't perform any kind of reasoning – and nor do they pass judgement on or analyse the information they contain.

Description: simply reporting information without any attempt at evaluating, commenting on or using the information to persuade

You might think that saying 'coronary heart disease affects more men than women' does include some kind of reasoning or evaluation. But even this simply provides descriptive information. I am not telling you what I think. I am simply passing on information.

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A **good description** aims to provide clear information without introducing any evaluation, reasoning or persuasion: its purpose is to convey relevant information as clearly and neutrally as possible. Compare the following two descriptions.

WHICH IS BETTER?

1. A lot of people in our experiment found it difficult to work out what was going on.
2. Eight out of the ten subjects in our experiment found the instructions they were given sufficiently unclear that they failed to perform the tasks correctly.

Both of the sentences above describe the same thing, but it's clear that the second sentence is a better description than the first. It is more detailed, more precise and clearer: it offers a more useful record of what happened. Paying close attention and writing detailed, useful descriptions is quite an art – not least because it means deciding what is worth paying attention to in the first place.

In the example above, it is useful to know that eight out of ten people found the instructions they were given unclear. It would be even more useful to know exactly what each of them found unclear within the instructions. It would probably not, however, be useful to know what colour clothes they were each wearing, or how tall they were. In any situation, there are an almost infinite number of things we could choose to describe – and so the question of what it is most relevant to include and exclude is of the utmost importance.

When reading or writing a description yourself, try to bear these questions in mind:

- What was the person writing this description in a position to know?
- What within this description is useful or relevant to what I want to know?
- What other details have been left out that might be useful or important?
- Is the description precise and clear, or is it vague, unclear or exaggerated?

What does 'good' description mean in different contexts? Science, journalism, literature, record-keeping...

Summaries

Here's an extended example of a particular kind of description often used in academic work and research:

> The experiment entailed dividing 100 volunteers into two groups of 50. The groups were selected at random in advance using a random number generator, and allocated to two different rooms in which they would sit an identical test. Half an hour was allowed for completing the test, which consisted of 30 multiple-choice questions based on correctly identifying the next symbol in a sequence. The first group was permitted, before sitting the test, to eat as many freshly baked cookies as they wished from five trays placed in the room. The second group had identical trays of cookies placed in their room, but were told that they could not eat until they had finished. Overall, those who were allowed to eat immediately averaged 75 per cent correct results in the test compared to 55 per cent among those who were not allowed to eat until the end.

This passage is a **summary**, in this case of a fictional experiment (based very loosely on a real psychological experiment conducted by Baumeister, Bratslavsky, Muraven and Tice at Case Western Reserve University in 1998).[4] Like any description, it conveys information without offering analysis or reasoning; but the particular skill of writing a summary is, as briefly as possible, to cover all the main points in an area.

Summary: a brief outline of key information, often setting out the main points covered in a longer piece of work

Being able to write and to read this kind of description closely is a surprisingly important and difficult skill. It means thinking and writing clearly – and identifying what the key points are within a

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longer piece of work. It also involves ensuring we do not unthinkingly introduce biases, arguments, opinions and other extraneous material into our work at a point where we are simply trying to provide information. Compare the summary above to this very different account:

> The experiment entailed dividing 100 volunteers into two groups of 50 that we ended up thinking of as the 'greedy' and the 'hungry' groups. Each group was forced to sit an identical and extremely boring test. I'm not sure all of them understood it, and am worried that the results might be invalid given how many of them seemed to crash the system or get stuck and not bother finishing. Anyway, the first group ate lots of cookies which we had put on a table while the others didn't, and it was amazing what a difference this made; being hungry is clearly bad for the brain, although actually the best performer was in the 'hungry' group. Then again, I think they cheated and stole a cookie or two before the time was up.

This is a pretty poor summary of an experiment compared to the first version (although I will admit that it's a livelier read). It's confused and confusing in terms of structure. It doesn't tell us everything we need to know to get a clear picture of what happened. It mixes things like opinion and evaluation in with the description ('being hungry is clearly bad for the brain'). And it contains irrelevant details, like speculation about whether one person stole cookies, while missing out key information – such as what the overall results were.

A **good summary** carefully and clearly sets out relevant information – and covers all the key points as briefly as possible, while introducing nothing that is irrelevant or confusing. When reading or writing a summary, ask yourself:

- What is the purpose of this summary?
- What are the key points needed to understand what is going on?
- Is there any irrelevant detail that can be left out – or some essential information that needs to be added – in order to make this as concise and clear as possible?

Opinions and beliefs

If I tell you what someone else thinks, then I am simply reporting a piece of information. If, during the course of a public debate, a politician says 'I believe that immigration is the greatest crisis facing this country today', everyone who has watched the debate is equally in a position to describe what the politician said. Reporting their opinion – by saying 'the minister stated during the debate that immigration is the greatest crisis facing our country' – is just another kind of description.

If, however, I share my own opinion or belief, then I am doing something different. I am describing something that nobody else has access to: what is taking place inside my own mind. Consider these three statements. Each one, in its way, presents an **opinion** or **belief**, offering information about one person's view of the world:

Opinion or **belief**: presents someone's point of view without offering reasoning. Opinions tend to be personal judgements based on facts; while beliefs tend to be convictions based on morality, faith or cultural context

		OPINION	BELIEF
1	Governments are morally obliged to lead the fight against heart disease.	○	○
2	Heart disease is a terrible thing.	○	○
3	Your diet is awful: you ought to stop eating so much bacon!	○	○

The first example doesn't contain the words 'I think that', but it's clear on reading it closely that saying 'governments are morally obliged to lead the fight against heart disease' is not simply a neutral

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description of something the speaker has noticed. It's not like saying 'there is a lot of heart disease in the world': it presents a particular individual's view about the way things ought to be.

The second statement, 'heart disease is a terrible thing', is more obviously a statement of belief. You might think that it's true, but what matters is that, in this particular case, it is presented without any particular reasoning being offered. We are simply being informed that this is what the speaker thinks about heart disease.

The last of my three examples is an opinion directly addressed to someone else, saying what I think they ought to do – 'your diet is awful: you ought to stop eating so much bacon!' We can classify this as a piece of **advice** or a **warning**: a special kind of opinion that describes not only someone's point of view, but their point of view about what ought to be done.

Advice and **warnings:** opinions about what someone should, or should not, do

In the real world, we spend much of our time dealing with beliefs and opinions – and expressing our own. We only tend to offer reasoning for our point of view occasionally; and even when we do, we are often not so much trying to persuade someone else that we are correct, as seeking to explain why we did something or believe something. When encountering an opinion or a belief, ask yourself:

- Does this seem like a reasonable view for someone to hold?
- What effect is holding such a belief or opinion likely to have?
- What different opinions or beliefs is it possible to hold, or are held by others?

Description also a statement of belief?

Clarifications and illustrations

Clarifications and illustrations are often used to help us understand ideas and arguments. Here is an example of each – read them closely and see if you can tell them apart:

		CLARIFICATION	IIUSTRATION
1	By coronary heart disease, I mean a group of diseases that involve reduced blood flow to the muscles of the heart itself, resulting from the narrowing of the coronary arteries.	○	○
2	Cultures all around the world celebrate dancing in public. In China, many couples used to perform publicly in parks to ballroom dancing music played through loudspeakers.	○	○

The first is an example of a **clarification**: it takes a phrase or an idea (in this case, coronary heart disease) and clarifies what is meant when this phrase is used. The second is an **illustration**. Having made a point – that cultures all around the world celebrate dancing in public – a specific example of the point is supplied in order to show how the point may apply in a particular instance.

