CRITICAL THINKING

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How can you think critically about emotional and persuasive language?

How can you think critically about fallacies and faulty reasoning?

How can you think critically about cognitive and behavioral bias?

How can you best overcome bias in yourself and others?

How can you be a more critically engaged user of technology?

How can you become a critically engaged writer and thinker?
If this sounds excessively abstract, here’s a more practical way of putting it. We cannot possibly take in all the information around us, understand everything, or spend our time considering all possibilities and perspectives. Mostly, we need to be able to act and to interact with confidence, in a timely manner – deploying the slow and resource-intensive business of conscious attention only where it really adds value.

Our conscious awareness is thus highly selective, and geared towards behaviors that enabled small groups of humans to co-operate around common causes and across hundreds of thousands of years of evolution. In outline:

- We prefer speed and simplicity to slowness and complexity
- We are most influenced by the immediate and the local
- We tend to see things in terms of patterns and narratives
- These patterns and narratives reflect us, and what we already know
- We extend these patterns into our accounts of the past and future
- We are highly selective about how and what new information we notice

Do you trust this person or not? Do you take a risk in this situation, or play it safe? What do you enjoy, and why? Feelings flush our bodies and brains before we are consciously aware what is going on, allowing us the possibility of decision and preference in the first place. To be without emotion would mean being paralyzed by even the tiniest dilemma.

In psychological terms, emotional reactions often inform a kind of mental short-cut or rule of thumb allowing us to make quick, effective decisions without using up too much time or energy-intensive consideration. Short-cut like this are known as heuristics, and our thinking is packed with them – practical, approximate methods that don’t guarantee success, but that are essential in everyday situations.

A key to understanding many mental shortcuts and habits is their replacement of a complex question with something amenable to a quick, simple and instinctual solution. When such solutions work well, which is most of the time, we don’t even notice what has happened. Sometimes, however, our mental short-cuts will misfire in a particular situation: they will produce a cognitive bias, meaning a flawed judgement that does not represent a correct assessment of the situation.

These biases are impossible to eliminate – but not to comprehend or to mitigate, if we are sufficiently meticulous and strategic in our approach. This chapter explores mental heuristics and common cognitive biases; the following chapter explores strategies for coping with both.

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Heuristic: a cognitive shortcut or “rule of thumb”, allowing for quick decision-making and judgement

Cognitive bias: a particular situation in which mental heuristics introduce a predictable distortion into our assessment of a situation, resulting in a flawed judgement

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Behavioral economics and the research context

You’ll notice that this chapter has lots of footnotes compared to other chapters. I’ve used these as an unobtrusive way of referring to some of the research behind its examples and themes. There are many accessible and enjoyable books in this area, as well as some unusually readable scientific papers. You’ll find a selection of these in the recommended reading at the back, but three papers in particular deserve mentioning up front. They are...
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all by Daniel Kahneman and Amos Tversky, who subsequently won a Nobel prize for their efforts, and between them defined many of the subsequent central themes of a field known as *behavioral economics*. They are:

- “Prospect Theory: An Analysis of Decision under Risk”, *(Econometrica, 1979)*

What is behavioral economics? It has become one of the most fashionable branches of psychological research in recent years, but its basic proposition is simple enough: applying the methods and insights of psychological research to the field of economics. It is, in other words, interested in observing how real people actually take decisions relating to risk, loss, gain, and perceived value – rather than relying on mathematical models of what a perfectly rational person ought to do. In this, it has become a leading example of the observation-based exploration of systematic biases in human thought and action – and of the investigation of how such biases might be either overcome, or manipulated.

There’s a full reference for each paper below – and the text of each can be read for free online. If you only ever read three academic papers in the field, make it these – and make sure you do so critically, asking yourself how far you agree with what they argue, and how far there remains room for further research and debate within this young, contested field.

It’s important to note that this research is continuing to develop; that it is much-debated and disputed in places; and that I can only scratch its surface. Don’t treat my account as an impartial guide to the fundamentals of human nature – there’s no such thing. Think of it as a rapid tour of the last few decades of research into certain aspects of human nature – and as the starting point for further reading and thinking of your own.

**Four types of heuristic**

Before looking at cognitive biases in detail, it’s important to set out the context within which

*Question to consider*: Before reading any further, pause and ask yourself: which biases in your own thinking, of any, are you most aware of? Which biases or distortions do you most commonly find yourself coming up against in others? Do you share these too?
they operate: the heuristics that create them. Below are explanations of four of the most significant heuristics explored so far by researchers. Other heuristics exist, but what matters most is familiarizing yourself with the underlying psychological mechanisms that these point towards – together with the fact that, most of the time, these mechanisms are remarkably effective and efficient in delivering appropriate judgements.

In general, we should err on the side of caution before we label any observed behavior “irrational” as opposed to “incompletely understood.”

**The affect heuristic**

Here’s a simple choice. Don’t think for too long about it before choosing:

You are in hospital suffering from a rare disease that is fatal if left untreated, and have to choose between two experimental treatments. You are told that in trials involving 20,000 patients, Treatment A resulted in the deaths of 4,956 people while Treatment B was seventy per cent effective at saving lives. Which treatment would you prefer to take?

