Decision Making

The Science of Resilience

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Definition

A decision is "a commitment to a course of action having the intention of serving the interests and values of particular people" (Hoffmann & Yates, 2005, p.77). For a person to make a decision, they must be in a certain kind of situation. As Hastie and Dawes (2009) claim:

> A decision is a response to a situation that is composed of three parts: First, there is more than one possible course of action under consideration in the choice set. Second, the decision maker can form expectations concerning future events and outcome following from each course of action, expectations that can be described in terms of degrees of belief or probabilities. Third, the consequences associated with the possible outcomes can be assessed on an evaluative continuum determined by current goals and personal values. (p.24)

Decision-behaviours "fit three parts of definition: two or more courses of action, uncertainty about events that will affect the relevant outcomes, and positive-negative consequences contingent on the events. It is the integration of objective events and our subjective evaluations of those events that is the essence of decision-making" (Hastie & Dawes, 2009, p. 24). Decision-making involves three steps: information acquisition; perception and interpretation; and commitment (Hoffmann & Yates, 2005). Decisions are shaped by an individual's view of how things are supposed to be based on their values, beliefs, morals, and goals (Beach, 1993).

Individuals have different decision-making styles; this is, behavioural patterns concerning how they respond to alternatives when making decisions (Scott and Bruce, 1995). Scott and Bruce (1995) proposed five decision-making styles; rational (logically and thoroughly examine for alternatives), intuitive/affective (using feelings and hunch), dependent (giving away the responsibility to make decisions to other people), avoidant (avoiding decision-making) and spontaneous (making a decision quickly). When making important decisions however, people use a combination of styles (Scott & Bruce, 1995). Individuals with intuitive decision-making styles are often spontaneous in making decisions and individuals with rational styles will be more likely to consult and deliberate with other people to make decisions (Loo, 2000; Delaney et al., 2015). De Martino et al. (2006) found that people with rational decision-making styles still use heuristics and are just better at representing their own emotional biases to help them in achieving optimal decisions.

Janis and Mann (1976) proposed five coping patterns used by individuals to make decisions in stressful situations: *unconflicted adherence* (individuals ignore new information and the risks and continue what they have been doing), *unconflicted change to a new course of action* (individuals adopt the alternative most recommended to them)*, defensive avoidance* (individuals avoid making decisions, for example, by procrastinating or buck-passing)*, hypervigilance* or *panic* (individuals hastily search for a solution to have an immediate relief

without examining all alternatives), and *vigilance* (individuals search for relevant information and evaluate them carefully before making decisions).

Research suggests that decision-making and problem-solving strategies are intertwined. Problem solving is "a process which we perceive and resolve a gap between a present situation and a desired goal, with the path to the goal blocked by known or unknown obstacles" (Huitt, 1992, p.34). Most models on decision-making and problem-solving involve four phases: an input phase where the problem is received and individuals try to understand the situation; a processing phase in which alternatives are made, evaluated and a solution is chosen; an output phase where individuals arrange and act on the solution; and a review phase in which individuals evaluate, review and improve the solution (Huitt, 1992). However, decision-making does differ from problem-solving. In decision-making, individuals have their options/alternatives and must choose a solution to reach a goal. In problem-solving, the individuals typically have never encountered the situation before and do not have a specific solution from their past experience (Huitt, 1992). The outcome of problem-solving process is a choice that help individuals to be closer to achieve their goal. Decision-making transforms the choice into action steps to reach the goal (Sampson et al., 1999).

Setting goals improves individuals' decision-making performance. Goal setting encourages individuals to monitor their actions up to the standards and maintain their efforts to achieve their aims. Individuals who are aware of their specific goals have better self-efficacy judgement and self-evaluate reaction in decision-making compare to the those without specific goals (Cervone, Jiwani, & Wood, 1991).

Decision-Making Theories

Decision-making research includes several different paradigms: the *formal-empiricist paradigm*, the *rationalist paradigm*, the *naturalistic paradigm* and *heuristics*.