Clarification: spells out what is meant by a particular phrase, idea or line of thought

A clarification may sound similar to supplying the definition of a word or concept, but it can also apply to a more general explanation of what an author is interested in or means. For example, if I am writing an essay about research ethics in sociology, I might begin by clarifying my focus:

Illustration: provides a particular instance of a general point

> Research ethics is a contentious field. For the purposes of this essay, I will largely be referring to research ethics within the field of sociology; this is not to suggest that many other fields do not face their own version of these challenges.

We can think of illustrations as a special kind of clarification: a particular example is used to illustrate what is meant by a larger idea. In my essay on research ethics, I might use a particular case to illustrate a general principle:

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Determining which of these is most reasonable requires further investigation, and here is some information from a police report presenting the results of this:

> Upon inspection, the car's speedometer turned out to be working perfectly; a phone call revealed that the driver's mother was perfectly healthy; and a search of the police database revealed that it was not his first time being caught speeding.

At this point, you might decide that the second explanation – I was driving too fast because I have a fast car and love driving it fast – is the best fit. This doesn't mean it is definitely correct; but it does mean that I would need to come up with something else that explained all the facts more efficiently and effectively if I wanted to change your mind (or that of the police).

SMART STUDY: Six key types of content

Here is a list of the six different kinds of information and expression we have looked at in this chapter, with a brief summary for each. We have looked at four types of information presented without reasoning:

Description: reporting information in a direct and straightforward way

Summary: providing a brief outline of key information

Opinion: presenting a judgement without providing reasoning

Belief: presenting a judgement without providing reasoning

Clarification: spelling out or demonstrating a particular concept

Illustration: spelling out or demonstrating a particular concept

And we have also looked at two types of information presented with reasoning:

Argument: persuasion through reasoning in support of a conclusion

Explanation: reasoning backwards from something assumed to be true

Between them, these six classes of content describe most of what is likely to be relevant and meaningful within a piece of work you are studying or writing yourself – these will need to be carefully distinguished from irrelevant and extraneous materials.

Try to classify each example below as either a description, summary, opinion or belief, clarification or illustration, argument, or explanation. There are only two arguments, and at least one example of every other type of content we've covered:

1 An odd number of participants means that someone will always be left out when picking two balanced teams: five people means two teams of two and one person left out; seven people means two teams of three and one left out; and so on.
2 My cake burned to a crisp because I accidentally left it in the oven for 13 hours.
3 The IKEA wardrobe gently collapsed as I stepped back to admire my handiwork; it was almost majestic to behold its gravitationally induced self-disassembly.
4 Here is how I built the wardrobe: first, I threw away the instructions; second, I fitted all the round bits into the little holes; third, I screwed together everything that looked like it needed screwing; fourth, I hit all the remaining parts with a hammer.
5 It's immoral to buy incredibly cheap clothing on the high street.
6 It's immoral to buy incredibly cheap clothing: people work long hours for terrible pay in overcrowded factories in order to produce it.
7 The clothing we buy is only incredibly cheap because the people making it are paid so little.
8 He ran rapidly and gracefully out of the water because he had a crab attached to his face.

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9 You ought to buy copies of this book for all your friends: it is excellent value and will almost certainly make them all cleverer.
10 I only wrote the previous example because I was running out of ideas. It isn't easy to think up engaging examples...

DESCRIPTION #: .... **SUMMARY #:** ....
OPINION #: .... **BELIEF #:** ....
CLARIFICATION #: .... **ILLUSTRATION #:** ....
ARGUMENT #: .... **EXPLANATION #:** ....

The two arguments are: (6), which attempts to persuade you that it's immoral to buy cheap clothing, using the reasoning that the people who make it work in terrible conditions; and (9), which attempts to persuade you that you should buy this book for your friends, using the reasoning that it is excellent value and will make them cleverer. Whether either of these constitutes a good argument is something for you to ponder.

Among the rest, (1) is an illustration: a general point is made, about someone always being left out when you pick teams from an odd number, and then illustrations are provided of particular cases that show how it works. Then (2) is an explanation: I am explaining why it is that my cake burned to a crisp. Next, (3) is a simple description (of a wardrobe collapsing), while (4) offers a summary outlining the process by which I built the wardrobe so badly, and (5) is an opinion or belief – it's probably most accurate to call it an opinion about the immorality of cheap clothing, likely to be based on underlying beliefs about what is right and wrong.

As we've already seen, (6) is an argument – notice that it takes the opinion expressed in (5) and turns it into an argument by expressing reasons to support that point of view, while (7) is an explanation on the same theme – it simply seeks to explain the fact that the clothing we buy is incredibly cheap. Finally, (10) is also an explanation, providing an account of why it is that I wrote the previous example.

Overall, how many did you correctly identify out of ten? If it was fewer than seven, I'd recommend you look briefly again over the ones you found most difficult.

THINK ABOUT THIS: Can you think of other kinds of information offered without attempts at persuasion beyond those listed in this chapter? How might you classify them? ....
....
....
....
....
....

WHAT ISN'T AN ARGUMENT? PERSUASION WITHOUT REASONING

While arguments are an attempt to persuade us of something using reasoning, **rhetoric** is an attempt to persuade us by other means. Rhetoric is a general term for the art of persuasive speaking or writing, dating back to the ancient Roman and Greek world. A great variety of rhetorical techniques are deployed by speakers and authors, with the intention of bringing their audience around to a particular conclusion or point of view. We'll examine rhetoric in depth in Chapter 7 – for now, it's worth running through a few of its basic features.

Rhetoric: the attempt to persuade by appealing to emotions rather than to reason

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In practice, most of the arguments (and the non-arguments) we encounter in real life will have some rhetorical elements around them. Rhetoric isn't inherently a bad thing, but we need to pay very close attention to how the **style** in which something is written and presented can affect our thinking in ways that have nothing to do with reasoning.

Style: describes the way something is written: its words, phrases and the structures of its language. Different topics and audiences require very different styles

Everyone writes in a different style, and there are different styles appropriate to different subjects. When we are writing a message to friends, we use different words and phrases than if we are writing to our parents. If you were writing a story, a lyric or a poem, you would do very different things with language than if you were writing an essay or describing a scientific experiment.

'whatever cannot be said clearly is probably not being thought clearly either.' – Peter Singer

In general, academic writing requires a style that is as clear as possible: that says exactly what you mean and that is not confusing. Difficulty is an inevitable feature of academic disciplines that demand specialist terms and high-level understanding. Unfortunately, some academic writing can also be needlessly difficult itself – either in terms of its structure and vocabulary, or the length and complexity of its sentences.

This lack of clarity can itself be a rhetorical manipulation: a way of conveying that you are an expert and that only experts are able to deal with the complexities of your subject. In general, it's a good idea to be wary of very difficult writing. It may be concealing a lack of precision, understanding, evidence – or simply the fear that expressing something too clearly devalues expertise. Then again, even the use of rational and reasonable language can itself be a persuasive technique ('I am a serious scientist: you can trust me'). One of the first things you need to do when looking at any piece of writing is to ask:

- What style of writing is this?
- What are the intentions behind this style: how does the author want me to feel?
- Is there actual reasoning behind what's being presented, or am I being asked to accept it on other grounds?

Here are examples of just a few rhetorical techniques. In each case, how might you describe the particular manipulation I'm using to try to make my case?

1 You look great today! So professional, so powerful. You should let me come and work with you, given that you're such a brilliant leader and entrepreneur. ....

2 It's time for a change: for something new and for someone fresh and keen in your workplace – and that someone is me. ....

3 I'm fending off job offers from a dozen potential employers right now – but it's you I really want to work for. What do you say? ....

4 If you don't give me a job, I really don't know what I'm going to do – I've got nothing. You are my only hope. Please. ....

5 If you don't take someone like me on in the current business climate, your company will fail; just see if it doesn't. You're in trouble and you need my help. ....

