

Research insight  
February 2014

Fresh thinking in  
learning and development  
Part 2 of 3

**Cognition, decision and expertise**



WORK



WORKFORCE



WORKPLACE

## Championing better work and working lives

The CIPD's purpose is to **champion better work and working lives** by improving practices in people and organisation development, for the benefit of individuals, businesses, economies and society. Our research work plays a critical role – providing the content and credibility for us to drive practice, raise standards and offer advice, guidance and practical support to the profession. Our research also informs our advocacy and engagement with policy-makers and other opinion-formers on behalf of the profession we represent.

To increase our impact, in service of our purpose, we're focusing our research agenda on three core themes: the future of **work**, the diverse and changing nature of the **workforce**, and the culture and organisation of the **workplace**.

### WORK

Our focus on work includes what work is and where, when and how work takes place, as well as trends and changes in skills and job needs, changing career patterns, global mobility, technological developments and new ways of working.



### WORKFORCE

Our focus on the workforce includes demographics, generational shifts, attitudes and expectations, the changing skills base and trends in learning and education.

### WORKPLACE

Our focus on the workplace includes how organisations are evolving and adapting, understanding of culture, trust and engagement, and how people are best organised, developed, managed, motivated and rewarded to perform at their best.

## About us

The CIPD is the professional body for HR and people development. We have over 130,000 members internationally – working in HR, learning and development, people management and consulting across private businesses and organisations in the public and voluntary sectors. We are an independent and not-for-profit organisation, guided in our work by the evidence and the front-line experience of our members.

# Fresh thinking in learning and development

## Part 2

### Cognition, decision and expertise

#### Contents

<b>Background</b>	<b>2</b>
<b>Acknowledgements</b>	<b>3</b>
<b>About the author</b>	<b>3</b>
<b>Executive summary</b>	<b>4</b>
<b>1 Making good decisions</b>	<b>5</b>
The power of choices	5
Decision-making: the discounted skill	5
Our cognitive constraint	6
Behaviour and uncertain choices	6
<b>2 How we decide the theory</b>	<b>7</b>
Fit for purpose: the tricks of heuristics	7
Beware of bias in the system	7
Our flawed human being	8
<b>3 Deciding in practice</b>	<b>9</b>
Expert decision-making: patterns from know-how	9
Juries really don't know – they make up stories	9
The power of practice	10
Decision and indecision: thinking in two minds	10
Thinking out of our minds: distributed cognition	11
Willpower, habits and decision fatigue	11
<b>Conclusion and practice pointers</b>	<b>12</b>
<b>Key reading on cognition and decision-making</b>	<b>13</b>
<b>References</b>	<b>13</b>

This report was written by Dr Adrian P. Banks, University of Surrey, with Dr John McGurk, CIPD.

# Background

This report forms part of stage two of research launched in 2012 to challenge tried and tested models of insight and diagnosis such as Myers-Briggs, learning styles and other such approaches, and build fresh insight for L&D. Through our 2012 *Learning and Talent Development* survey, conducted in partnership with Cornerstone OnDemand, we identified extensive use of traditional techniques and low awareness of emerging practice such as neuroscience, cognition and wider cognitive processes such as intuition and thinking skills. We outlined our

survey findings in our 2012 report *From Steady State to Ready State: A need for fresh thinking in learning and talent development?* and set out to develop newer insight. These new insights are critical, in our view, to developing curiosity, the driving behaviour of L&D professionals. This new series of reports, written with key experts, allows us to tap into the insight potential of new areas. The intention is that this will help build the capability which helps L&D build its role at the centre of organisational learning.

## **These three research insight reports cover:**

- neuroscience and learning
- cognition, decision and expertise
- insight and intuition.

This is the second in the series and it addresses cognition, decision-making and the role of expertise and professional judgement.

# Acknowledgements

The CIPD wishes to thank the community of learning and development practitioners who made this series possible by completing our 2012 survey and allowing us to tap into both the steady and ready states of L&D practice. We also wish to thank those practitioners who joined

our winter 2013 webinars and who participated in the webinar delivered by Dr Adrian Banks. We want to thank Mike Morrison of RapidBI and Martin Couzins of LearnPatch for facilitating those webinars and helping facilitate delivery of some of the insights we used in this report. Finally, thanks

are owed to Dr Banks for providing us with his expertise and giving us real insight into decision-making and cognition.