The Formal-Empiricist Paradigm

"The formal-empiricist paradigm focussed on behavioural testing of formal models, not on the cognitive processes actually underlying decisions" (Cohen, 1993, p. 43). The formal-empiricist researches construct a new normal definition of anomalies. These normative theories are tested and described as decision-making performance. The researches focus less on how subjects made decisions and the reason why the decisions were made, and more on behavioural testing of formal models (Cohen, 1993).

The Rationalist Paradigm

The rationalist paradigm formally analyses problems and options using probabilities and the economic concept of utility. This paradigm is used by economics theory. Economists separate functions of describing behaviour and evaluate them formally (Simon, 1979). For a rationalist, differences in models and behaviours are due to the irrationality of decision makers

(Cohen, 1993). The rationalist paradigm assumes that humans have complete information on the costs and benefits of each option. Rationalists make comparisons using scales based on their values, preferences, or utilities to decide which scale should be used (Schwartz et al., 2002). However, the rationalist approach cannot be used to analyze situations where there are a lot of uncertainties and imperfections, such as to analyze human behaviour. Rationality is bounded because individuals do not know all of the alternatives and all possible outcomes (Simon, 1979). Simon (1979) argued that optimizing/maximizing the search for all options is too complex. Instead, individuals form some *aspirations* on how good the options are. The search ends when individuals found an option that met their aspirations, or what Simon (1979) called as *satisficing*.

Based on Simon's work, Schwartz et al. (2002) developed a scale to measure the degree to which individuals optimize choices in decision-making. "Maximizers" (who desire the best results) tend to experience more regret, depression and less satisfaction in life. They are more likely to use spontaneous and other maladaptive decision-making styles (e.g. dependency). They also report worse behavioural coping (Schwartz et al., 2002). Maximizing is more common in people with lower socioeconomic status and less education (Parker, Bruine de Bruin, & Fischhoff, 2007).

Naturalistic Decision-Making Paradigm

Naturalistic decision-making focuses more on decision-making processes in realistic, dynamic, and complex environments; and less on decision accuracy (Cohen 1993, Keller et al., 2010). From the naturalistic perspective, individuals have different cognitive processes and therefore different standards are needed for evaluating their decision-making process (Cohen, 1993). The naturalistic decision-making paradigm investigates best practices and uses the findings to improve decision-making (Keller et al., 2010).

Orasanu and Connolly (1993) listed eight factors characterizing decision-making in naturalistic settings: "ill-structured problems; uncertain dynamic environment; changing or unclear goals; action/feedback loops; time stress; high stakes; multiple players; and organisational goals and norms" (p. 7). The naturalistic decision-making paradigm came from the view that the rationalist view of intuition is misguided, and task environment is important in decision-making (Cohen, 1993; Klein, 2015). In the naturalistic decision-making framework, intuition is used as a tool to make rapid decisions (Klein, 2015). Intuition is "an expression of experience as people build up patterns that enable them to rapidly size up situations and make rapid decisions without having to compare options" (Klein, 2015, p.164). However, naturalistic decision-making does not require full analysis and therefore can miss good solutions. Naturalistic decision-making can also lead to unintended consequences from not considering all alternatives (Rehak, Adams, & Belanger, 2010).

Heuristics Decision Making

Gigerenzer and Gassmaier (2011) define heuristics as "strategies that ignore information to make decision faster, more frugally, and/or more accurately than more complex methods" (p. 454). Heuristics acknowledge that there is no single process that will always result in good outcomes due to real-life limitations (Keller et al., 2010). "The effectiveness of the heuristic relies on its fit to the environment … thus defining its regions of good and bad performance" (Keller et al., 2010, p. 258). Heuristics and intuition can be used to make quick decisions that are as good as decisions made through rigorous analysis (Klein, 2015).

Gigerenzer and Gassmaier (2011) review the following four classes of heuristics.

