Maximizing Multi-Disciplinary Team Impact in High-Performance Sport: Exploring Problem Solving, Decision-Making, Expertise, & Team Performance.

Part 3: Heuristics, Intuition & Decision Making

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[1.] Blended Intellligence

Multi-disciplinary Team; Practitioners; Decision Making; Intuition; Heuristics; Cognitive Load

Overview

The act of decision making is an essential aspect of daily life, with humans making up to 30,000 decisions a day. However, the term 'decision making' encompasses a broad range of actions, from sub-conscious, automated decisions to slow, logical, and rational deliberations. Despite the prevalence of decision making in daily life, there is a pervasive belief in the concept of the rational actor, which assumes that humans can act much like computers, delivering the optimum solution with clear logic and rationality. This belief has been challenged by behavioral psychologists and Nobel Prize winner Herbert Simon, who argues that humans are bounded in their ability to be both rational and to rationalize. This essay explores the different types of decision making, the concept of the rational actor, and the impact of decision making on individuals' cognitive load and performance under pressure. It also highlights the importance of systems thinking in decision making, particularly in complex and uncertain environments.

Individual Ability

Decision making

We should recognise that the term 'decision making', to choose a course of action can be interpreted in different ways. First, there are different classifications of decision type that can assist us when we apply them in a problem-solving context (Lyle & Muir 2020) but essentially decision making is to choose a course of action (Lipshitz, Klein, Oransana, & Salas 2001). It is estimated that humans make up to 30000 decision a day. Should we consciously deliberate before choosing every course of action and before every decision we would very quickly become ineffective and overwhelmed by the countless scenarios, options and possibilities.

Types of decisions

Non deliberative decisions refer to those decisions that are sub conscious, automated and happen without 'rationalisation' or awareness. Consider the act of driving a well-known route to work or controlling the car that you are driving whilst creating a mental 'to do' checklist for the day. Semi-deliberative decision making requires a level of conscious choice. The actor will be aware of weighing decision options however the processes that underpin it are fast, tacit and 'intuitive'. If we think about our usual route to work changing, driving in a city that we don't know or concentrating when getting squeezed between two lorries on narrow lane motorway, our attention becomes fixed on the task, not on other cognitive activities. The final decision-making type is deliberative decision making. This type of decision making requires time, it's slow, logical, rational and requires the weighing of multiple options without time constraints (Lyle 2010). Humans must be able to make decisions in a variety of time frames in different situations and contexts with magnitudes of constraints (Lipshitz et al 2001). Depending on the stakes of the decision, the cognitive cost on us from a 'load' perspective can be significant (Sanfrey & Loewenstein, McClure & Cohen 2006). By borrowing from the field of neuro-sciences and neuro-economics we can see that across the spectrum of decision types, the individual cost on making decisions can vary and have an impact on our effectiveness (Sanfrey & Stallen 2015).

The rational actor

It is worthy to note that much of the work of behavioural psychologists have looked at Decision Making through the lens of the 'rational actor' (Simon 1990). The belief that humans can act much like computers carrying out multiple calculations and delivering the optimum solution with clear logic and rationality has been well challenged; the Nobel prize winner Herbert Simon argues that humans are bounded in that they are fallible to thinking errors, emotional and limited in their ability to be both rational and to rationalise (Simon 1959; 1990). The idea of 'unbounded rationality' still permeates our beliefs about how practitioners should operate in high performance elite sport and yet, practitioners must operate in complex environments, with complex interactions across a complex spectrum of hierarchical relationships with high stakes and under high pressure (Miller, Miller, McCann, Stacey & Groom 2020). Herbert Simon talks about decisions by an 'actor' as ecologically rational and has used a scissor metaphor to bring this concept to life. Where one blade of the scissors is the task structure and the other is cognitive processes, the 'cut' is the decision which is wholly contextually and idiosyncratically derived (Gigerenzer & Gassimaier 2009).

It turns out that as decision makers we satisfice, often selecting the 'best fit' or 'less than perfect' solution that enables us to move forwards (Gigerenzer 2008). Optimising would suggest that practitioners can weigh all and every data point relating to a decision, calculate the correct option and make the optimum decision. This view, when considered through the lens of our emotions, computational abilities and socially derived contexts, make this unrealistic. In MDT's in sport, the belief that practitioners are unbounded rationalists, immune to beliefs, values and emotion whilst being able to make the correct decision based on fully informed and completely rational judgement is a problem that could be addressed through education programmes, situated learning approaches (Cassidy & Rossi 2006) and our yet to be designed, MDT delivery methods.