## About the author



**Dr Adrian Banks** is a psychologist at the University of Surrey who specialises in reasoning, decision-making and awareness. He explains in his research and drawing on that of others, that reasoning ability is the single biggest predictor of performance at work (aside from completing samples of the work itself) and plays a key role in many problems, arguments and decisions in our non-work lives too. However, in formal education and training settings explicit development of this skill is comparatively neglected.

His research aims to develop understanding of reasoning processes, and applies this to everyday settings to improve reasoning performance and extend theoretical understanding.

Currently he is working on individual reasoning and the role of prior beliefs and experiences. This has involved modelling belief bias effects computationally to better specify the processes involved. He is also looking at the reasoning processes of experts and non-experts in various business situations.

# Executive summary

A key component of being in a ready state from an L&D perspective is to be aware of how we make decisions. The ability to make, reflect upon, analyse and put into practice decisions is something we do constantly. Whenever we cross a road or pick up an item in a supermarket we make a decision. When we make judgements about someone in a meeting we are deciding and if we don't reflect and analyse properly we can make poor decisions. Knowing how we make decisions in a mindful and informed way is a key skill for ourselves and will help others. In some ways decision-making is a 'discounted' skill; we don't pay much attention to it, yet our ability to filter out from the noise and stimuli of the everyday world, to deliberate and decide, is a mark of our uniqueness as human beings. We are decision-making machines.

Dr Adrian Banks is a cognitive psychologist and an expert on reasoning and decision-making in the workplace. Dr Banks looks at how we reason and decide individually, in teams and as organisations. He is also interested in how we operate under pressure and how we function in, for example, technology-rich environments and with the issue of distributed cognition. He has written extensively in academic articles on how we process the

logic of decision-making, so he is an excellent guide and expert source for bringing reasoning and decision-making into our thinking. Dr Banks looks in detail at the power of making choices and its importance for how we behave and act at work. He focuses on:

- how our minds constrain us from making good decisions by the way they operate automatically and respond to stimuli
- the nature of uncertainty and prediction and how it can help and hinder decision-making
- the cognitive processes which drive decision-making.

Having introduced the importance and theory of decision-making the report then looks in detail at:

- the use of decision shortcuts known as heuristics, which allow us to 'parse' decisions
- the nature of bias in decision-making, looking at issues such as availability and representation bias and how to be aware of and control for biased decision-making
- how our ability to reason and decide is impaired by our patterned thinking responses to suit our functioning in society and ultimately our survival as a species. With big and complex brains we are adapted to continually scan our options and

to focus properly on decisions we need to control those mechanisms.

This leads us into the final section; how do we actually make decisions in practice? Dr Banks looks at:

- experts and how they use their deep knowledge to solve problems and generate solutions. Some of the issues around the well-known 10,000-hour heuristic for expert practice are explored.
- the use of critical decisions such as those made by juries who are expected to make rational decisions but are impeded by our all too human cognitive frailties; how in practice the holes in our knowledge and memory lead us to weave stories to fill in gaps
- how we acquire habits, how they can be changed and how we can exercise that most elusive of strengths, that of willpower.

The report concludes by looking at how L&D and HR professionals can help support better awareness, reflection and decision-making. This is very much about supporting people's ability to think and to understand thinking as a process.

**Dr John McGurk, CIPD**

# 1 Making good decisions

## The power of choices

Making good decisions is central to the success of any individual or organisation. From an organisational perspective, these decisions can vary in scope from daily decisions about what to do next to decisions about strategy that will unfold over several years and affect many people. Together the choices made at these key moments plot the chart of where an organisation has come from and where it will go in future. However, the decisions made are often not optimal. They are susceptible to the constraints of time, incomplete information and the limitations of our cognitive processing power. These factors lead to systematic errors in thinking which can have disastrous consequences. Nonetheless, humans have evolved to live in this complex world and while the decisions may not follow the normative framework of rationality commonly favoured, they are often reasonable and effective in our working environment.

## Decision-making: the discounted skill

Decision-making is a topic that has been of central concern in several different disciplines including maths, economics and psychology over a long period of time. The classical theories of decision-making propose that people know the desirability of different outcomes, known as *utility* and will choose the option with the highest utility. Utility is subjective; in the eighteenth century Daniel Bernoulli discussed the difference between the utility of a sum of money and the actual value of the money, proposing ‘*a poor man generally obtains more utility than does a rich man from an equal gain*’ (Bernoulli 1738). More recently, von Neumann and Morgenstern advanced expected utility theory to provide an influential framework for rational choice when the outcomes are uncertain (von Neumann and Morgenstern 1944).