What was your natural response upon being presented with this choice? If you were reading and thinking careful, you probably realized that Treatment A is a better option that Treatment B. This is because, while Treatment B saves 70 per cent of lives, Treatment A saves fractionally over 75 per cent effective at saving lives. Which treatment would you prefer to take?

For a lot of people presented with similar options, however, the vivid and concrete information that 4,956 people died while taking Treatment A outweighs a purely mathematical assessment of the percentages. This is known as the **affect heuristic**, and describes the fact that people tend to rely upon the emotional intensity of their responses to different options as a guideline to deciding between them – even when this emotional response is potentially misleading.

As researchers such as the psychologist Paul Slovic have explored, there are broader implications to the fact that people tend to let their likes and dislikes dictate the conclusions they accept. If, for example, you identify yourself as a conservative thinker, then you are more likely to judge conservative arguments positively and opposed arguments negatively. Conversely, if you have a strong positive identification with liberal politics, then you will tend to let this preference dictate your beliefs – and treat liberal ideas as convincing as positive, and opposed ideas as unconvincing and negative.

Does this sound too extreme or simplistic to be true? Think of it as a tendency to see the world as tidier than it actually is. If you perceive something as good, it is natural to underplay its costs and disadvantages. If you perceive something as dangerous or negative, it is natural to underplay its benefits and advantages. And if you are struggling to choose between alternatives, emotional impact tends to substitute for other factors.

Imagine that you have decided to donate ten dollars each month to a marine conservation charity, and are choosing between two different organizations in an effort to donate to as worthwhile a cause as possible. Which of these approaches would you pick?
Hi! Could you give ten dollars each month to charity in order to help raise awareness of environmental degradation in the Pacific Ocean?

Hi! Could you give ten dollars each month to protect a family of dolphins at risk from environmental degradation in the Pacific Ocean?

While the question of how your money might most effectively be spent is a tricky one, I suspect that the second approach is more enticing on a purely emotional level. This may seem both obvious and manipulative: sponsoring dolphins is designed to be more appealing than raising general awareness. Yet this emotional appeal is difficult to keep distinct from the overall decision-making process, especially given its vagueness and complexities.

Many people will care much more about the second proposition than the first – and it's the strength of this emotion that acts as a decision-making shortcut. A potentially difficult question that is complex to resolve (what's the best way to spend my monthly charitable donation?) is replaced by a simpler question that is quick and easy to resolve (what do I prefer: raising awareness, or protecting dolphins?).

The availability heuristic

Consider the following question:

Do you think that more English words begin with the letter K, or have the letter K as their third letter?

Have a think about it – what's your answer? If this is the first time you have encountered this question, you are likely to guess that more words begin with K than have a K as their third letter. This is wrong. There are in fact three times as many words in English, approximately, with K as their third letter compare to K as their first letter. But it is much more difficult to think up words based on their third letter than it is to think up words beginning with that same letter – and this relative difficulty is used to provide a quick answer to the question.

This is known as the availability heuristic, and describes the tendency to assume that something is likely or significant in direct proportion to how easily it comes to mind (literally, how easily available the information is). Perhaps most famously, people tend to over-estimate the likelihood of death or injury from causes such as terrorism because these generate very high levels of media attention and awareness – and to under-estimate the likelihood of death or injury from less striking causes, such as heart disease or traffic accidents (Americans are about 35,000 times more likely to die from heart disease than terrorism). Similarly, cancer doesn't kill as many people as heart disease, yet it attracts considerably more funding and attention because of the very public and prolonged
nature of many people’s experiences.

In other words, one extremely vivid story that attracts large amounts of publicity can have more impact on people’s perceptions than any information about likelihood or significance. If a celebrity dies of a rare form of cancer, many people will subsequently tend to think of that disease ahead of other much more common cancers.

In essence, judgement is being influenced by the ease or difficulty with which particular information comes to mind, rather than by an interest in underlying truth – one of the reasons that frequently repeating something makes people more likely to treat it as true, thanks to familiarity. Consider the following two questions, and try to answer them honestly as they apply to you:

☐ On average, do I spend more time, less time, or about the same amount of time as an average person reading books and articles?

☐ On average, do I spend more time, less time, or about the same amount of time as an average person using my mobile phone?

How did you answer? Did you rate yourself above average in either or both habits? In general, people tend to over-estimate the time and effort they put into activities compared to other people because they are more aware of their own actions than others’. Our own habits loom large because they are more easily available to us.

In one experiment on married couples, each partner was separately asked to estimate their own contribution to shared domestic tasks as a percentage: tidying, shopping, washing, and so on. Unsurprisingly, the total of both partners’ estimates was greater than 100 per cent in most cases. Each partner systematically over-estimated their contributions and underestimated their partner’s because their own actions came much more easily and vividly to mind.