6 I've worked with some major-league disruptors in the disintermediation space. I know how to radically rethink verticals and horizontals. I can add real value. ....

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In order, these examples embody:

1 **Flattery**: praising someone in order to get them to do what you want.
2 **Appeal to novelty**: saying that something is new and so it must be good.
3 **Appeal to popularity**: saying that something is popular, so it must be good.
4 **Appeal to sympathy**: playing on the heartstrings.
5 **Appeal to fear**: trying to frighten someone into agreement.
6 **Jargon**: using fancy, largely meaningless words in order to sound smart.

There's plenty more where this came from. When it comes to critical thinking, you need to recognize as far as possible the rhetorical elements of any text you are engaging with – and then to disentangle the underlying reasoning from the materials surrounding it.

Let's take a look at an emotive piece of writing, sentence by sentence. Can you see where the author is attempting to persuade you using emotional appeals and rhetorical devices rather than reasoning?

> (1) The world of business is crazy! (2) Everyone is always talking about disruption, new ideas and new technology. (3) They say artificial intelligence is going to put half of the world's workers out of a job. (4) But I don't believe it. (5) I think that we are going to end up with a world where everything we do involves smart machines, but these smart machines allow us to find all kinds of interesting new work. (6) After all, people have always been afraid of new technology. (7) Just look at the Luddites, smashing up cotton mills during the Industrial Revolution back at the start of the 19th century. (8) Yet everybody didn't stop working. (9) They just couldn't imagine what all the new kinds of work would look like – until technology created it.

Sentence (1) is pure rhetoric: 'the world of business is crazy!' This is emotional language, complete with an exclamation mark for emphasis. It's trying to get you on the author's side, to create the expectation that you're about to hear some zany stuff about the world of tech, and to create an informal rapport with the author.

Sentence (2) is also rhetorical rather than an attempt to provide reasoning or make an argument: 'everyone is always talking about disruption' we are told, which is unlikely literally to be true. The author is using **exaggeration** to set the stage: in this case, to suggest that 'everyone' is 'always' saying one thing, but that you are about to be presented with an exciting alternative point of view.

Exaggeration: overstating the case, often as a rhetorical tactic; like over-generalization, this is a way of making a far bigger claim than is actually the case

Sentences (3) and (4) deliberately contrast what 'they say' with the fact that 'I don't believe it'. This is conversational language, designed to create a sense of drama and engagement – so that by the time we finally get to sentence (5) and find out what 'I think', we are ready to start nodding our heads even though we have as yet seen no reasoning or evidence. Sentence (5) contains the concluding idea that the author wants you to believe – although it's only after you get to the end of the passage that you are likely to work this out

As often happens in everyday prose, the reasoning in support of this conclusion is presented after rather than before that conclusion (it can be more rhetorically effective to start with your conclusion, and then to justify it). 'After all' begins sentence (6), before telling us that people have 'always been afraid of new technology' – a piece of reasoning expressed in the form of an **over-generalization**.

Over-generalization: suggesting that something is more generally true than it actually is, often as a rhetorical tactic; making a far broader claim than is the case in reality

Sentences (7) and (8) further support the conclusion by inviting us to 'look at the Luddites' in the 19th century – making the assumption that the way things were 200 years ago is

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For spelling out what you think, taking nothing for granted.

SPELLING OUT ARGUMENTS AND ASSUMPTIONS

A.K.A. PROVE You know What You're Talking About.

Why does reasoning matter (and how can you spot an argument)?

↓

How do you spell out the reasoning behind an argument?

↓

How do you draw out a logical conclusion from your premises?

↓

How do you draw out a probable conclusion from your premises?

How can you select and test the best explanation of something?

How should you assess evidence and plan your reading strategy?

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THERE IS ALWAYS A WELL-KNOWN SOLUTION TO EVERY HUMAN PROBLEM —NEAT, PLAUSIBLE, AND WRONG.

H.L. MENCKEN

#TalkCriticalThinking

FIVE THINGS YOU'LL LEARN IN THIS CHAPTER

1. How to *reconstruct* someone else's argument in standard form
2. How to spot *premises* and *conclusions*
3. How to spell out *assumptions*
4. The importance of being charitable towards *others' arguments*
5. How to tell the difference between *linked* and *independent premises*

Assuming an argument is being made, what exactly is its author claiming – using what reasoning? To return to the analogy of developing a toolkit for critical thinking, answering these questions is like getting to grips with a complicated piece of machinery. We need to be able to take something apart and identify its different components if we want to fully understand it. This is known as **reconstructing** an argument.

Reconstructing an argument: identifying all its different parts, then spelling these out clearly in a standard form that allows us to see exactly how they work

Over the course of this chapter, we will build up a recipe for reconstructing any argument. The skills involved apply to more than just arguments: they are used whenever we are trying to get to the bottom of someone else's thinking, and to spell out the key ideas and assumptions at play in a piece of writing or evidence. You can use them when thinking about explanations, and indeed any act of reasoning – so long as you don't let your own assumptions prevent you from seeing what someone else is trying to say.

PREMISES AND CONCLUSIONS: THE STANDARD FORM

Appropriately enough, the most common approach to setting out an argument clearly is known as **standard form**. Here's an example of a simple argument expressed first in a paragraph of ordinary writing, and then in standard form:

> There are no copies of the textbook that you need in the library: this means that you won't be able to borrow a copy from there.

Premise 1: The library does not have any copies of the textbook that you need.

Conclusion: **You cannot borrow a copy of the textbook that you need from the library.**

Standard form means rewriting an argument so that:

1. The **conclusion** is set out clearly at the bottom.
2. The reasoning leading to the conclusion is set out clearly above it in the form of numbered **premises**.

Premise: a claim presented by an argument in support of its conclusion

Conclusion: the final proposition in any argument, supported by its premises

A premise is the most basic building block of an argument. Many different premises can be linked together into a chain of reasoning to support a conclusion – or, as in the example above, just one premise can sometimes be enough to support a conclusion on its own.

An argument can have many premises, but it can have only one final conclusion. The conclusion of one argument can form the premise of another: what defines a conclusion is simply its place at the end of an argument. In a sense, all arguments are just a collection of propositions within which one is supported by all the rest. This is made clear when we use standard form. Every proposition has its own numbered line, and these lead in sequence to the final conclusion. When an argument is successful, the progression between them is like a smooth stroll up a flight of steps.

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Often, we encounter arguments in everyday life as a jumble of propositions, rather than a neatly structured sequence of premises followed by a conclusion. Below is an example of a more complex argument, set out in ordinary language first and then in standard form:

> If I don't know how to tell apart different types of variables, I will definitely fail my statistics exam. Unfortunately, I don't even really know what a variable is, let alone how to tell different types apart. I am doomed to fail my exam!

Premise 1:	Knowing how to tell apart different variables is essential to passing my statistics exam.
Premise 2:	I do not know how to tell apart different types of variables.
Conclusion:	**I will fail my statistics exam.**

Notice that in setting out this argument in standard form, I have rephrased and clarified the two premises compared to their original language. The second sentence of the original – 'Unfortunately, I don't even really know what a variable is, let alone how to tell different types apart' – contains emotional information that is irrelevant to the process of reasoning.

Once we have accepted the premise that 'knowing how to tell apart different variables is essential to passing my exam', the only relevant information for the purposes of this argument becomes whether or not I can tell variables apart. If I cannot tell them apart, I will fail – which is the conclusion that the argument is seeking to justify. The information 'unfortunately, I don't even really know what a variable is…' is **extraneous** to the argument, so I should leave it out of my reconstruction.

