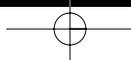
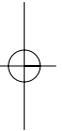




1

Introduction and Overview: Judgments, Decisions, and Rationality





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INTRODUCTION

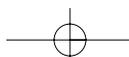
Everyone complains of his memory, and no one complains of his judgment. (La Rochefoucauld, 1678)

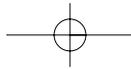
You've gotta make decisions. You've gotta keep making decisions, even if they're wrong decisions. You know . . . if you don't make decisions, you're stuffed. (Joe Simpson explaining his epic escape from a mountaineering accident, in the documentary movie Touching the Void)

Our waking lives are largely devoted to making judgments and decisions of one sort or another, whether judging if it is safe to cross the road, deciding to quit your job and live the dream, or choosing what colour to paint your apartment. Although we often conflate the terms 'judgment' and 'decision' in everyday language, judgments are essentially evaluations or estimates whereas decisions indicate an intention to pursue a particular course of action. The decisions we make are, of course, informed by our judgment.

There are so many types of judgments and decisions that it might seem hard to believe that there could be any common processes involved in the ways we think about them. However, consider the following occurrences (perhaps you will even recognise these situations):

- You have set your iPod to random shuffle, yet it seems to be playing certain artists more than others. Is there something wrong with your iPod's randomising device? In fact, occasional 'streaks' in outcomes are exactly what should be expected in random sequences.
- You are having a lively discussion with someone who has a very strongly held belief on the subject. It seems to you that there is no amount of evidence that will change his mind.
- There are a few purchases you have been thinking of making, but have held off from doing so on the grounds of expense. However, today you have just made a much larger expensive purchase, and shortly afterwards also made the smaller purchases you had been thinking about. Somehow, the large purchase seems to have made it easier to make the smaller purchases.





- You are in a meeting at work. As time goes by you realise that a number of people are tending to dominate the conversation. Decisions are reached where some people hardly speak or don't speak at all. Do the decisions really represent the majority view? Why did the chair not try to ensure that all voices were heard?

The fact that such situations are common reflects something important about our basic psychology. Determining the nature of that psychology is the subject of much research and the subject of this book.

The examples above give a small flavour of this book's content, which includes assessments of uncertainty and probability, argumentation and the assessment of evidence, the role of value in decision making, and group decision making. Along the way I shall also look at other phenomena and processes, such as being wise after the event, judgments of causation and association, judgments about what might have been, decisions under risk and uncertainty, judgments and decisions over time, risk perception and risk taking, and factors influencing cooperation and coordination.

WHAT IS RATIONALITY?

One of the topics occasionally discussed by JDM researchers is the extent to which people can be considered 'rational'. Rationality is normally taken to mean adherence to some normative model, such as probability theory or decision theory. As the subsequent chapters will present many instances where people do not behave in accordance with normative models, I want to take a moment in this first chapter to ponder the nature of rationality.

Classical economists have tended to assume rationality as a given, hence the phrase *rational economic man* (or to use more contemporary non-sexist parlance, the *rational actor*). Although research conducted by psychologists has noted many discrepancies from rational theory, economists often respond by noting differences between the laboratory situation and the real world. In particular, the psychologists' participants tend to be naive about the situation and are asked to make one-off decisions, sometimes without incentives for accurate responses. Economists have argued that as people gain experience of a particular domain they learn accordingly and so behave in a more rational way. There is some evidence to this effect, but also there is considerable evidence of economically irrational behaviour even among those who are experienced in a particular domain (e.g. Haigh & List, 2005).

However, violations of rational norms by species with longer evolutionary histories than the human race (e.g. Shafir, 1994) are not generally taken to indicate that animals are somehow *irrational*. Rather, it is assumed that the mechanisms that contribute to evolutionary fitness may nonetheless not predict behaviour in certain specific instances.

An analogy is occasionally drawn with visual perception. Figure 1.1 shows the Müller-Lyer illusion. Compare the horizontal line in (a) with that in (b). Virtually everyone agrees that (b) looks longer than (a). In fact, both lines are exactly the same length, as you can easily verify by placing a ruler against each. The research literature on visual perception is full of such illusions. Although the Müller-Lyer illusion may seem somewhat artificial, illusions

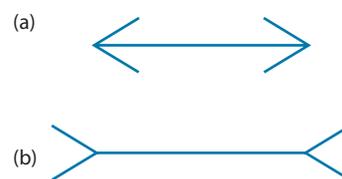
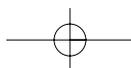


Figure 1.1. The Müller-Lyer illusion

can occur even when we perceive the natural environment. For example, an illusion that most people are not aware of until it is drawn to their attention is the *moon illusion*. Compare the size of the full moon when it is just above the horizon to when it is high in the sky. The full moon just above the horizon appears much larger.