Performance under pressure

In VUCA landscape, where there is no clear solution or path forwards, we will have to rely on some form of deliberative problem solving/decision making and apply expertise, knowledge and tools to create solutions of value (Page 2017). In VUCA situations to the untrained or impartial observer, unfolding events can seem chaotic inducing uncertainty over what the optimal course of action should be but to the contextual expert, may seem predictable, clear and obvious. Consider the observer to a multiple car road traffic accident versus the trained paramedic, immediate responder or firefighter. The understanding of the environment, most likely through exposure to similar events, training and experience present the individual with options that the casual observer would not have. Consider the cost on each of these individuals. The cognitive cost of decision making under pressure (Westbrook & Braver 2015) is high. Depleting the decision makers consumable cognitive resources impairs human performance (Furley, Bertrams, Englert & Delphia 2013) when making future decisions and when married with stress, anxiety and uncertainty (Baumeister 2002) can further impair clarity of thought and the ability to make coherent decisions (Westbook and Braver 2015).

Cognitive Load and Systems Thinking

Cognitive load theory (CLT) (Loewenstein, Rick and Cohen 2008) borrows from and is underpinned by Kahneman and Tversky's Type 1 and Type 2 thinking styles (Kahneman 2011). This body of work argues that humans can engage in fast, intuitive, energy conserving type 1 thinking but can also operate in deliberate, slow, methodical and rational type 2 methods. System 1 enables us to operate and interact in the world without having to rationalise and purposefully weigh decisions. Without system 1, we would not have been able to respond with the 'fight, flight or freeze' response to threats in our early evolution. From a physiological perspective, the ability to conserve energy stored in the brain by reducing depletion when carrying out cognitive functions has given us the ability to deploy those resources to other more complex cognitive requirements and take on more challenging operations (Loewenstein et al 2008; Leppnick & Van Den Heuvel 2015). System 1 is fallible as it is reactive to our beliefs, emotions and is susceptible to cognitive thinking errors (Crosskerry 2003) and biases. Our Type 2 systems enable us, with the affordance of time, to problem solve, rationalise and apply levels of logic to complex and unpredictable situations. Type 2 thinking is less susceptible to emotion but its energy hungry, saps our resources and depletes our cognitive capacities. System 2 is also inherently lazy and reluctant to be utilised favouring its reactive and emotional yet energy saving counterpart (Kahneman 2011).

Heuristics

Heuristics (Tversky & Kahneman 1974), Speedy Heuristics (Lyle 2010), Fast and Frugal Heuristics (Bennis & Pachur 2006; Gigerenzer 2008) can be thought of as cognitive shortcuts, rules of thumb or learned reactions that when applied enable quick response times with low cognitive effort and minimal draw on cognitive resources. Heuristics have been shown to be highly effective in helping decision makers to make accurate decisions when weighing multiple options with or without time constraints (Gigerenzer 2008; Gigerenzer & Gaissmaier 2011; Raab 2012; Raab & Gigerenzer 2015). Heuristics are thought of as adaptive and have been argued to be a key neural 'adaptation' that has enabled us to operate and interact within a complex world (Ullen, de Manzano & Moising 2018). Heuristics might be thought of as highly complex or dense bundles of knowledge not unlike multiple folders zipped into a compressed computer file) that can then be committed to long term memory to be called upon by working memory without being decompressed or unpacked.

There are many heuristics, both mathematical and situational (Page 2017) that have been identified. Kahneman and Tversky (1974) led the systematic errors and cognitive biases programme and along with others (De Martino, Kumaran, Seymour & Dolan 2006; Epley & Gilovich 2006; McCLy, Beaman, Frosch & Goddard 2010), found and documented many examples including anchoring & adjustment; framing, availability/recency, sunk-cost, overconfidence, representativeness, confirmation and hindsight bias (Kahneman & Tversky 1984) and yet, heuristics and their unintended biases and errors appear to be part of our neurophysiology aiding and supporting learning and our ongoing development. This perhaps raises a question, is heuristic behaviour simply a characteristic of our cognitive and neural apparatus (Sanfrey & Stallen 2015) that enables us to take in more complex operations, carry out cognitive tasks, attend to multiple stimuli and execute skilled functions and is it a characteristic of expertise (Larrick & Feiler 2015)?