Extraneous material: information that is not relevant to the argument and should be left out as we carefully clarify each premise and conclusion by rewriting them

Try rewriting the example below in standard form, eliminating extraneous material in the process. It's an argument with three premises, leading to a single conclusion.

> Listen up! We must set off by 5pm at the latest. The river crossing is only open until 6pm. We need to use that river crossing – and we are one hour's travel away.

Write them out below:

Premise 1: ....

....

Premise 2: ....

....

Premise 3: ....

....

Conclusion: ....

....

How did you do? Compare your version to my one, below. Did you put the premises in a different order to me? Did you separate all three in the same way as I have done? In this particular case, the sequence of the premises is not the most important thing. What matters is that the combination of three separate premises comes together to provide reasoning in support of one particular conclusion.

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Premise 1:	We need to use the river crossing.
Premise 2:	We are one hour's travel away from the river crossing.
Premise 3:	The river crossing is only open until 6pm.
Conclusion:	**We need to set off by 5pm at the latest.**

There is one further thing we can add to aid our understanding here. In order to reconstruct this argument in as much detail as possible, we can fill in a missing piece of the reasoning: a step in the argument that has been **assumed** rather than spelled out. As often happens in arguments, the author has taken some information for granted – and we can only fully investigate their reasoning if we spell out what they are inviting us to assume.

Assumption: something relevant to an argument that has been taken for granted by the person presenting it, rather than spelled out

Can you see what assumption is being made in the middle of this argument? It's something so obvious that you might not think it's even worth noting. I have added it in, below, next to the heading 'Conclusion 1':

Premise 1:	We need to use the river crossing.
Premise 2:	We are one hour's travel away from the river crossing.
Conclusion 1:	**We need to set off at least one hour before the crossing shuts.**
Premise 3:	The river crossing is only open until 6pm.
Conclusion 2:	**We need to set off by 5pm at the latest.**

Notice that I have put this assumption in the form of an intermediate conclusion into my reasoning. The first two premises suggest this conclusion, which I then re-use as a new premise in combination with the third premise. An argument can only have one final conclusion, but it can have many intermediate conclusions along the way.

An intermediate conclusion is a conclusion arrived at during the course of an argument; it is then used as a premise for building towards the final conclusion, which is the very last thing that the argument is attempting to prove.

Before we finish this introductory section, let's look at one of the great advantages of using the standard form for argument – the fact that it allows us, easily, to compare different points of view and, once we have set them out clearly, to spot which is better or more reasonable. Imagine that there are a dozen of us in a group facing the scenario above: we all need to use a river crossing which is only open till 6pm and we are debating what we should do next. Someone else in the group shouts:

> We need to get going right now! It would be terrible if we missed the crossing; we really need to use it. It is only open until 6pm. It takes an hour to get there and it's 2pm already. Time is flying past. I can't bear the thought of us failing to get across: it would be a disaster. There's no time to lose – we need to get moving right now!

Just as we did above, let's reconstruct this argument by disregarding the extraneous material, clarifying the language, setting out the conclusion at the end, and then listing the individual premises in order. Once we do all this, we end up with the following:

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Premise 1: When a team has a fluid structure, debate and delegation are difficult.

Premise 2: ....

....

Conclusion 1: ....

....

Premise 3: ....

....

Premise 4: ....

....

Conclusion 2: ....

....

How did you do? Below is a completed version of that argument in standard form.

All clear to you when you first read the example?

Premise 1: When a team has a fluid structure, debate and delegation are difficult.

Premise 2: Clearly defined roles and expectations facilitate debate and delegation.

Conclusion 1: **Teams with clearly defined roles and expectations outperform those with more fluid structures at debate and delegation.**

Premise 3: Team training to clearly define roles and expectations is affordable.

Premise 4: There are no other obvious effective alternatives at a similar cost.

Conclusion 2: **Team training to clearly define roles and expectations is an affordable, effective option for improving performance at debate and delegation.**

The language used in this argument is relatively cumbersome, but its structure is straightforward. Conclusion 1 – the intermediate conclusion – comes in the first sentence, but other than that all the points flow in order. For comparison, take a look at exactly the same argument set out in a less logical way, with some additional information introduced:

> Team training to clearly define roles and expectations is extremely affordable, according to our research. We believe that it should be a budgetary priority. When a team has a fluid structure, debate and delegation are difficult. Members report far greater stress and difficulty in communication. Much better experiences of debate and delegation come when roles and expectations are clearly defined. There are no obvious effective alternatives to team training, of the type suggested above, available at a similar cost. Teams with clearly defined roles and expectations outperform those with more fluid structures. This is unsurprising, in light of the above.

Here, the very same extended argument is being expressed much less clearly. Carefully tracing the steps in an author's reasoning is all the more important in such cases – as is bearing in mind the flow of your own arguments when you are writing. As often in critical thinking, you'll find that the skills of close reading and comprehension directly translate into making you a better writer and thinker.

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THE TRUTH IS ALWAYS SOMETHING THAT IS TOLD, NOT SOMETHING THAT IS KNOWN. IF THERE WERE NO SPEAKING OR WRITING, THERE WOULD BE NO TRUTH.

SUSAN SONTAG

#TalkCriticalThinking

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THINK ABOUT THIS: What are the main differences between ordinary writing and writing an argument out in standard form? What might you be able to learn in your writing from thinking about standard form and the structure of arguments? ....
....
....
....
....
....

A STEP-BY-STEP GUIDE TO RECONSTRUCTING ARGUMENTS

Now that we've introduced the standard form and extended arguments, let's look in more detail at the process of reconstruction. I have divided it into five steps:

1. Apply the **principle of charity**.
2. Identify the **final conclusion** (and write it down at the bottom).
3. Identify the **explicit premises** (and write them down in order above).
4. Identify any **implicit premises** (and insert them where they are needed).
5. Distinguish between **linked** and **independent** premises.

1 Apply the principle of charity

The first principle to bear in mind when reconstructing someone else's argument is to keep an open mind and not to let your own feelings, beliefs or expertise get in the way. In particular, we should begin by assuming that someone is:

- Telling the truth rather than aiming to deceive us
- Sufficiently well informed to know what they are talking about
- Presenting a coherent and reasonable account.

In other words, our default position should be one of generosity towards someone else's perspective when we are reconstructing their argument: something that philosophers often call the **principle of charity**.[5]

Principle of charity: the assumption that someone else is truthful and reasonable, and that their argument deserves stating in its strongest form

The principle of charity requires us to begin with the assumption that someone else is truthful and reasonable, reconstruct their argument in its strongest form. Why should we do this? The answer isn't that we should always be nice to other people. In fact, it's the reverse: if we want to subject someone else's point of view to as vigorous an analysis as possible, we need first of all to grasp their point of view in its strongest form. This is the only way we can then hope to either come up with a really robust argument for a different point of view or be certain that we have the best possible reasons for agreeing with them. Imagine that a friend makes this argument to me:

It can be really, REALLY hard to do this.

> I have seen the latest accounts at the company you work for and they don't look good. Sales have declined and profits are the lowest they have been for five years. I would suggest that you are unlikely to get a good bonus this year.

There are a number of different ways I could respond to this. I could say:

> (1) I don't believe you: you're just trying to make trouble. You've never forgiven me for that incident on our trip to Latvia.

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Or I could say:

> (2) You don't understand what you're talking about. You're claiming that profits can exactly predict everyone's bonuses every time. That's just crazy.

Or I could think to myself:

> (3) Hmm… The fact that you've seen the accounts, and that they show sales declining and low profits, does suggest that bonuses might not be good this year. It looks like I shouldn't base my plans on getting a big bonus.

Response (1) – 'I don't believe you: you're just trying to make trouble…' – is dominated by **prejudice**. In it, I have decided not to take my friend's argument seriously without bothering to consider the evidence.