*‘Making good decisions is central to the success of any individual or organisation.’*

In this case, the rational decision is the one that is expected to have the highest utility. The expected utility of an option is calculated by multiplying the utility of the option by the probability of it occurring. The best choice is the option with the highest expected utility. For example, which of the following options would you choose?

- 1 I toss a coin and if it lands on heads, I will give you £100, but if it lands on tails, I give you nothing.
- 2 I give you £48.

Option two is desirable, but the expected utility of option one is higher. For option one, there are two alternatives (heads or tails) and each has a probability of 0.5 of occurring. So that option has an expected utility of  $0.5 \times £100 + 0.5 \times £0 = £50$ . Option two has one certain outcome, £48. So the expected utility of option one is greater than option two, making it the rational choice.

*‘Defining a choice as “rational” requires a statement about which logical or mathematical framework is being used to evaluate that choice.’*

#### **Our cognitive constraint**

Despite the clear logic of expected utility theory, the attraction of a guaranteed £48 is compelling for many people. Maximising expected utility may be a rational thing to do, but it is not what people always do. One reason is that limitations to cognitive resources such as attention and memory, the limitations of time available and incomplete access to all the relevant information prevent a full analysis of the problem. Simon (1955) concluded that these limits led to what he termed *bounded rationality*. Bounded rationality is choosing the best solution, given the limitations of information and cognitive capacity.

From the 1970s, Tversky and Kahneman began a programme of work identifying different ways in which people failed to follow the various axioms of rationality and most famously demonstrated a wide range of biases in human decision-making. This pessimistic view of human decision-making shows it to be inconsistent, influenced by irrelevant contexts and systematically flawed.

Recently, a more optimistic view of human decision-making has emerged. For example, Gigerenzer and Goldstein (1996) have shown that people may well use simple decision methods which use only limited information rather than sophisticated techniques which integrate all the available information. But these simple methods prove to be well suited to the complexity of the world. They are robust, often giving better solutions than more complex methods when they are used in situations to which they are well adapted.

#### **Behaviour and uncertain choices**

Defining a choice as ‘rational’ requires a statement about which logical or mathematical framework is being used to evaluate that choice. A conclusion that is valid within one system of logic may not be valid in another system. As a result of the work of von Neumann and Morgenstern, amongst others, the commonly applied framework for making rational choices in uncertain situations is to maximise expected utility. In practice this means that when faced with a choice, there are two questions to ask: ‘How likely is this outcome to occur?’ and ‘What are the benefits?’ To maximise expected utility, select the option that maximises these two answers.

Human judgement has been found to err in assessing the answer to both of these questions. While some mistakes are simply random, there are also systematic patterns of error. The answers to questions about both the likelihood and the utility of an outcome are skewed in predictable ways. For example, some possibilities are given more or less weight than they should be, given their actual likelihood of occurring. Consider the ‘certainty effect’ for example.

#### **The certainty effect**

The *certainty effect* describes the bias that people heavily favour a certain outcome in comparison with a highly likely outcome (Kahneman and Tversky 1979). The value people give to being 100% certain is a lot greater than for 90% certain, more than an extra 10% deserves. They will pay much more for an option in which all risk is eliminated compared with an option in which 90% of risk is eliminated.



## 2 How we decide the theory

Humans are also biased in their assessment of outcomes. Tversky and Kahneman (1991) said that *'losses loom larger than gains'*. The pain of losing £100 feels worse than the equivalent joy of gaining £100, even though those two things are symmetrical. This fundamental mismatch or *asymmetry* in how gains and losses are viewed leads to a number of systematic errors. The *disposition effect* describes how traders are more reluctant to sell from losing positions and realise their loss than they are to sell winners to make a gain (Shefrin and Statman 1985). This is to their detriment, as they maintain a losing position for too long. One explanation of this effect is that the pain of making the loss is greater and so the position is maintained for longer, in the hope that it will recover. A similar bias is described as the *sunk cost effect* (Arkes and Blumer 1985). If a project does not work out as planned it can be hard to accept this and stop. The temptation is to 'throw good money after bad' because the investment made so far will be lost. However, if persisting with the project will lead to further loss, the right course of action is to stop. The pain of losing the investment of money, time and political capital looms large, resulting in failing courses of actions being pursued for longer than they should.

### Fit for purpose: the tricks of heuristics

In a small number of situations, such as in a casino, it is possible to calculate the exact probability of an event such as dice roll, or a gain such as the number of chips won

in a game. In these situations the calculations required to maximise expected utility are at least feasible. However, in most situations this is not the case. The likelihood of an event occurring is more often unknown, and difficult to estimate with any degree of accuracy.