Once again, the availability heuristic involves swapping a tricky factual question (in what precise proportion do you and your partner divide various domestic tasks) for a far easier question about ease and emotion (how easily can you bring to mind your own domestic contributions versus your partner’s?).

Plenty of interesting phenomena exist as a result of the availability heuristic, but one that’s worth noting in particular is recency bias, meaning a tendency to over-estimate the significance of recent events simply because they come more easily to mind. Here’s a question to think about:

**Who might you name as five of the greatest musicians of all time?**
First and foremost: slow down. Cut yourself some slack! Does what's in front of you matter and require deep thought? If so, pause. It deserves a strategy. If not, don't worry too much. Get on with it. Get it out the way.
Have you thought of a few names of great musicians? How many were born in the last fifty years? How many were born in the last century, or two centuries? If you had to make a list of twenty or fifty musicians – how many would you even be able to name from more than a few hundred years ago?

Recency bias inherently applies when we think about questions like this, because we tend to know much less about the distant past compared to more recent history. Questions about musicians are subjective and usually asked for entertainment purposes – but the same doesn’t apply to fields such as politics, technology, economics or history. If we wish to understand societies and our world as fully as possible, taking the long view is a vital counterpoint to the disproportionate attention we tend to pay recent events simply because they are fresh in our experience.

As we’ll explore later in this half of the book, this is also especially important in a digital age where the volume of information produced today vastly exceeds that produced even a decade ago – and where most digital means of communication and research are heavily biased towards “freshness” (that is, recency) as a measure of relevance and quality.

The anchoring heuristic

Read the following carefully, filling in the blank space at the end of the paragraph with any number you see fit:

I used to enjoy shopping at the Tasty Wine Shop at number 997 High Street – next to the Meaty Butchers at 999 and the Green Green Grocers of Home at 995. I liked to buy a case of tasty wine every now and then, as recommended by the owner. Tragically, he died suddenly last year at the age of _________________________________________

After that, I enjoyed shopping at the Select Wine Shop at number 12 High Avenue – next to the Veggie Emporium at 10 and the Hair Today Gone Tomorrow Salon at 14. I liked to buy a case of select wine every now and then, as recommended by the owner. Tragically, he also died suddenly just last week at the age of _________________________________________

This may seem a strange exercise, but give it a go. There’s no right or wrong answer – simply select any figure you like for the age in each of the paragraphs. Done? Good. Which number is bigger, and which is smaller? If you came up with a larger age for the first paragraph than the second, you may have been experiencing a version of the anchoring effect.

Anchoring effect: the ability of a starting value or frame of reference to influence your subsequent judgements, even when it has no relevance to what you’re considering.

Anchoring occurs when something acts as an “anchor” for your judgement, weighting it in a particular direction without you consciously noticing what is going on. The two paragraphs in my example are almost identical, except that the street addresses in the first paragraph – 997, 999 and 995 – are considerably higher numbers than the street addresses in the second paragraph – 12, 10 and 14. Self-evidently, street addresses can have no direct relationship with the age at which someone suddenly dies, even if that person is fictional. And yet research suggests that even completely unrelated “anchors” can influence our judgement – and do so without us consciously noticing what is going on.

Why is this? The first thing to note is that no judgement occurs in a vacuum. Across a host of fields, we tend to assess things by a process of comparison rather than in absolute terms. The Earth is big compared to the scale of the human body, but small compared to the Milky Way galaxy. If I asked you to add to a list I was making of really big things, and I began by saying “the planet Jupiter, the Sun, the age of the universe,” you would almost certainly make
a different contribution than if I said “the Empire State Building, the Great Wall of China, the Pyramid of Giza.”

This is an appropriate reading of context, and essential to our everyday functioning – but it’s not a mechanism we can simply switch off, even when it may be unhelpful. Our judgement always tends to be particularly influenced by the first information we receive. As most people who work in sales know, it can help to begin a negotiation by asking for an unrealistically high price in order to make a higher number seem more reasonable – or to initially show someone something that’s much too expensive for them, simply to make everything that comes after feel cheap. Restaurants and supermarkets play a similar trick: the prominence of very expensive items makes merely pricey items seem affordable.

We see a version of this in what’s known as the focusing effect. This describes a tendency to focus too much attention on one immediately obvious feature of something, leading to an unbalanced assessment. Imagine you are talking to a friend about their desire to move house, and they tell you the following. Do you trust their judgement?

I’m fed up with living in cold, damp England. You barely see the sun at all for three months of the year. I’m going to head to California and try to find a job. Sunshine, sea, beautiful people, movies. It’ll be a better life for me out there, I know it! No more trudging around in the gloom wearing a jacket and two jumpers.

Obviously, you will need to know much more before offering your friend any worthwhile advice. But on the basis of the paragraph above, you might suspect that they are focusing too much on one of the most immediately obvious features of life in California – the weather – and thus failing to give other factors due consideration.

In this, the familiar pattern we see in other heuristics is repeated. A tricky question involving complex information (should I move to California?) is swapped for an easier question about ease and emotion (how does the first thing that comes to mind when I think about California make me feel?). And even if the person who has performed the swap notices what is going on, they may not be able to escape its disproportionate influence.