Prejudice: holding a belief without consideration of the evidence for or against it; deciding in advance of hearing an argument what you believe to be the case

Meanwhile, in response (2) – 'You're claiming that profits can exactly predict everyone's bonuses every time…' – I am putting words into my friend's mouth. She didn't actually argue that profits can exactly predict bonuses: I am setting up this claim as a **straw man** so that I can dismiss her position more easily. It's tempting to do this when we disagree with people, but it means we miss out on the opportunity to either learn from them or come up with the best possible response (straw men are designed for one thing only: burning).

Straw man: an absurd simplification of someone else's position that is obviously wrong or stupid, and that is only expressed so that it can easily be defeated

Finally, response (3) – 'It looks like I shouldn't base my plans on getting a big bonus…' – embodies the most charitable interpretation of my friend's argument. It assumes she is truthful, reasonable and well informed. Compared to the first two responses, this last reaction is most likely to prove useful: it allows me to make the best possible use of potentially important information, and to check out a potentially alarming scenario.

In the real world, complex arguments will always tend to have strong points and weak points. Often, people who disagree with one another will each attack the weakest point of their opponent's argument, looking for an easy victory. The problem with this is that attacking only the weakest point of someone else's argument is unlikely to change their mind, or to change the minds of anyone else who agrees with them.

If we wish, genuinely, to challenge what other people think, we need to engage with the very strongest version of their arguments. Otherwise, by attacking straw men or picking only on their weakest points, we are likely only to reinforce existing beliefs – and to allow ourselves to get away with weak or underhanded forms of argument.

SMART STUDY: Why be charitable towards other people's arguments?

It may seem strange to suggest that you should be as generous as possible to other people's points of view, especially if you think they are likely to be wrong. Yet this is a vital skill, for three reasons:

1. Beginning with the assumption that someone is truthful, informed and reasonable ensures that you don't simply dismiss their views through prejudice.
2. Understanding someone else's argument in its strongest form is the best way of analysing it as rigorously as possible – and learning as much as you can from it.
3. If you do wish to come up with the strongest possible objection to an argument, or to change someone else's mind, you need to understand the most convincing features of what they and others like them say, rather than simply attacking their weakest points.

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2 Identify the final conclusion

When reconstructing an argument, we almost always begin with the end: the final conclusion. Why? First, because identifying a conclusion tends to be one of the most important ways through which we recognize that an argument is being made in the first place. Second, because no matter how many premises may be involved or how long the chain of reasoning, every argument only has one final conclusion. Once we have determined this, we can safely tease out the chain of reasoning leading to it.

Correctly identifying conclusions is a question of close reading and practice rather than a precise science, but there are some general questions we can ask ourselves to help spot a final conclusion:

- What is the author ultimately trying to prove?
- What is the message you are expected to take away from reading this?
- Is a final decision, verdict or recommendation being offered?
- Is a particular point being repeated or emphasized?

Try to identify and underline the final conclusion for each of these arguments:

1 I love eating pies. My friend Bob is organizing a competition to see who can eat the most pies. Because I love pies, I should have a great time taking part.
2 If there were intelligent aliens out there in the universe, they would have sent us some kind of clear message by now. Since we haven't received any kind of message like that, there can't be any intelligent aliens out there.
3 Insomnia is extremely difficult to treat. There is some evidence that cognitive behavioural therapy (CBT) can improve sleep quality for sufferers. We should watch CBT trials in the field closely, given that it's important to pay close attention to any possible therapeutic treatment for this difficult condition.

In the first example, the conclusion comes at the end: I should have a great time taking part in my friend's pie-eating competition. In the second example, the conclusion also comes at the end: there can't be any intelligent aliens out there. In the third example, the final conclusion comes in the first part of the last sentence – we should watch CBT trials in the field of insomnia closely – followed by a premise that supports it. Here is a slightly more complex example. Can you find the final conclusion?

> The experiment was a failure. I was testing to see if rabbits preferred lettuce or carrots. But I had forgotten to lock the door of the hutch and all the rabbits ran away without eating either the lettuce or the carrots. I didn't get any results and I'm too embarrassed to write up what actually went on. Some experiment!

The final conclusion, here, comes in the first sentence: *the experiment was a failure*. If you wanted to express this paragraph more formally, you might shift this to the end, together with an indicator word at the start: 'Thus, the experiment was a failure'. Make sure, however, that you remove all indicator words as part of the process of clarification when writing something out in standard form.

3 Identify the explicit premises

Once we have identified the final conclusion, we can begin listing the premises provided by the author. Separating out premises from extraneous material can be difficult, depending on how clearly an argument is expressed, not least because a premise can be a very simple or basic piece of information. In general, use these guidelines to help you hunt out individual premises:

- Work backwards from the conclusion: what are the key points that support it?
- Ignore emotion and repetition: what matters is whether something counts as part of a process of reasoning, not what it may tell us about the author's feelings.

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4 She is going to fail her degree: I never see her at lectures..
....
....
....

Think carefully for yourself before looking at my answers, below. For each, I've commented on whether the assumption is likely to prove important or not. Do you agree?

1 *It is a good idea to slow down if a road has sharp corners. If you don't do this, you might come off the road.* [Probably so obvious that it isn't worth mentioning, although someone driving too fast may need reminding of these reasons]
2 *Things that the Prince of Wales likes are good. Therefore this marmalade is good.* [Perhaps worth mentioning: once we have spelled this out, it becomes far easier to see how we might argue against this position or find it unconvincing. What is so special about the Prince of Wales's taste in marmalade?]
3 *There is nothing wrong with doing things that are perfectly natural.* [Definitely worth spelling out: once we look closely at this assumption, we can find several problems with it. For example, is it also OK to urinate in public because it's 'natural'? And what does and does not count as 'natural' anyway: wearing clothes, writing?]
4 *If I haven't seen someone at lectures, this means that they are not going to lectures. If you do not go to lectures then you are not going to pass your degree.* [Probably worth spelling out: looking more closely at these assumptions might lead us to change or be more specific in our thinking. Can we be entirely certain that not seeing someone means that they are not going to lectures, or that doing this definitely means failing their degree?]

Here's a final example, below, of an argument expressed first in ordinary prose and then in standard form. I have filled out all the explicit premises and the final conclusion already. It's your job to fill in the relevant implicit information.

A book says that tall people are more confident than shorter people. I'm much taller than you: no wonder I find it easier to ask someone out on a date!

Premise 1: This book says that tall people are more confident than short people.

Premise 2: [Implicit] ....
....

Premise 3: [Implicit] ....
....

Conclusion 1: **Tall people are more confident than short people.**

Premise 4: I am taller than you.

Conclusion 2: **[Implicit]** ....
....

Premise 5: [Implicit] ....
....

Conclusion 3: **I find it easier than you do to ask someone out on a date.**

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Here's my version, below, with the missing steps of the argument filled in:

Premise 1:	This book says that tall people are more confident than shorter people.
Premise 2:	This book accurately describes the way things are.
Premise 3:	I'm accurately describing what the book says.
Conclusion 1:	**Tall people are more confident than shorter people.**
Premise 4:	I am taller than you.
Conclusion 2:	**[Implicit] I am more confident than you.**
Premise 5:	[Implicit] Being more confident makes it easier to ask someone out.
Conclusion 3:	**I find it easier than you do to ask someone out on a date.**

In this particular case, it is probably worth spelling out Premise 2 and Premise 3 – that this book accurately describes the way things are, and that I'm accurately describing the book – because the argument not only relies on both of these things being true, but also seems particularly vulnerable to scepticism at this point.

Is it likely that a book actually says something this simple, or that I'm reporting it entirely accurately? Perhaps not. On balance, the truth is likely to be a little more complicated – and it's precisely by spelling out assumptions like this that we can move towards a more nuanced account (or a counter-argument of our own).