The outcomes of an event are complex as decisions may have far-reaching consequences which are not possible to foresee. Often the facts required are simply not available and, if they are, the sheer volume of information would be too vast to analyse in time. In these situations it is hardly surprising that people do not evaluate decisions in a rational fashion – it is impossible. Yet people do make reasonable decisions all the time.

One solution proposed by Simon (1955) is to use *heuristics*. These are simple rules of thumb that require only a small amount of effort and information and yet generate a solution that is normally good enough. His example is *satisficing*. This involves setting a criterion for an outcome that will be good enough and then choosing the first option that meets that level. This means that an exhaustive evaluation of every option is not required; the goal is to find something that is, as we often say, 'fit for purpose'. For important decisions the level that is satisfactory could be high, requiring an extensive search. For less important decisions a lower level may be sufficient and the search shorter. For example, in a learning programme aimed at developing capability in a sales team, the 'bells and whistles'

solution might provide bespoke sales training, informed by the latest techniques and behavioural science around selling. A keynote 'guru' speaker might also be flown in. However, it might be just as useful and much more cost-effective to emphasise the importance of relationships and networks as being the fundamental driver of selling. The latter would be a satisfied solution.

### Beware of bias in the system

While heuristics enable fast decisions, they can also lead to characteristic biases (Tversky and Kahneman 1974). These biases are systematic errors that can occur as a side effect of the simple method used by the heuristic to form a judgement. For example, the *availability heuristic* involves judging the likelihood of an event based on how readily a memory of that event comes to mind. Given that it is often impossible to actually compute the probability of an event, this is a reasonable way of making an estimate. Events that are encountered more frequently will more readily come to mind and so more available events are often more likely to occur in future, too. However, many other factors also influence the availability of a memory. Many people are anxious about flying because they are concerned about the possibility of an accident. Far fewer people are anxious about driving, even though driving is a more dangerous form of transport than flying. In this case the availability heuristic provides a false estimate. Aeroplane accidents are rare, but when they do occur they are publicised widely and so these examples come readily to

mind. In contrast, the majority of car accidents are not widely reported and so most people have fewer examples of dangerous driving and they do not come to mind as readily.

Another common heuristic is the *representativeness heuristic*. This heuristic is used when a judgement about an event is based on how similar it is to other examples of that type. For example, we may form a judgement about how likely a candidate at an interview is to be successful in the job based on how similar she or he is to employees who are currently successful in the role. This may be biased if the judgement of similarity is made on irrelevant features such as gender or ethnicity.

### Our flawed human being

A large number of heuristics and biases have been identified which together paint a bleak picture of human decision-making. Many studies provide demonstrations of situations in which people do not act rationally because of their heuristic thinking. However, recent research has studied the effectiveness of heuristics

in providing solutions to more complex real-world problems. Gigerenzer has shown that when heuristics that are adapted to the environment we live in are used, they can be as effective as more complex decision analysis (Gigerenzer and Goldstein 1996).

One example is the *recognition heuristic*. This heuristic is used to establish which of two options is the greatest on any given attribute and involves simply selecting the option that is recognised. Goldstein and Gigerenzer (2002) asked students to decide which of two cities was larger; 62% of students at the University of Chicago were able to identify correctly whether San Diego or San Antonio had more inhabitants, whereas 100% of students at the University of Munich were able to do this. This is unexpected – did the German students know more about the geography of the USA than American students? Quite the reverse, they knew less. German students were more likely to recognise only one city and so assumed that it was larger whereas American students were familiar

with both and so couldn't apply this heuristic in making the decision.

This heuristic exploits the adaption of our memory to the environment in which it has evolved. Memory is not perfect, people forget many things. However, this is adaptive; forgetting is also an important function of memory. If every time we went shopping we recalled every previous shopping list with perfect clarity it would be much harder to decide what we needed on this particular visit. Ideally we would forget the irrelevant information and remember the relevant information. Anderson and Schooler (1991) found that we do this – the likelihood of remembering a fact is related to how frequently and recently it is encountered in our environment. Larger cities are encountered more commonly and so larger ones are more likely to be recognised. Therefore recognition is a good estimate of the importance of something, but it will be effective only when making decisions on topics where our experience has been well tuned to the environment.