The representativeness heuristic

Here is one of the most infamous psychological case-studies of recent decades, involving a fictional bank employee called Linda. Read it, then select one of the two options in the final sentence:

Linda is 31 years old, single, outspoken, and very bright. She majored in philosophy. As a student, she was deeply concerned with issues of discrimination and social justice, and also participated in anti-nuclear demonstrations. Which is more probable?

- That Linda is a bank teller

- Or that Linda is a bank teller and is active in the feminist movement.
Which option did you go for? As you may remember from the first half of the book, it is a logical certainty that Linda is more likely to be a bank teller than she is to be a bank teller who is active in the feminist movement. This is because the second possibility is entirely contained within the first. Every bank teller who is active in the feminist movement must be a bank teller – but there are also plenty of other female bank tellers who are not active in the feminist movement.

If you went for the second option, or found yourself drawn towards it, you were experiencing what is known as the **representativeness heuristic** – an elaborate way of saying that people are often more influenced by how convincing a representation of something is offered, rather than by how strictly likely it is. The possibility that Linda is a feminist bank teller feels more plausible than the possibility that she is simply a bank teller, and this plausibility creates a preference that can outweigh mathematical probability.

There’s plenty of debate around whether the Linda problem illustrates an irrational blindness to probability, or whether it is in fact perfectly reasonable to interpret “most probable” as synonymous with “plausible” in the context of the question. What we can say with some confidence, however, is that we respond in an intuitive way towards narratives and scenarios that can lead us to have false confidence in the accuracy of certain judgements. Here’s another example:

**I’m a young Englishman with a healthy tan who likes to spend time outdoors, stay physically fit, and drink strong tea with two sugars. Is it more likely that I work in mining and quarrying; in electricity, gas and water supply; or in health and social work?**

What do you think? A wise answer based on my description might begin by saying, “but you haven’t given me any relevant information about what kind of work you do.” An even wiser answer might continue by asking, “well, how many people in England work in each of those sectors?” A less wise answer might go, “it sounds like you work in a physically demanding outdoor job like mining or quarrying, or perhaps utilities.”

As it happens, more than ten times as many people in England are employed in health and social work than are employed in mining, quarrying, electricity, gas and water supply combined. In the absence of other relevant information, this suggests that I am most likely to be involved in health and social work. The representativeness heuristic, however, describes our tendency to assess such a scenario not by seeking out meaningful data, but by seeing how closely someone conforms to a **stereotype**. The better a description fits with our expectations of what a representative individual is most likely to look like, the more likely we are to match them together.

Once again, a kind of substitution is in action. We are swapping an effortful investigative question (how many people are employed in each of these sectors?) for an easier question about emotion and expectation (what stereotype does a person like this seem most closely to correspond to?).

**Summarizing heuristics**

In summary, we have looked so far at four types of heuristic, each embodying a kind of...
cognitive shorthand:

- **The affect heuristic** – the strong influence of emotional intensity as a guide to judgement, even when this may be misleading (“The beautiful celebrity in that advert looks so happy: the product must be special!”)

- **The availability heuristic** – the strong influence of how easily something comes to mind as a guide to judgement, even when misleading (“I heard about that beautiful celebrity who was lactose intolerant: I must be too!”)

- **The anchoring heuristic** – the strong influence of the first information we encounter on our subsequent judgement, even when misleading (“My new car costs $45,000, which makes $1,000 extra for red seats a real bargain.”)

- **The representativeness heuristic** – the strong influence of how closely something conforms to our expectations on judgement (“This wine costs a lot, comes in a posh bottle and is being served to me by a French person in a white jacket: it must be something special!”)

Heuristics allow quick decision-making and judgement, via the simplification of a complex question into something more intuitive. On the whole, they work extremely well, are essential to our lives – and we couldn’t function without them.

Indeed, it’s neither possible nor desirable entirely to escape the kind of experiences heuristics suggest are unfolding in our minds. Consider expectations and the representativeness heuristic. Serving someone food that is beautifully presented in an immaculate restaurant setting doesn’t just create a deceptive expectation of quality – it also actively affects the experience of eating the food itself, and even our perception of the flavours. This is part of the basis of branding, among other things. Drinking Coca Cola when you know it’s Coca Cola, and are drinking it from a branded bottle, is quite a different experience to drinking exactly the same liquid in a blind taste test.

**Why and when, then, does all this matter?** There are two points to make here:

- Becoming more aware of the heuristics our everyday thinking relies upon allows us to base our actions and investigations of human experience on a realistic assessment of how most judgements are reached.

- This awareness helps us be alert towards – and to put strategies in place to resist – both deliberate manipulations and accidental sources of error.

As we noted at the very beginning of this book, this resistance almost invariably begins with **slowing down**: taking a moment to think twice about what is going on, to bring into critical focus the kind of mental shortcuts both you and others may be using without even noticing.

(iii) Biases born from patterns: framing effects and Prospect theory

Which of these two products would you prefer to buy in a supermarket?