Intuition as trademark of expertise:

Gary Klein has contributed significantly to our understanding of expertise and has underscored the importance of observing decision makers in natural real-world contexts outside of a lab setting (Lipshitz et al 2001). Klein has observed military personnel, medics, paramedics, air traffic controllers and firefighters (Klein 1984) to understand real world decision making in high stakes time pressured situations (Hotaling, Fakharl & Busemeyer 2015). What was initially thought of by some professionals to be a remarkable Extra Sensory Perception (ESP), has subsequently been investigated and better understood.

Pattern recognition

Klein has been able to define and articulate expertise through both pattern recognition (Klein 1984) and mental simulation (Klein & Klein 2004). These skills enable practitioners in real time to observe, identify and recognise an unfolding scenario by extracting cues, triggers and catalysts from the environment through cognitive mental structures called schema's and scripts almost instantaneously (Klein 1993). These knowledge structures are built up through exposure, experience and reflective practice (Oliveira, Lobinger & Raab 2014) and then when needed, can be accessed and unpacked 'intuitively' by the decision maker without purposeful deliberation, rationalisation or the benefit of time. Klein has been able to cast light over the tacit, rapid and detailed computations of decision makers in high stakes situation and has also been able to show that this intuitive, recognition primed decision making is reliable in naturalistic setting and an important component of decision making (Klein 1993; Lipshitz et al 2001; Lyle 2010)).

System 1, Intuition and Heuristics

Where Kahneman has argued against the reliability of fast system 1 thinking citing its fallibility to systematic cognitive thinking errors, biases and mistakes (Kahneman & Tversky 1984), Klein argues that intuition is a key requirement of skilled expert practitioners in the field (Klein 1993). Bringing this academic debate closer to the realities of MDT practitioners operating day to day in the field; can and do they rely on heuristics and intuition within their individual discipline (Kahneman & Klein 2009) and in which case, does it confirm that they are skilled doers who don't frequently need to problem solve or utilise the data at their disposal in a purposeful way?

If we acknowledge the importance and undeniable reality of intuition and heuristics as an element of human decision making, how do we accommodate this when practitioners work in cognitively diverse expert teams (Salas, Rosen & DiazGranados 2010)? Do we need to identify team heuristics, group mental models' schemas and scripts, shared pattern recognition and simulation, shared vocabulary and shared intuition and expertise (Kerr & Tinsdale 2004; Milkman, Chugh & Bazerman 2009, Mitchell et al 2016)? These are interesting questions and to the authors knowledge, not yet explored in any detail across elite multi-disciplinary teams and certainty not factored in to the training and ongoing learning of our practitioners and support staff.

Summary and Conclusion

The paper has explored the concept of individual ability in decision making. We have explained the different types of decision making, including non-deliberative, semi-deliberative, and deliberative, and how they require varying levels of time, logic, rationality, and cognitive cost. The paper also highlights the rational actor theory and how it has been challenged by behavioral psychologists who argue that humans are fallible to thinking errors, emotions, and limited in their ability to rationalize. Additionally, we examined the impact of performance under pressure on decision-making, emphasizing the cognitive cost of making decisions under stress and how it can impair human performance. Finally, we discussed cognitive load theory (CLT) and systems thinking as an approach that can be used to address the challenges associated with decision-making under pressure. The essay recommends education programs, situated learning approaches, and yet-to-be-designed MDT delivery methods to help practitioners make better decisions in complex environments with high stakes and under high pressure.

About Blended Intelligence

Blended Intelligence is not just a consultancy service, it's a game-changer for high-performance sports organizations. By leveraging the power of diverse teams and innovative technology, Blended Intelligence enables collaborative problem-solving and delivers tailored solutions to complex performance challenges. With a focus on shared intelligence and a commitment to maximizing competitive advantage, Blended Intelligence is helping teams think differently and achieve brilliant outcomes.

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