5 Distinguish between linked and independent premises

Linked premises: support a conclusion when taken together, but not individually

Independent premises: support a conclusion individually and don't rely upon each other

As you may have noticed in the examples above, some premises only provide support for a conclusion when they are **linked** together, while others **independently** provide some support. Here's an argument involving two linked premises, expressed in ordinary prose with (P1) and (P2) used to mark the two premises and (C) to show the conclusion:

> (P1) The chemical only reacts at this temperature in the presence of a catalyst. (P2) There is currently no catalyst present, so (C) it cannot react at this temperature.

Quick, easy format for reconstructions.

Here, by contrast, is an argument on a similar theme involving two independent premises:

> (P1) The chemical doesn't react when I apply heat. (P2) The chemical doesn't react when I increase the pressure. (C) I may need a catalyst to help the reaction.

In the first instance, neither premise supports the conclusion when taken on its own: if you read either one without the other, there is no argument. This means that they are linked, because it is only when they are taken together that they support the conclusion.

In the second example, both (P1) and (P2) independently provide some support for the conclusion. The argument is stronger as a result of having two premises, but it would still function as an argument with just one of them, even if it would be less convincing.

It's possible to draw diagrams of arguments that show the relationships between linked and independent premises, but for most purposes it is simpler, and more important, to ensure that you can distinguish between:

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- Which premises must be taken together in order to support a conclusion (linked) and
- Which premises support a conclusion without relying on any others (independent).

Here is a longer example for you to consider, including both linked and independent premises. Can you see which is which?

> (P1) All successful athletes combine effective training with natural ability. (P2) My sister wants to be a successful athlete and (P3) she has managed to stick to an effective training programme. (P4) She's tall, muscular and seems to have a great deal of natural flexibility and co-ordination. (P5) Her coach says she has great potential. (C1) That suggests she really is a natural. (C2) So I reckon she has a decent chance of making it all the way.

Here, premises (P4) and (P5) work independently to support (C1) – my sister being tall and muscular, and her coach saying she has great potential, both suggest she has natural talent. The rest of the premises are linked together. If it is the case that (P1) all athletes combine effective training with natural ability – and (P2) my sister wants to succeed as an athlete – then (P3) combined with (C1) supports the final conclusion (C2). She has a decent chance of making it, because she both trains effectively and has natural ability.

You'll notice that I haven't written out this reconstruction in as lengthy a form as the earlier examples. Practically speaking, unless an argument is very complex, it is often easier to note premises and conclusions like this, making sure you spell out implicit assumptions and rephrase to clarify as needed.

SMART STUDY: Ensuring you don't confuse the two types of premise

Arguments can use a combination of both linked and independent premises, but each works very differently:

- Linked premises rely on one another, so an argument using them fails if even one linked premise is faulty. The relationship between linked premises is typically one of 'IF BOTH X AND Y, THEN Z'. For example, '*If both a warning light is on and we know it is not a test, then we should evacuate the lab.*'
- Independent premises reinforce one another, but, although an argument is weakened if one or more is faulty, it does not automatically fail. The relationship between independent premises is typically one of 'IF X, THEN PERHAPS Z; IF Y, THEN PERHAPS Z'. For example, '*If there is a smell of burning, then perhaps we should evacuate the lab; if there are unexplained noises coming from inside the test chamber, then perhaps we should evacuate the lab.*'

Being alert to this difference allows you to distinguish between an argument that fails when it has a faulty premise and one that is just weakened. Be sure that, in your own work, you know whether you're presenting independent premises that support a conclusion individually, or linked premises that need to be taken together. This will help you to stay on top of your own arguments and to deliver a conclusion with confidence.

A FEW FURTHER WORDS ABOUT ASSUMPTIONS

We can't talk about anything without making assumptions. If you think hard enough, there is no end to the assumptions you can list behind any claim or argument. Imagine we are standing together in a kitchen and I say this to you:

> Don't touch that pan – it's hot!

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This seems so obvious it is hardly worth analysing. Yet the shared assumptions required for us to communicate successfully are considerable. I am assuming that:

- A hot pan will burn you if you touch it.
- You don't want to get burned.
- You are able to understand the meaning of my words in English.
- You trust me to be telling the truth.
- The pan really is hot and I'm not simply confused.

Is any of this worth spelling out? Probably not. If, however, I'm talking to my 2-year-old son, I will work hard to explain several of the assumptions above, because he doesn't yet know enough to take all these things for granted. Similarly, if you are talking to someone in a language that's foreign to you, or from a different culture, you may find that certain things you usually take for granted need to be spelled out in order for you to successfully communicate.

Here's an example in the kind of prose you might find in a newspaper article about the global economy. What key assumptions are being made here?

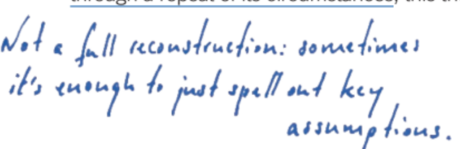
> The financial crisis of 2008 was fuelled by bad loans in the US housing market, and the financial derivatives based on these loans. When the housing bubble burst, massive losses associated with the derivatives wiped trillions off the global economy. Today, lessons have been learned around both loans and derivatives, and so we will not see a repeat of the circumstances of 2008, thus making us safe from crises on a similarly massive scale, even though lesser global recessions may still occur.

As so often with arguments, it's useful first of all to locate the final conclusion, so we can see what is being claimed. In this case, the author wishes us to conclude that the world is safe from future financial crises on the scale of 2008. Now we can ask – what reasoning is provided to support this? The argument is that the 2008 crisis was caused by bad loans and derivatives based on these loans, and that, because lessons have now been learned around both loans and derivatives, a similarly massive crisis won't come again. What relevant reasoning is being assumed but not spelled out? Here are the two most important implicit premises:

1. The lessons learned around loans and derivatives are sufficient to ensure that the circumstances of 2008 will never be repeated.
2. The only way that a financial crisis as massive as the 2008 crisis can occur is through a repeat of the circumstances of that crisis.

We can now rewrite the argument in ordinary prose, adding in these assumptions along the way. I have underlined the inserted assumptions, below:

> The financial crisis of 2008 was fuelled by bad loans in the US housing market, and the financial derivatives based on these loans. When the housing bubble burst, massive losses associated with the derivatives wiped trillions off the global economy. Today, lessons have been learned around both loans and derivatives that are sufficient to ensure we will avoid any such mistakes in future. So we will not see a repeat of the circumstances of 2008, because the only way that a financial crisis as massive as that in 2008 can occur is through a repeat of its circumstances; this thus makes us safe from crises on a similarly massive scale…



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I would say that it is very much worth explaining these assumptions, because both of them are open to questioning. Is it really true that the circumstances of 2008 will never be repeated? Perhaps. But it's hardly a certainty. Is it also true that the only way a massive financial crisis can occur is through those circumstances? Almost certainly not.

SMART STUDY: A practical guide to challenging assumptions

Every single argument relies on assumptions, and learning to spell out the ones that matter is important for getting to grips with ideas and research in any field. To help you do this, try asking these five questions whenever you're struggling to work out whether you should accept someone's claims at face value:

1. Is this argument moving too simplistically from the particular to the general, or assuming that one thing must be like another without a good reason?
2. Is an assumption being made about one thing being the cause of another when, in fact, this is not obviously true?
3. Are any particular beliefs about what is right and wrong, or natural and unnatural, being used to support a conclusion without being made explicit?
4. Does this argument assume that the future must follow the same pattern as the past without providing evidence or considering differences in circumstances?
5. Has what you're reading begun by assuming the thing it is supposed to be proving?