- Beef mince: organic and delicious, 90 per cent fat free!
- Beef mince: delicious, organic! Ten per cent fat.
You probably noticed that both products are essentially the same. Each one is beef mince that is 90 per cent lean meat and 10 per cent fat. You probably also noticed, however, that the formulation “90 per cent fat free” is more enticing than “ten per cent fat.” This is known as a framing effect, because it entails presenting exactly the same information in two different ways. Like two different frames that make the same picture appear different, the fat content of the beef has a different emotional impact depending on how it’s described: something we have already encountered earlier in this chapter in our discussion of the significance of emotional impact on decisions.

Framing effects are important because no information can ever be presented without some kind of framing – and yet, in most instances, you only get to see one framing device, and thus don’t appreciate there may be many different ways of thinking about the same thing. Here are just a few further examples of how we might re-frame information, given a moment to pause and select a different emphasis. What might be the intentions behind the framing and re-framing in each of these cases?

Crime is at its lowest for four decades, with just 370 violent crimes per hundred thousand people this year.

Although crime is at its lowest for four decades, there are still 370 violent crimes each year for every hundred thousand people.

In the educational case study we investigated, the level of absence among year five students was ten per cent.

In our educational case study, year five students had a ninety per cent attendance record.

One in every ten politicians reported receiving hate mail at their office.

Ninety per cent of politicians had never received hate mail at their offices.

Framing effects: the way in which presenting the same scenario in different ways can affect judgment and alter preference, based on perceptions of loss and gain, positive and negative.

Re-framing: deliberately selecting a different way of presenting information in order to challenge the emphasis created by a particular initial framing.
There are still ten miles left to run in the marathon, I’ll never make it

I’ve run sixteen miles of this marathon and am still going – I’ll make it!

You might think that these are all pretty obvious. But, when presented with information framed in a particular way, most people simply accept the presented framing, not noticing that every presentation of information comes complete with assumptions that we may wish to dispute.

What about these two opportunities. Which does your instinct favour?

- Fancy a gamble? You’ve got a ten per cent chance of winning $95 – and a ninety per cent chance of losing $5.
- Buy a lottery ticket for $5? There’s a ten per cent chance to win a hundred dollars!

Which option did you go for this time? If you prefer the second, read them both carefully one more time. These options are also identical, at least in mathematical terms. Each one gives you a ten per cent chance of finishing $95 richer than when you started, and a ninety per cent change of finishing $5 worse off. If you don’t believe me, read them again. The outcomes really are identical.

For many people, however, the second option is much more appealing. Why? The first option presents you with a 90 per cent chance of “losing” five dollars. The second option asks you to “buy” a lottery ticket for five dollars, complete with a 90 per cent chance of winning nothing. Both of these describe the same process, but it comes framed in two very different ways: in one, you see yourself as risking a loss with only a slim chance of gain. In the other, you are purchasing the chance of a gain.

The psychological force of this form of framing is known as **loss aversion**, and is one of the fundamental insights to come from **Prospect theory**: an observation-based theory of how people deal with different prospects in terms of perceived risk, gain and loss.

Developed by Daniel Kahneman and Amos Tversky in the late 1970s, Prospect theory has proved extremely significant in the short history of behavioral economics – and earned its developers a Nobel prize – as it contrasts the standard economic notion that people will assess risk based on final outcomes. In contrast to this, it suggests that people assess risk based on the psychological impact of the perceived losses and gains involved.

Perhaps Prospect theory’s most significant insight is that people are more sensitive to losses than they are to gains – and that a strong aversion to perceived loss can thus guide decision-making even when this leads to a worse outcome.

It also notes that not all risks are treated equally, and that both very unlikely events and near-certainties tend to have a greater psychological impact than a purely logical analysis might lead us to expect. Here’s another example. Which of these options do you prefer?
Pay an insurance premium of $20 to guard against a one percent chance that you will lose or damage your $1,000 pair of designer sunglasses.

Don’t pay for any insurance and accept the one per cent risk of losing your £1,000 glasses and not being able to afford to replace them.

Assuming you can afford it, I suspect you would be tempted to pay $25 in order to eliminate the anxiety of losing such a valuable pair of sunglasses. Is this reasonable? It’s difficult to say, in the sense that it makes perfect psychological sense to pay a small fee in order to eliminate the anxiety associated with a large potential loss that may not be affordable. Once we consider the fact that you face many similar decisions during the course of your life, however, it becomes more difficult to justify this preference as a strategy. Consider:

Assuming that you make many decisions of this type, being prepared to pay $20 to guard against a one percent risk is equivalent to paying out $20 * 100 = $2,000 for every $1,000 of loss that you can on average expect to incur over time.

How do you feel about buying the insurance now? It all depends on how much value you place on peace of mind, and on being guaranteed to have either $1,000 sunglasses or $1,000 you can spend on replacing those sunglasses. What we can say, however, is that what seems entirely reasonable and unproblematic in a one-off case makes far less sense as a general strategy. This is the basis for much of the insurance industry’s profitability – because each payment is treated as a one-off opportunity to eliminate risk, rather than one instance of a lifelong series of decisions.