### How heuristics work: an example

Gigerenzer has identified a range of simple heuristics. Often the *recognition* heuristic cannot be used because an experienced decision-maker recognises both options. In this case, the *take the best* heuristic may be effective. Rather than attempt to compare the options based on a wide range of factors, this approach involves taking the single most valid cue and making a decision based on this one factor. In the event that it is not possible to distinguish between the options using the most valid cue, the second cue is used, and so on. This heuristic is also effective only in environments well known to the decision-maker because it depends on knowledge about the order of cue validity that is learned over time. So for example, an expert in learning asked to help support assertiveness training as part of a diversity programme may know that a new behavioural insight challenges the need to be more assertive when people are identified as having a bias towards introversion. However the cues from the organisation say that traditional assertiveness training might be appropriate with some tailoring for types of extroversion. This kind of thinking would be almost instantaneous for the expert learning adviser based on accumulated knowledge of culture, organisational objectives, the people involved and the expectations of stakeholders.

Heuristics are applied widely to manage the complexity of decisions faced in the real world. Some researchers have shown that they lead to biases and others have shown that they can be effective. Neither position tells the full story; heuristics themselves are neither good nor bad. When applied indiscriminately as a substitute for a more complex calculation they can lead to bias. But when applied in the right niche they can give better solutions than more complex decision methods.

## 3 Deciding in practice

### Expert decision-making: patterns from know-how

While simple heuristics can be effective in the right situation, research on expert decision-makers shows that they use more than simple rules of thumb. Experts characteristically have very detailed knowledge about the situations that they commonly face. This is organised into templates or generic examples that frequently occur. When experts face a fresh situation they don't have to try and think simultaneously about many unconnected facts – that would be overwhelming. Instead all the facts fit into one of several familiar scenarios. Klein has developed a *recognition-primed decision-making* model of expert decision-making in which most decisions involve little more than this (Klein 1998). Experts recognise many situations they are likely to face and simply know what to do because they have seen it before.

This would suggest that experts do very little thinking, they just recognise familiar patterns. But that is not the full story. It is true that experts can rapidly recognise situations, but they do also analyse them. Expert chess players for example recognise complex patterns of chess pieces and this enables them to make fast decisions (Chase and Simon 1973). But if chess was only about rapidly recognising patterns, expert chess players would be as good when playing speed chess under severe time constraints as they are when less time pressured. They do well under time pressure, but not as well as when they have time to think (Burns 2004). The extra time

is used to think through slowly and analytically the consequences of different moves and this improves the quality of their decisions over the rapid responses. Air traffic controllers, who it is often said play 'three dimensional chess', and nuclear engineers and other expert employees must continually flit between routine process and novel problem-solving. Expertise and heuristics help, so there is more to expert decision-making than simply problem and solution recognition. They must operate in a contingent environment. This insight is useful when thinking about how a variety of knowledge workers learn and develop, those with less safety-critical but business-critical roles for example, whose judgement is key in their roles, such as those in financial services and those working in non-clinical management roles in areas such as healthcare.

The benefits of expert knowledge about the decision domain are twofold. It is possible to recognise situations that fit a well-known pattern; it is also possible to think more powerfully about a decision by considering the interaction of many factors at once by representing them in complex patterns rather than focusing on only one piece of information at a time.

### Juries really don't know – they make up stories

Pennington and Hastie offer a different way of presenting the idea that people link information into familiar patterns when making decisions (1986). They suggest that people create stories. Their research

*'While simple heuristics can be effective in the right situation, research on expert decision-makers shows that they use more than simple rules of thumb.'*

*'The nature of expertise lies in the ability to fit the complex world into familiar patterns and to create coherent stories out of a situation.'*

focuses in particular on jury decision-making. Evidence is presented to the jurors and instead of weighing the evidence for and against the accused, they build a story. They actively create an account of what might have happened, using what they have been told, and use the story to pass a verdict. However, they flesh out the story with other details based on their general knowledge and assumptions about the situation. Therefore the decision is based on a story containing both the evidence provided and their own additions. For a juror this is a concern. Jurors should make a decision based on the evidence they have been given and making faulty assumptions could lead to errors. But for an expert this can be very beneficial. An accurate knowledge of the domain means that the details that are filled in are more likely to be relevant and lead to a fuller account of the situation, which helps the decision being made.