Despite the existence of such visual 'errors', there is no concern among vision researchers that there needs to be a mass correction of our visual systems in order to prevent such illusions. Clearly, our visual systems have evolved in such a way as to help us successfully navigate our environments. Likewise, the occasional error in making judgments and decisions may be a small price to pay for a cognitive system that is otherwise well adapted to facilitating our survival and reproduction. In fact, individuals who score higher on measures of intelligence are *more* susceptible to visual illusions (Jensen, 1998).

Such observations have led some researchers to question attributions of irrationality to humans. As Ayton (2000, p.667) put it (in the style of Irving Berlin): 'Birds do it, bees do it, even educated Ph.D.s do it; why not violate normative rules of rationality?' Nonetheless, the nature of the contemporary environment is very different from that within which our ancestors evolved, such that both the visual and the intellectual environment can pose problems where any errors can be costly. In Britain, and no doubt some other countries too, the exit roads from motorways often have a series of stripes painted across them. This is because people adapt to the speed that they travel at on the motorway and sometimes fail to slow to an appropriate speed when they leave the motorway. To motorway drivers exiting on a slip road, the stripes seem to whizz



by really quickly, which alerts them to the speed at which they are travelling, thus prompting them to slow down (Laming, 2004).

However, the kind of contemporary environments within which people make high-level decisions tend not to present such blatant wake-up calls. For instance, people who play lotteries, or other games of chance, often tend to behave as though sequential outcomes are causally connected. In the natural world, of course, people are quite well attuned to identifying the many real causal connections that exist between events. However, in a fair lottery there is no connection between events, so the likelihood of a particular number appearing in the next draw does not increase if that number has not appeared for a long time (see Chapter 3). In the realm of financial investment, the success of mutual funds is as hard to predict as the outcome of lotteries. Yet when choosing a fund people are probably more impressed to learn of that fund's success *last year* (which does *not* actually predict future performance) than they are to read about the humdrum fact that share prices can go down as well as up.

People also frequently lose out due to a tendency to focus on immediate concerns rather than distant ones. This means that many people fail to save sufficiently for their retirement (the phenomenon of future discounting is covered in Chapter 10).

These kinds of findings muddy the meaning of what it is to be rational. It seems that people often don't behave in their own best interests, so it is tempting to think of them as irrational. On the other hand, the success of the species as a whole suggests otherwise. Furthermore, rational thinking has come to be identified with highly analytical thinking that considers multiple options, yet in some environments there is evidence that simpler strategies can be more successful (see e.g. Chapters 2, 9 and 11). Indeed, by changing the decision environment we can sometimes change behaviour. For example, employees can be induced to invest more in their pension plans by the simple expedient of getting them to make an advance commitment. This commitment involves allowing one's company to deduct increasingly large amounts for one's pension in future years. Although people may back out of future increases when the time arrives, few people actually do.

Some authors have suggested that we should not use the term 'rationality' at all. For example, Gintis (2006) has referred to the *beliefs, preferences, and constraints* model of decision making whereby people use their beliefs to try and satisfy their preferences within certain constraints.

BOUNDED RATIONALITY

In the 1950s psychologists began to report examples of people's limitations in the domain of judgment and decision making. Herbert Simon (e.g. 1955, 1956) criticised rational models of decision making for ignoring situational and personal constraints such as time pressure and limited cognitive capacity. By way of illustration, consider the following quote from the former investment banker David Freud about his experience of decision making in the City of London:

The currency was not cash but chaos. Transactions invariably took place at the edge of feasibility conducted under a competitive background under great time pressure. I found few committees of experts considering all the available evidence in wise conclave. Much more typical were decisions taken on the fly, by whoever happened to be available, based on a fraction of the full information. (Freud, 2006, pp.355–356)

Simon's own analyses of organisational decision making led him to propose that the mind had evolved short-cut strategies that delivered reasonable solutions to real-world problems (Simon, 1956), an idea that is known as *bounded rationality*.