Prospect theory continues to undergo debate and revision, not least around what actually causes the phenomena it is based upon (and what role regret and anticipation have in our decisions). In outline, however, it represents a hugely significant shift in economics towards the observation of how real people actually make decisions, rather than what perfectly rational people should theoretically do. And its implications and influence continue to be felt far beyond this field.

(iv) Biases born from assumptions: confirmation bias and coherence

**Confirmation bias** describes a human tendency I touched on several times in the first half of this book: the tendency to pay attention only to things that confirm our pre-existing ideas. Consider the following story, which is my version of a famous illustrative tale:

A man walks into town claiming to be a brilliant marksman. “Prove it”, you say – and so he walks outside, points his gun at a blank wall in the distance, and fires several dozen shot at random into the brick. When he has finished he walks up to the wall, gets out a marker pen and carefully draws a target around the largest cluster of holes. He turns to you with a grin. “I told you I was a great shot.” he says. “Just look how many bullets I got on target at that distance!”

Told like this, the story seems absurd to the point of ridiculousness. The man shot first and then drew on the target afterwards – of course he isn’t any kind of marksman. Yet most of us
Discovery commences with the awareness of anomaly.

Thomas Kuhn
are on occasion guilty of this kind of thinking, which in this particular instance is sometimes known as the sharpshooter fallacy or the clustering illusion.

In essence, people tend to find patterns even when these aren’t justified by evidence; and we tend to do so by paying attention to similarities while ignoring differences. Unless we are extremely cautious, we tend to see what we either want to see, expect to see or are inclined to see as noteworthy – while ignoring information that is not meaningful to us in this way.

Consider the case of someone who sees something that looks like the face of Jesus in a slice of burnt toast, and declares it to be a miracle. This kind of thing has actually happened on more than one occasion. Images of the miraculous toast are shared and discussed; it may even be sold for a large amount of money. What is going on? Two things are occurring that, when taken together, account for most events hailed as miraculous or revelatory:

- The very large number of cases in which nothing that strikes the human mind as particularly noteworthy are ignored (“one billion pieces of burnt toast look a bit like all kinds of different things”)
- A claim that people are predisposed to deem noteworthy is offered as the single correct interpretation of a chosen instance (“these marks resemble Jesus’ face and must be miraculous”)

Here’s a more serious example for you to think about. How might confirmation bias be present in this particular experiment – based on a real instance – and in the larger claims made for its results?

Our study suggests that homosexual people who actively wish to change their sexual preference through a programme of counselling can do so. Volunteers for our experiment sought counselling, and many reported a change in their sexual preference following this process, confirming our belief that homosexuality is not “natural” and can be overcome with help and willpower. We believe that those who did not report an initial change would come around to this view with time and effort.

Many things are wrong with the above experiment. First, the fact that it used volunteers actively seeking to change their sexual preference through counselling suggests that such people may have begun the experiment with a strong investment in this outcome, and both a pre-existing desire and belief in its desirability. Second, the experimenters themselves seem to share this assumption, given that they are setting out to seek confirmation of this same belief with willing volunteers – and seem intent on interpreting any results in accordance with their pre-determined assumptions.

Experiments such as this may seem laughably poor as investigations of what is actually going on – as indeed they are – yet they are by no means uncommon among people determined to find a certain pattern in events. Once we have decided that a certain pattern exists, we can find confirmation for it everywhere and anywhere. One striking example of this is sometimes known as the just world hypothesis, and describes a belief commonly embodied in phrases like “what goes around comes around.” In other words, everything balances out ethically in the end: good things happen to good people, bad thing happen to bad people, in the next life if not in this one.
Can we be sure that such a view of universe is not correct? It features in many religions and ideologies, with varying degrees of subtlety. Ultimately, it is not something that can be disproved. But what we can say is that its cruder forms create a troubling incentive to assume that people who suffer ill fortune somehow deserve their suffering – and that, if all things are for the best, we need not worry too much about trying to change them.

Much of this comes down to the stories we choose to tell about ourselves and the world. Stories are perhaps the most fundamental patterns we see in the world: chains of cause and effect, action and consequence, in which the most significant factor is often not likelihood, evidence or reasoning, but plausibility.

As we saw in the first section of this chapter, plausibility often counts for more on an intuitive level than probability. Similarly, our confidence in the information we possess is often more closely related to its coherence than its accuracy or likelihood. Take the following two stories. Which do you find more convincing?

Me and my friend, we were driving along. Everything was fine. Suddenly, I found myself steering off the road into a tree. I didn't see it until we hit it. Except, my friend told me to watch out for a tree. So perhaps I did see it.

My friend Jason and I were driving along when he said something to me, about this picture he just got on his phone. Well, I didn't want to look because I was driving but I turned my head slightly, and then I suddenly saw an animal in the road, like a rabbit, and I steered just a little to avoid it and the wheel caught a bit of gravel on the verge and next thing I know, bang! We hit a tree.