#### **The power of practice**

The study of expertise in chess has also led to insight into the development of expertise, most famously the length of time required to acquire expertise. Simon and Chase (1973) originally proposed that a minimum of ten years' practice was required to reach master level, while Ericsson et al (1993) proposed a minimum of 10,000 hours. The length of time taken is in fact quite variable. Campitelli and Gobet (2011) found masters with anything between 3,000 and over 20,000 hours' practice, and non-masters with 20,000 hours' practice. Of more relevance is the type of practice required. Deliberate practice requires focusing on specific areas of the skill and honing it through accurate feedback. Unfortunately, in organisations it is rarely possible to make the same decision repeatedly and receive feedback

on the outcome. It is rarely clear what would have transpired if the other option had been taken. Achieving more than 10,000 hours' experience in a domain is possible, but that amount of deliberate practice is much harder to acquire.

The nature of expertise lies in the ability to fit the complex world into familiar patterns and to create coherent stories out of a situation. Over many years experts learn what the most likely stories and scenarios are and can either recognise them or fill in the gaps to help understand them. Their familiarity with these stories also helps them envisage how complex events will unfold if they take a course of action, as they know how the underlying factors are connected, rather than having to consider each one individually.

#### **Decision and indecision: thinking in two minds**

A popular idea is that there are two modes of thinking, intuitive and analytic, and that decisions are made using one or other of them. Intuition is fast, effortless and automatic. It uses undemanding shortcuts or heuristics to form judgements and may be influenced by the emotional response to an event. In contrast, analytic thinking is slow, effortful and consciously controlled. It deliberately combines the information available to seek a rational solution. Often these two modes are depicted as being in conflict. For example, some people see themselves as intuitive or analytic. While it is true that these two approaches to decision-making are different, they are not necessarily competing processes. Instead, the automatic, unconscious process typically supports the slower, conscious decision-making process. There are several related theories of how these two types of thinking interact, broadly described as *dual process theory*. Typically,

the intuitive mechanisms are referred to as *System 1* and the analytic mechanisms are referred to as *System 2* (Stanovich and West 2000).

One example of heuristic and analytic processing working together is in the study of belief bias. Belief bias occurs when people are asked to reason about a problem using only the facts they are given, however they cannot help but be influenced by their prior knowledge which they have been told to ignore. Is this really a bias? It is in the experiment, in the sense that they have been told to suppress their beliefs and failing to do so leads to logical errors. But this approach to thinking is well adapted to people meeting their personal goals in their familiar environment. In this case, their beliefs about the world are likely to be relevant to the problem and the kinds of conclusions that have been true in the past. The heuristic has cued up what is most likely to be a relevant conclusion, given our prior experiences, cutting through the overwhelming amount of information to bring to conscious attention only the most salient facts. This more manageable amount of information can then be used for analytic reasoning (Banks 2013). With effort, more analytic thinking can be applied. Choosing between intuitive and analytic modes of thinking is not a dilemma; typically they are both used at the same time.

### **Thinking out of our minds: distributed cognition**

The models of decision-making discussed so far all refer to decisions that are made in people's heads. However, most decision-making does not take place solely in our unsupported minds. The decision arises through a system of interacting agents. Only by looking at this

wider unit of analysis is the full picture apparent. Hutchins refers to this as *distributed cognition* (Hutchins 1995). The thinking process extends beyond the brain to a wider system that includes all of the props that interact. For example, a notepad acts as an external memory and a diagram acts as a different representation of the situation which enables new connections to be made. This view of decision-making changes the role of the decision-maker. The skill of decision-making does not lie solely in the experiences learned over many years that an experienced person can summon from their mind to see a solution. It also lies in the ability to manipulate these tools optimally so that they generate the correct solution. The tools overcome the limited capacity of attention and memory by externalising and greatly enhancing those processes.

While the decision-maker decides how these tools are used, it is also true that they shape the decision. The way that they are designed affords certain behaviours and the most advanced technology is not necessarily the best. For example, spreadsheet software enables 3D graphs to be created very easily and as a result they are commonly used by default. However, studies of graph interpretation show this format to be unclear if it introduces extraneous information to create the sense of perspective. Following procedures to which the tools or the decision environment lend themselves can influence the decisions in unforeseen ways. This is not always necessarily for the better.

### **Willpower, habits and decision fatigue**

Another feature of the decision models discussed so far is that they focus only on how the information is processed. But people are not

simply information processors, they are computers made out of meat. Brains use energy and when making decisions they can become 'fatigued', although not literally in the way that a muscle becomes fatigued. Nonetheless, the demand of repeated decision-making influences subsequent decisions. Baumeister refers to the limited capacity to self-regulate as *ego depletion* (Baumeister et al 1998). For example, participants in a study required to resist eating a tempting biscuit did not work as hard at solving puzzles subsequently, suggesting that their willpower had been depleted. Similarly, a study of judges assessing parole found that they were less likely to grant parole later in the day, suggesting that the demanding decisions throughout the day influenced the later judgements (Danziger et al 2011).