Such mental short cuts, or *heuristics*, have formed the basis of two intense programmes of research. The first programme was summarised in the book *Judgment Under Uncertainty: Heuristics and Biases* (Kahneman *et al.*, 1982). Much of this research focused on the systematic errors (*biases*) that could occur through the use of heuristics, although the primary aim of this research was to elucidate the nature of the heuristics themselves, not to portray people as hopelessly irrational.

A second programme of research has emphasised the positive outcomes that can result from the use of heuristics, as summarised in the book *Simple Heuristics that Make Us Smart* (Gigerenzer *et al.*, 1999; see Chapters 2 and 9). This approach has placed special emphasis on the relationship between the human mind and the nature of the environment within which it evolved. In other words, the use of heuristics often leads to positive outcomes precisely because the heuristics themselves are the product of environmental contingencies. Computer simulations of heuristics have shown that they can indeed lead to accurate judgments, although – at the time of writing – the empirical evidence is somewhat more contentious.

A similar, though independent, approach has looked at the strategies for making choices that people adopt depending on their circumstances. The *adaptive decision maker* approach argues that people have a variety of possible strategies available to them when choosing between options, varying from fairly simplistic strategies to highly analytical ones (Payne *et al.*, 1993; see Chapter 8). The final choice of strategy depends on a trade-off between the effort required to implement the strategy and the importance of achieving high accuracy. In many circumstances, a reasonable level of accuracy can actually be achieved by using a less analytical strategy.

In Simon's (1955) paper on the limitations of human decision making, he wrote that 'we cannot, of course, rule out the possibility that the unconscious is a better decision-maker than the conscious' (p.104). In fact, there is now some evidence that the unconscious mind might well be better suited to making more complex decisions, with the conscious mind better at making simpler decisions (Dijksterhuis, 2004; Dijksterhuis & Nordgren, 2006). On the other hand, conscious thought does seem to be better at abstracting logical structure from the content and context within which it is embedded (Stanovich & West, 2000). As we shall see in Chapter 15, many researchers now propose a dual system theory of thinking involving fast unconscious processes, on the one hand, and slower conscious processes on the other.

AN OVERVIEW OF THE SUBSEQUENT CHAPTERS

Although I have ordered the following chapters in a way which made sense to me, in many cases it will be possible to read a given chapter without having read what has gone before.

Chapter 2 introduces a conceptual framework for thinking about predictive or diagnostic judgments. This framework is known as the *lens model*, and distinguishes between objective relations between, on the one hand, predictive cues and outcomes, and, on the other, the actual (subjective) way in which people use those cues. In other words, the objective relationship between cues and outcomes is based on how much importance *should* be attached to certain items of information when making a prediction or diagnosis; typically, though, people's subjective assessment of the importance of information does not correspond to the objective relationships. Social judgment theory uses the lens model framework to create statistical models that can be used for socially important predictions. One type of statistical model is based on the objective relationships between cues and outcome; another type of model is based on the subjective judgments of a person over a long series of cases. Although this approach is concerned with the importance (or weighting) attached to information, it does not specify the underlying cognitive processes. In the final part of the chapter, I describe the theory of probabilistic mental models, which describes certain short cuts (heuristics) that people might use when making a judgment.

Chapter 3 picks up where Chapter 2 leaves off, by describing two important heuristics that were proposed in the early 1970s: representativeness and availability. In addition I look at support theory, which draws attention to the way in which probability judgments are influenced by how specifically possibilities are described. I also look at the MINERVA-DM theory, which tries to place representativeness and availability within the framework of a wider theory of memory. Finally, I look at the topic of conditional probability and the debate over how best to improve people's ability to update their beliefs in the light of new evidence.

Chapter 4 explores the anchoring-and-adjustment heuristic and hindsight bias. Anchoring and adjustment is a cognitive process that people often use when making some kind of numerical estimate in the absence of certain knowledge. It assumes that an initial numerical value is used as an anchor point from which people make some (typically insufficient) adjustment. Hindsight bias is the tendency for people to overestimate – in retrospect – the predictability of outcomes that are now known to have occurred or not occurred. For both anchoring and adjustment and hindsight bias I shall further investigate the nature of the underlying processes.