The second of these paragraphs is certainly a more vivid and coherent account of events, including a firm narrative of cause and effect. Does this make it more reliable? Not necessarily. If we think of it as a more elaborate and more specific explanation of the same events as the first paragraph, then it is less likely to be entirely true: the first description includes many more possibilities, while the second relies upon every detail being accurately recalled and connected.

As you'll probably have noticed, however, the coherent narrative structure of the second paragraph makes it easier and more satisfying to grasp in cognitive terms that the first paragraph. Coherence – something that is easily grasped as a whole, and that hangs together persuasively – is experienced as evidence of credibility, while uncertainty and inconsistency make something seem less credible.

This is significant not only in settings like a court of law, where the credibility of a witness is all about consistency, but also in those circumstances where we value our own consistency above evidence that we ought to change our minds. Have you ever bought a ticket for an event – a play, a concert, a film – and then sat there throughout the entire thing because you didn’t want to waste your money by leaving? This is an example of what is sometimes called the sunk cost fallacy, so-called because the money you have spent on a ticket is “sunk” and cannot be got back whatever happens.

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You might as well leave if you’re not enjoying the experience at the theatre, rather than adding the psychological cost of a bad night out to the monetary cost of a ticket. But a desire to maintain consistency with your past decision keeps you in place.

A more dangerous version of this is the tendency to keep going with a project even after it becomes increasingly obvious that it is likely to fail. Rather than endure the contradiction of admitting that something you believed would succeed is a failure, you keep pouring in effort long after it would have been more sensible to give up. As to whether this is actually fallacious – or whether it’s entirely understandable on the basis of reputational damage and social expectation – that is a matter for ongoing debate, together with the question of how profoundly we see social expectations shaping all our behaviors.

(v) Biases born from self-deception: ability and overconfidence

In 1999, the psychologists Justin Kruger and David Dunning tested students at Cornell University in three fields: logic, grammar and humour. Students sat four tests in total, and were then asked to estimate where they thought their scores ranked them compared to other students. The result was intriguing. Competent students produced a fairly accurate estimation of their own expertise. The weakest of the students, however, consistently and substantially over-estimated their own performance: they thought that they were approaching the top third of results, when in fact they were in the bottom quarter.

Why did this happen? The authors noted that, once weak students had been given some instruction in their areas of weakness, their ability to estimate their own lack of ability improved. In other words, people who know very little about something have little capacity accurately to assess their own lack of skill – because they don’t have much of sense of just how much they do not know. It takes some knowledge to realize how much you do not know.

This phenomenon is known as the **Dunning-Kruger effect** in its discoverers’ honour. It stems from the fact that some degree of practice and skill is needed for people meaningfully to compare themselves to others. In the absence of this, all of us have a tendency to over-estimate our abilities. Ignorance breeds over-confidence – while it takes dedicated practice to create caution.

If this were all psychology suggested about expertise, we might take comfort: people who know what they’re doing do, indeed, tend to have a realistic assessment of their own abilities. It’s those who don’t even notice that they don’t know anything we need to watch out for. Unfortunately for experts the world over, however, a second well-evidenced effect is also commonplace.

This is known as the **overconfidence effect**, and describes a powerful psychological tendency for people to have more confidence in their judgements than those judgements actually warrant. In a classic study conducted during the academic year 1968-9, the decision analysts Marc Alpert and Howard Raiffa asked groups of Harvard students to estimate a number of different figures: quantities ranging from the egg production of the US in a given year to its total car imports, the toll collections of the Panama canal, and the number of doctoral students enrolled at Harvard Business School.

**Dunning-Kruger effect**: the tendency of people with little or no ability in an area to greatly over-estimate their ability, resulting in ignorance breeding unwarranted confidence

**Overconfidence effect**: the strong tendency for most people – and especially experts outside their domain of expertise – to have excessive faith in their judgements and abilities
These were not numbers students were familiar with, and so they were asked to suggest a possible range of values for each answer, such that there was a 98% chance that the true value lay somewhere within the range they had chosen. You can try it for yourself, first of all. For each of the following questions, select a range of possible results such that you are almost certain – 98% certain, to be precise – that the correct answer will lie somewhere within your selected values:

What was the total egg production of the US, in millions, in 1965?

How many foreign cars were imported into the US in 1967, in millions?

How any doctoral students were enrolled at Harvard Business School in 1969?

These questions will be still more difficult for you to guess than students in 1968/9, given five decades’ distance in time – so you should have been even more cautious and broad in your chosen range. Here are the results. How did you do?

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<tbody>
<tr>
<td><strong>Total egg production in 1965</strong></td>
<td>-</td>
<td>64,588 million</td>
</tr>
<tr>
<td><strong>Foreign cars imported in 1967</strong></td>
<td>-</td>
<td>697 thousand</td>
</tr>
<tr>
<td><strong>Doctoral students enrolled in 1969</strong></td>
<td>-</td>
<td>235</td>
</tr>
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If you’re anything like the students who originally took the test, at least one of these values is likely to lie outside your chosen range. As it turned out, instead of just 2 per cent of the actual results lying outside students’ guesses (as you would expect with a range aiming at 98 per cent accuracy) the range of possibilities provided by students proved incorrect in an impressive 40 per cent of cases – a failure rate twenty times greater than they were asked to aim towards.