Repeated cognitive effort can lead to performance decrement, but this decrement does not always occur in performance on the main task that is being undertaken. Performance decrements occur in the secondary tasks (Hockey 1997); for example, it is the next task that is performed less well or the task is completed with a less sophisticated approach. Finding the consequences of decision fatigue involves looking more widely than the immediate decisions being made.

# Conclusion and practice pointers

Making good choices is a complex process. The rational solution is often impossible to achieve. Instead, people often find a reasonable solution. This might involve a heuristic thinking short-cut which can be effective when well adapted to the environment. Or, it might involve drawing on experience to build a story of events. But without relevant experience these methods are more likely to lead to an error. Deliberation and reflection on alternative stories that fit the facts and effective use of tools to support decision-making can help reduce errors and lead to longer-term development of decision-making skills and a supportive decision environment. The best advice is:

- Weigh decisions and think deeply and deliberately about the very important ones. There are some well-known tools and approaches, outlined below, for doing so.
- Be mindful when using shortcuts such as heuristics and other rules of thumb, using them carefully and deliberately. It is not always easy but beware of how your brain operates in system 1 and system 2 modes and try to get system 2 to the forefront. This is especially so when you are working with people demonstrating high levels of stress and anxiety.
- Think about how you and others use expertise. How up to date is it and how relevant is it to the issue being addressed?
- Beware of bias and control for it in yourself and others. The most benign but damaging bias in a complex and changing world is availability bias. Think about

why we are using an approach, a technique or a training tool. In our research report *From Steady State to Ready State: A need for fresh thinking in learning and talent development?* we identified the overuse of certain analytical and diagnostic tools as a form of availability bias.

- Understand how much of our reasoning is about pattern formation – remember how juries rely on storytelling and filling in gaps. Understand how witnesses find patterns and convince juries that they are true. This should give us some mindful insight into organisations.
- Know about the power of habit and the evidence on willpower. This will help us make a contribution, especially in the coaching, mentoring and personal development areas.
- Know about distributed cognition and how tools and practices such as note-taking can help us deliberate better.
- Use tools such as PESTLE, SWOT, fishbone and decision trees as a regular check on your own and on group decision-making. This will help to make decisions more deliberative and thoughtful.

The process of business and project planning helps us to make better decisions and to think about how we can involve other people in our thinking; it forces us to consider risks and dependencies. These processes need not be complex and involved, such as PRINCE or detailed business planning tools. Used flexibly they can become rules of thumb or heuristics. There are many apps and online tools which

can help these processes. Make use of them.

Best of all, write stuff down in order to engage and reflect with it. Use mind maps and other thought-planning tools and even if you use the rule of three to write down the key issues that need to be addressed, you will do better than simply percolating an idea in your head. Our brains relate better to material which is externally captured and analysable. This promotes a different dynamic by our brain. For example, if you just consider when planning your wedding that you are not going to invite your stepfather, you will not reflect as much as if you write it down. Students who take notes are known to perform better in comprehension of material than those who use highlighting, for example.

Conversations are great thinking tools. Do your thinking out loud with a coach, colleague or friend. Hearing what you are thinking will almost certainly lead you to think differently and more powerfully.

Finally, knowing about how we think and decide opens up a whole new range of insight for L&D. Linked with the insights from our related research insight reports *Neuroscience and Learning* and *Insight and Intuition*, it lifts our 'cognitive capability' as learning and development specialists. As the world of learning shifts towards more social, collaborative and interactive learning, these thinking, perceiving and sense-making skills will become invaluable.

**Dr John McGurk, CIPD**

# Key reading on cognition and decision-making

BAUMGARTNER, W. and TIERNEY, J. (2011) *Willpower: why self control is the secret of success*. London: Penguin.

DOBELLI, R. (2013) *The art of thinking clearly: better thinking better decisions*. London: Sceptre.

DUHIGG, C. (2013) *The power of habit: why we do what we do and how to change*. London: Random House.

EAGLEMAN, D. (2011) *Incognito: the secret lives of the brain*. Edinburgh: Canongate.

GIGERENZER, G. (2008) *Gut feelings: short cuts to better decision-making*. London: Penguin.