PUTTING IT ALL TOGETHER

We have looked at a method for reconstructing arguments in five steps:

1. Apply the principle of charity
2. Identify the conclusion
3. Identify the explicit premises
4. Spell out any relevant assumptions
5. Distinguish between linked and independent premises.

Here's an example to help you put this into practice. First, read the paragraph below. I have marked up premises and conclusions in brackets:

> For the purposes of my research project, I developed an initial theory about student work habits. Unfortunately, (P1) it is not possible to obtain any good quality data about student work habits. This means that (C1) I cannot meaningfully test my theory. Given that (P3) a theory which cannot meaningfully be tested is unsuitable for a research project, it has become clear that (C3) I need to abandon this particular theory.

Now we are going to put this into standard form. In the argument box below, I have provided a structure with some elements filled in and some left blank. Try to fill in all the blanks, beginning with the final conclusion and working back from there. Note that a couple of the steps you need to clarify are implicit rather than explicit.

Premise 1: [Implicit] ....

....

Premise 2: It is impossible to obtain good quality data about student work habits.

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TWO

CONSERVE MENTAL ENERGY. BUILD HABITS AND A WORKING ENVIRONMENT THAT HELP YOU FOCUS. THIS MEANS NOT HAVING EMAIL OR SOCIAL MEDIA OPEN IN THE BACKGROUND. DEAL WITH EMAIL IN FOCUSED BURSTS. DON'T LET OTHERS DICTATE YOUR TIME AND ATTENTION.

#TalkCriticalThinking

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THINK ABOUT THIS: How does it make you feel to set out a position that you disagree with like this? Does it have any impact on what you think or believe, or on how you might choose to argue with someone who believes differently to you? ....
....
....
....
....
....

SUMMARY

Reconstructing an argument means identifying all its different parts, then setting these out clearly in a standard form that allows us to see exactly how they work.

Standard form means rewriting an argument so that:

- The **conclusion** is set out clearly at the bottom.
- The reasoning leading to the conclusion is set out clearly above it in the form of numbered premises.

A **premise** is the most basic building block of an argument. Many different premises can be linked together into a chain of reasoning to support a conclusion.

Extraneous material is information that is not relevant to the argument, and that should be left out as we carefully **clarify** each premise and conclusion by rewriting them.

An **assumption** is something relevant to an argument that has been taken for granted by the person presenting it, rather than spelled out.

An **extended argument** is one in which the final conclusion is supported by one or more premises that are themselves supported by previous premises.

An **intermediate conclusion** is a conclusion arrived at during the course of an argument; it is then used as a premise for building towards the final conclusion.

The **final conclusion** comes at the end of an extended argument: it is the final thing that the person making the argument is attempting to persuade you of.

Prejudice means holding a belief without consideration of the evidence for or against it, or deciding in advance of reading an argument what you believe to be the case.

A **straw man** is an absurd simplification of someone else's position that is obviously wrong or stupid – and that is only expressed so that it can easily be defeated.

The **process of reconstruction** can be divided into five steps:

1. Apply the **principle of charity**. This requires us to begin with the assumption that someone else is truthful and reasonable, and to try to reconstruct their argument in its strongest form.
2. Identify the **final conclusion** (and write it down at the bottom) – conclusion indicator words such as 'because', 'since', 'thus' and 'so' may help us to work out what is going on in an argument by indicating where the final conclusion is. Final conclusions also often appear at either the very start or very end of a piece of writing.

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3 Identify the **explicit premises** (and write them down in order above the final conclusion) – these are all the claims that someone has set out in support of their conclusion.
4 Identify any **implicit premises** or **implicit conclusions** (and put them where they are needed) – these are not spelled out by the person stating an argument, but are **assumed** as part of their reasoning and need to be included in reconstruction.
5 Ensure you know which premises are **linked** (they need to be taken together to support a conclusion) and which are **independent** (they work on their own).

Following this reconstruction, you are ready to **evaluate** the reasoning on display, paying careful attention to the different types of reasoning in use.

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THINK

REASONING WITH LOGICALLY AND CERTAINTY

It's how to successfully challenge other people's conclusions!

Why does reasoning matter (and how can you spot an argument)?

↓

How do you spell out the reasoning behind an argument?

↓

How do you draw out a logical conclusion from your premises?

↓

How do you draw out a probable conclusion from your premises?

↓

How can you select and test the best explanation of something?

↓

How should you assess evidence and plan your reading strategy?

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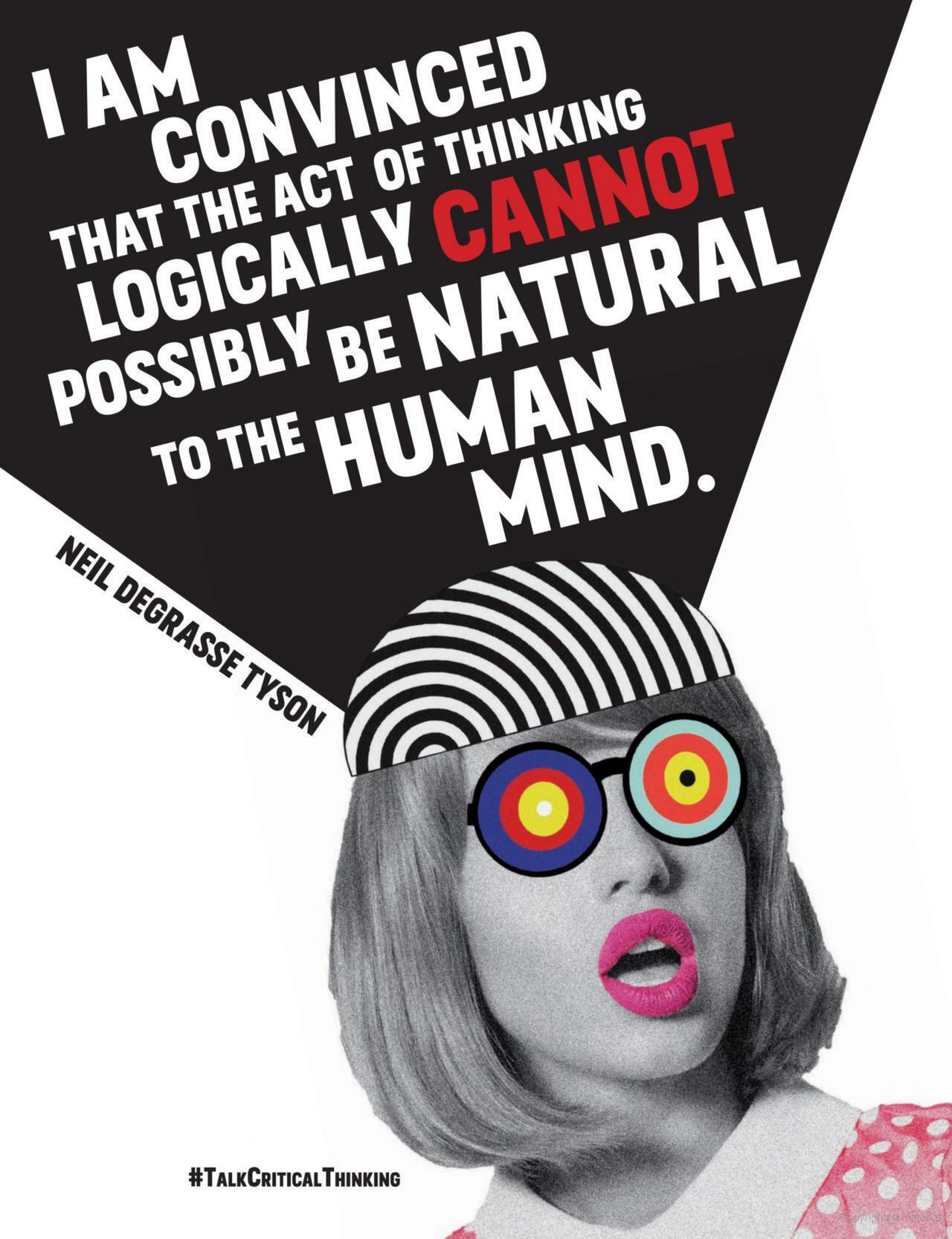
I AM CONVINCED THAT THE ACT OF THINKING LOGICALLY CANNOT POSSIBLY BE NATURAL TO THE HUMAN MIND.
NEIL DEGRASSE TYSON
#TALKCRITICALTHINKING

The conclusion – that I am sexy – follows logically and inevitably from the premises. If all men who wear glasses are sexy, and I wear glasses, then it must follow that I am indeed sexy. My argument is valid, even if the truth of my premises is open to debate. By contrast, here is a piece of invalid reasoning based on the same premises:

> All men who wear glasses are sexy. I wear glasses. Therefore, I am a man.