Many judgments occur after a process of reasoning and argumentation, in which people assess theories and evidence. Chapter 5 introduces the notion of an argument as a formal structure. It then examines some common limitations in people's ability to process arguments, such as failing to properly distinguish between theory and data, allowing one's beliefs to override evidence. This

chapter also looks at factors affecting the persuasiveness of communications.

Chapter 6 concerns judgments of association, causation, and counterfactual thinking. It looks at people's ability to assess the correct relationship between items of information, especially their ability to determine whether one variable has caused another. In particular, the chapter investigates the way in which people incorporate both evidence and their ideas about causal mechanisms in order to arrive at judgments. Counterfactual thinking is thinking about how things might have been different, and has also been linked to judgments of causation. People may engage in counterfactual thinking both in order to prepare for the future and to regulate their affective feelings.

Chapter 7 introduces the topic of decision making under risk and uncertainty. It shows how the theory regarded by many as normative – expected utility theory – fails to capture some aspects of decision making. The chapter reviews prospect theory as an account of decisions under risk and examines the neuroscience of valuation. It also explores how prospect theory has been developed to explain decision making under uncertainty. An alternative approach to this latter topic is described, based on optimal foraging theory. Another approach to decision making is based on the idea that people frequently switch their attention between different aspects of a decision. One such model – the priority heuristic – is described in further detail.

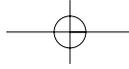
Chapter 8 looks at the psychology of preference and choice. It shows how people have been shown to violate certain axioms of rational choice and goes on to explore the notion of mental accounting. This refers to the cognitive operations involved in thinking about money, though these may extend to non-monetary choices too. As with other aspects of human thought, heuristic thinking may lead to a range of biases. Finally, I look at people's desire for choice, but the problems that ensue once they get it.

Chapter 9 concerns the topic of confidence and optimism in judgment and decision making. Specifically, there is considerable evidence that people are overconfident in a variety of domains. I review some of this evidence and examine the relationship between overconfidence and skill, perceptions of control, expertise, and gender.

Chapter 10 examines people's judgments and decisions where a time perspective is involved. This includes people's ability, or lack of it, to accurately forecast whether they can meet a deadline and their preference for imminent rewards rather than delayed rewards. This chapter also looks at the topic of affective forecasting, this being the ability to accurately predict one's own future feelings.

Chapter 11 examines dynamic decision making and everyday decision making. Dynamic decision research is largely laboratory-based, but concerns complex decisions in which later decisions are affected by earlier decisions, where the task environment itself may be complex, and where feedback may be delayed. This leads in to discussing everyday decision making which typically involves research conducted in real-life settings (and which is often also dynamic). I also look at the role of cognitive ability in relation to both types of decision making.

Chapter 12 looks at the topic of risk, involving people's perceptions of and responses to potential hazards, including activities



they themselves may willingly engage in. This chapter shows how risks tend to be perceived along two dimensions ('dread' and 'unknown') and how our feelings may affect our judgments of risk. I also look at individual differences based on personality, sex, race, and expertise. I look, too, at the problems that 'risk compensation' poses for attempts to reduce risk, as well as the social amplification of risk and attempts to accurately communicate risk information.

Chapter 13 concerns decision making in groups and teams, and discusses the difficulties posed by social conformity, group polarisation, and other difficulties. The chapter also takes a critical look at the well-known 'groupthink' phenomenon, as well as the measures which have been proposed to guard against this. Chapter 13 also critically examines some of the techniques that have been proposed for making better-informed and more representative decisions. The chapter closes with a look at leadership and advice-taking.

Chapter 14 is about cooperation and coordination in human behaviour. These are often in tension with a motivation to behave in a self-interested fashion. Having introduced the concepts of game theory and behavioural game theory, I go on to explore the evolution of cooperation, and a range of factors that affect whether or not individuals behave in a self-interested way; for example, consideration of others; fear, greed, and punishment; trust; culture.

Chapter 15 takes a broad-brush approach to human thought. Specifically, it discusses the circumstances under which people engage in intuitive versus reflective thinking. After an initial review of individual differences in intelligence and reflectiveness, I go on to explore the idea that the intuitive and the reflective depend on two distinct systems for thinking and the implications for moral judgment. I also look at evidence suggesting that people lack insight into their underlying cognitions and that explanations of their own behaviour are post hoc rationalisations. Finally, I take a neuroscience perspective on intuition and rationality; in particular, I examine the role of emotion in decision making.