KAHNEMAN, D. (2011) *Thinking, fast and slow*. London: Allen Lane.

LEHRER, J. (2009) *The decisive moment: how the brain makes up its mind*. Edinburgh: Canongate.

## References

ANDERSON, J.R., and SCHOOLER, L.J. (1991) Reflections of the environment in memory. *Psychological Science*, 2. pp396–408.

ARKES, H.R. and BLUMER, C. (1985) The psychology of sunk cost. *Organizational Behavior and Human Decision Processes*, 35. pp124–140.

BANKS, A.P. (2013) The influence of activation level on belief bias in relational reasoning. *Cognitive Science*, 37. pp544–577.

BAUMEISTER, R.F., BRATSLAVSKY, E., MURAVEN, M., and TICE, D.M. (1998) Ego depletion: Is the active self a limited resource. *Journal of Personality and Social Psychology*, 74. pp1252–1265.

BERNOULLI, D. (1738) Exposition of a new theory on the measurement of risk. Translated from the original Latin in 1954 in: *Econometrica*, 22. pp23–36.

BURNS, B.D. (2004) The effects of speed on skilled chess performance. *Psychological Science*, 15. pp442–447.

CAMPITELLI, G., and GOBET, F. (2011) Deliberate practice: necessary but not sufficient. *Current Directions in Psychological Science*, 20. pp280–285.

CHASE, W.G., and SIMON, H.A. (1973) Perception in chess. *Cognitive Psychology*, 4. pp55–81.

DANZIGER, S., LEVAV, J., and AVNAIM-PESSO, L. (2011) Extraneous factors in judicial decisions. *Proceedings of the National Academy of Sciences, USA*, 108. pp6889–6892.

ERICSSON, K.A., KRAMPE, R.T. and TESCH-RÖMER, C. (1993) The role of deliberate practice in the acquisition of expert performance. *Psychological Review*, 100. pp363–406.

GIGERENZER, G. and GOLDSTEIN, D.G. (1996) Reasoning the fast and frugal way: models of bounded rationality. *Psychological Review*. 103. pp650–669.

GOLDSTEIN, D.G., and GIGERENZER, G. (2002) Models of ecological rationality: The recognition heuristic. *Psychological Review*. 109. pp75–90.

- HOCKEY, G.R.J. (1997) Compensatory control in the regulation of human performance under stress and high workload: a cognitive-energetical framework. *Biological Psychology*. 45, pp73–93.
- HUTCHINS, E. (1995). *Cognition in the wild*. Cambridge, MA: MIT Press.
- KAHNEMAN, D. and TVERSKY, A. (1979) Prospect theory: an analysis of decision under risk. *Econometrica*. 47. pp263–292.
- KLEIN, G. (1998) *Sources of power: how people make decisions*. Cambridge, MA: MIT Press.
- PENNINGTON, N., and HASTIE, R. (1986) Evidence evaluation in complex decision-making. *Journal of Personality and Social Psychology*. 51. pp242–258.
- SHEFRIN, H. and STATMAN, M. (1985) The disposition to sell winners too early and ride losers too long: theory and evidence. *Journal of Finance*. 40. pp777–790.
- SIMON, H.A. (1955) A behavioral model of rational choice. *Quarterly Journal of Economics*. 69. pp99–118.
- SIMON, H.A. and CHASE, W.G. (1973) Skill in chess. *American Scientist*. 61. pp393–403.
- STANOVICH, K.E., and WEST, R.F. (2000) Individual differences in reasoning: implications for the rationality debate. *Behavioral and Brain Sciences*. 23. pp645–726.
- TVERSKY, A. and KAHNEMAN, D. (1974) Judgment under uncertainty: Heuristics and biases. *Science*. 185. pp1124–1131.
- TVERSKY, A. and KAHNEMAN, D. (1991) Loss-aversion in riskless choice: a reference-dependent model. *The Quarterly Journal of Economics*. 106. pp1039–1061.
- VON NEUMANN, J. and MORGENSTERN, O. (1944) *Theory of games and economic behaviour*. Princeton, NJ: Princeton University Press.







Chartered Institute of Personnel and Development  
151 The Broadway London SW19 1JQ UK  
Tel: +44 (0)20 8612 6200 Fax: +44 (0)20 8612 6201  
Email: [cipd@cipd.co.uk](mailto:cipd@cipd.co.uk) Website: [cipd.co.uk](http://cipd.co.uk)  
Incorporated by Royal Charter Registered charity no.1079797