This conclusion – that I am a man – does not follow logically and inevitably from my premises. It may happen to be true that I am a man, but this is neither here nor there so far as deduction is concerned. My argument doesn't work on a structural level: I have failed to correctly deduce what my premises imply, instead leaping to an **unwarranted** conclusion.

Unwarranted: a conclusion that is not supported by the argument

Much of the time, you can use a combination of common sense and close reading to work out whether the form of an argument is valid or invalid. Here are a few examples. Are the arguments below deductively valid or invalid?

		VALID	INVALID
1	All students must register if they wish to attend the workshop. I wish to attend the workshop. Therefore, I must register.	○	○
2	There is no such thing as a purple monkey. This creature is purple, so it can't be a monkey.	○	○
3	Purple monkeys are difficult to spot. This creature is difficult to spot, so it must be a purple monkey.	○	○
4	We always need the permission of human volunteers if our experiments on them are to be ethical. We do not yet have permission from these subjects, so we cannot yet experiment on them in an ethical manner.	○	○
5	We always need the permission of human volunteers if our experiments on them are to be ethical. We do not yet have permission from these subjects, so we can only experiment on them if they don't know what we are doing.	○	○

Number (1) is clearly valid. Number (2) is also valid, although it takes a little more thought to see why: if there is no such thing as a monkey that is purple, it logically follows that anything which is purple cannot be a monkey. Number (3) is invalid, because saying that purple monkeys are difficult to spot does not imply that 'anything that is difficult to spot must be a purple monkey'. There may be countless other things that are also hard to spot (chameleons, tiny objects that are very far away, brown monkeys sitting on brown trees).

Number (4) is a valid argument. Its premises are lengthier than our first examples, but its form is straightforward: if we always need someone's permission to do something, then we cannot do that thing if we do not have their permission.

Finally, number (5) is invalid. It involves the kind of slippery thinking that people often use in order to justify a course of action, but this shifting of meanings has no place in valid reasoning. If we always need someone's permission to do something ethically, then we cannot do that thing ethically without their permission – full stop. Trying to provide an excuse for doing so is not valid. The conclusion is unwarranted: the given premises do not support it.

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SMART STUDY: How evasion creates invalid arguments

One of the most useful practical reasons for thinking about validity is that it allows us to spot situations in which someone is trying to get away with drawing an unwarranted conclusion from their premises, via a hidden assumption that they would rather not spell out.

In the final example above – 'We always need the permission of human volunteers if our experiments on them are to be ethical. We do not yet have permission from these subjects, so we can only experiment on them if they don't know what we are doing' – thinking rigorously about validity exposes the fact that the author is concealing an alarming assumption beneath their explicit argument: that, so long as someone doesn't know what we are doing, we can get away with acting unethically towards them.

Assessing sources closely for validity means insisting that people cannot pull off this kind of evasion. If someone wishes to present a claim as the logical outcome of their argument, it's our job to insist that their argument is honest and explicit. Don't be afraid to challenge invalid claims wherever you find them: it's an integral part of honest thought and research.

Invalid doesn't mean untrue — it means not serving as proof.

NECESSARY AND SUFFICIENT CONDITIONS

Necessary condition: must be met if something is to be true, but cannot by itself guarantee the truth of that thing

Sufficient condition: one that, if met, does guarantee the truth of something

One of the most fundamental ways in which concepts can be logically connected is through **necessary** and **sufficient** conditions. Here is an example of each:

> In order for me to be a successful student, it is necessary for me to work hard.
>
> This exam has a pass mark of 50, so my score of 52 is sufficient to pass.

A necessary condition is something that must be true in order for another thing to be true, but where the truth of the first thing does not guarantee the second. I must work hard if I want to succeed, but working hard doesn't guarantee success. A sufficient condition, by contrast, can guarantee that something is true. If I score 52 in an exam with a pass mark of 50, this does indeed guarantee that I have passed. Here are a number of conditions that are **necessary but not sufficient** for me to stream a movie on my iPhone:

> My iPhone needs to have a sufficiently fast data connection.
>
> I need to have access to some kind of streaming service.
>
> My iPhone needs to be sufficiently charged.
>
> My iPhone needs to be switched on and unlocked.

These conditions are necessary because, if even one of them is not met, I cannot stream a movie. Yet they are not sufficient because, even if these four things are true, I am not guaranteed to be able to stream a movie. All of the above could be true, yet my screen could be smashed and broken; or my phone could be paralysed by malware; and so on. Identifying and distinguishing between necessary and sufficient conditions is vital in logic. In general:

> Failing to meet a necessary condition means that THING X cannot be true. But…
>
> …meeting any number of necessary conditions still can't guarantee that THING X is true. But…
>
> …the moment that any sufficient condition is met, this does guarantee that THING X is true.

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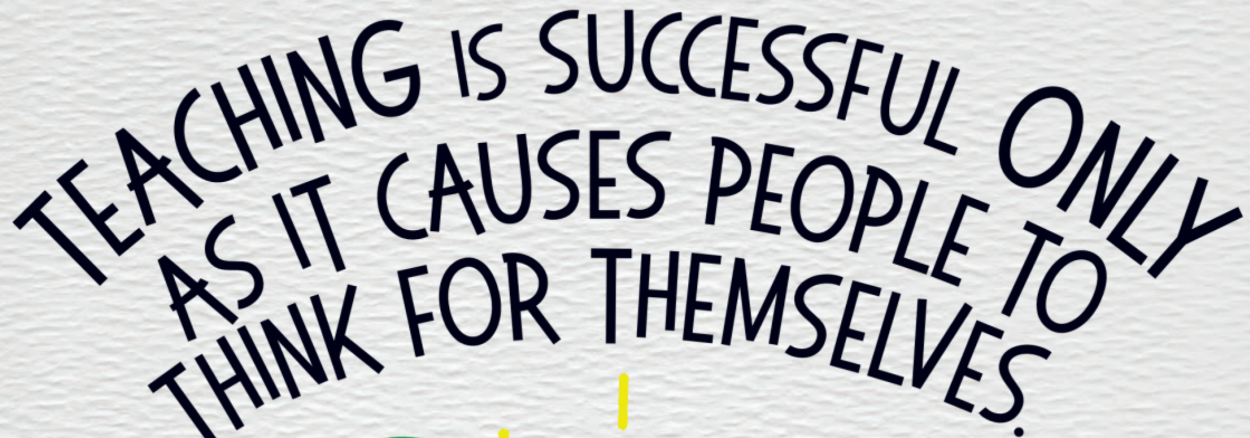

WHAT THE
TEACHER THINKS
MATTERS
LITTLE.

ALICE MOORE HUBBARD

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