What does this show? As subsequent research has repeatedly suggested, people are wildly overconfident in the accuracy of their own predictions; and this overconfidence extends to estimating their own abilities at pretty much any activity where there is little exposure to a truly representative sample of others’ activities.
A substantial majority of people believe themselves to be above average at everything from driving to love-making. Only a minority of people starting small businesses believe that they are likely to fail, even though most do.

And the worst people of all for this kind of mis-reckoning? Experts. While experts may be adept at predicting performance within their own fields, this doesn’t extend to restraining themselves outside the limits of their expertise. Someone who is justifiably confident in one area – the minutiae of macroeconomic theory, for example – is more likely than a non-expert to be unjustifiably confident in other areas.

How often, for example, have you seen a famous author or performer asked for their opinion about a field they have no expertise in – such as politics or international aid? How often have experts offered predictions in areas whose profound uncertainty – the future price of oil, distant geopolitical trends – should make the only honest answer “we cannot know”?

The temptation to predict and to exaggerate certainty is acute for those who are professionally obliged to seem more confident than others – unless, of course, they are thoroughly committed to the business of deflating unreasonable faith. As we’ll explore in the next chapter, there are particular strategies and tools that can help us do precisely this.

Summary

Careful, conscious scrutiny is a time-consuming and resource-intensive process, and so humans have evolved to rely upon a large number of largely unconscious, instinctual and emotive approaches to making rapid yet broadly accurate judgements.

We call the cognitive shortcuts that allow quick decision-making and judgement heuristics. They usually involve replacing a complex question with something amenable to a quick, simple solution. Four types of heuristic are of particular interest, and feature prominently in the literature of behavioral economics, although there are many more:

- The **affect heuristic** describes a tendency to use the strength of positive or negative emotional reactions as a decision-making shortcut
- The **heuristic** describes a tendency to be disproportionately influenced by whatever most easily or vividly comes to mind when taking a decision or assessing options
- An **anchoring effect** describes the ability of a starting value or frame of reference to influence judgements, even when it is of no relevance to their subject
- The **representativeness heuristic** describes a tendency to be influenced by the plausibility of a story or characterization, at the expenses of assessing its likelihood

Becoming more aware of the heuristics that everyday thinking relies upon can help us base our investigations of human experience on a realistic assessment of how judgements are reached. This awareness can also help us be alert towards – and put strategies in place to resist – both deliberate manipulations and accidental sources of error.

When our heuristics result in an incorrect judgement, this is an example of **cognitive bias** – a predictable distortion of judgement or thought. Cognitive biases and theories
I AM CONVINCED THAT THE ACT OF THINKING LOGICALLY CANNOT POSSIBLY BE NATURAL

NEIL DEGRASSE TYSON
relating to the presentation of information include:

- **Framing effects:** presenting the same scenario in different ways can affect judgment and alter preference, based on perceptions of loss and gain, positive and negative.

- **Re-framing:** deliberately selecting a different way of presenting information in order to challenge the emphasis created by a particular initial framing.

- **Loss aversion:** the observation that losses are more painful than equivalent gains are perceived as beneficial, and that people thus tend to biased towards loss avoidance.

- **Prospect theory:** an observation-based theory developed by Daniel Kahneman and Amos Tversky, describing how people choose between different degrees of known risk, and between different potential losses or gains. In essence, it implies that perceptions of gain and loss influence choices more than assessment of the final outcome; and that both very unlikely events and near-certainties have a greater psychological impact than would be expected from a purely mathematical accounting of cost versus benefit.

Cognitive biases relating to existing assumptions and the imposition of pattern include:

- **Confirmation bias:** the tendency to pay attention only to things that confirm our pre-existing ideas, and to ignore or seek to explain away evidence that contradicts them.

- **The sharpshooter fallacy / clustering illusion:** the tendency to see a pattern where none exists, by imposing it after the event on evidence while ignoring whatever doesn’t fit.

- **Just world hypothesis:** the belief that everything balances out in the end, and that the world is fundamentally arranged in a way that is fair.

- **Coherence effect:** the tendency to judge information not by its accuracy or likelihood, but by how internally coherent a story or a worldview it embodies.

Cognitive biases associated with judging one’s own expertise and accuracy include:

- **The Dunning-Kruger effect:** the tendency of people with little or no ability in an area to greatly over-estimate their ability, resulting in ignorance breeding unwarranted confidence.

- **Overconfidence effect:** the strong tendency for most people – and especially experts outside their domain of expertise – to have excessive faith in their judgements and abilities.
The video for this chapter is all about the influence of cognitive bias on the work of even renowned experts in a field. It's called "9. Just because you know a lot doesn't make you any good at knowing yourself," and can be seen on the companion website at [details]. Or share questions and ideas with me and other readers via the hashtag #TalkCriticalThinking