- *Recognition-based decision-making* which relies on recognition memory and ignoring other cues. For example, during elections, forecast based on name recognition were almost as accurate as analysing voters based on their voting intentions. Another example is when people choose the first options that comes to mind.
- *One-reason decisions*, in which individuals make judgments based on one good reason and ignore other cues. For example, people make decisions on two alternatives by inferring which alternatives has a better criterion value.
- *Trade-off heuristics,* in which individuals compare all alternatives equally. For example, when examining a possible stroke patient, health practitioners at the emergency room will perform three tests. If at least one indicates a stroke, they will perform MRI examination to rule out the diagnosis. Another example is, when an individual tries to make an investment, they allocate all of the resources equally to all alternatives.
- *Social heuristics*, in which individuals rely on social information and cues. One of the examples of social heuristics is when people decide if it is a good idea to imitate the behaviour of their peer.

Factors Affecting Decision-Making

Decision making is influenced by various factors including age, gender, education, socioeconomic status, and cognitive biases like framing (De Martino et al., 2006, Morewedge et al., 2015; Loo, 2000; Delaney et al., 2015; Bruine de Bruin, Parker, & Fischhoff, 2020; Tuinstra et al., 2000). Cognitive bias is systemic deviations from optimal reasoning (Caverni, Fabre, & Gonzales, 1990). The ways information is presented influence people's decisions-making about it (Rehak, Adams, & Belanger, 2010). Framing bias reflects how individual's previous emotional experiences is incorporated into decision-making process. However, unconscious knowledge and social cues can also help in making optimal decisions (De Martino et al., 2006).

Both rationalist and naturalistic decision-making is susceptible to cognitive biases. For example, people have a tendency to see what they expect to see (confirmation bias), they tend to overestimate their chances if they know the outcome beforehand (hindsight bias) and are overconfident in their skills (overconfidence bias). They are also susceptible to anchor bias, that is making estimations and decisions based on the initial values or starting points and do not

adjust their estimations based on new information (Rehak, Adams, & Belanger, 2010). Cohen (1993) listed some biases that were found in rationalist analysis. For example, people can be overconfident in estimating probabilities and frequencies. They also disregard evidences that differs from their prior hypothesis and sometimes overestimates the probability of compound events (Cohen, 1993). Biases in judgements and decisions may result in predictable errors. However, people are generally unaware of the extent they are biased and how to debias their decision-making (Morewedge et al., 2015). Cognitive Bias Codex details more explanations on all cognitive bias in a comprehensive way (Manoogian III, 2016).

Aging affects decision-making styles. Age is negatively associated with the intuitive and dependent styles and positively associated with higher self-control (Delaney et al., 2015; Loo, 2000). With age, people are less inclined to make hasty decisions and are more inclined to use cognitive resources to avoid a bad final decision (Delaney et al., 2015). Older adults have more resistance to sunk costs; that is, they are more willing to walk away from poor decisions (Bruine de Bruin, Parker, & Fischhoff, 2020).

Research in gender differences and decision-making styles has produced conflicting results. Loo (2000) and Sari (2008) found no gender differences in any of the decision-making styles among university students. However, Delaney et al. (2015) found that men are more likely to have an affective style and engage in more impulsive behaviour than women. They also found that women are more likely than men to have a dependent decision-making profile. Women are more likely to ask for support (Delaney et al., 2015) and tend to be more vigilant when making decisions. They are more careful about details and act according their gender role. Tuinstra et al. (2000) found that adolescent males tend to have more self-confidence in making decisions and are less impulsive compared to adolescent females (Cenkseven-Önder, 2012).

Socioeconomic status and education level affect decision-making competence. More affluent individuals are more resistance to framing bias and sunk costs and also better at recognizing social norms. They not only have better confidence and risk perception but also are better at eliminating suboptimal options. Lower socioeconomic status and poor decision-making increase the possibility of having negative experiences in life (Bruine de Bruin et al., 2007). Education also influences decision-making, such that adolescents with higher education levels use more competent decision-making styles. Those with lower education levels (or who quit school) are more impulsive and tend to use avoidance and panic styles (Tuinstra et al., 2000).

Relationship to Resilience

For people with traumatic experiences, deciding to take their own action at the time of suffering gives them a stronger sense of self and more positive view of the world (Staubb & Vollhardt, 2008). The decision-making skill is a cognitive competency that helps people adapt to

changing circumstances and control their emotional experience (Taylor, 2008). Decision-making skills foster resilience by decreasing dependency, providing a sense of control, and imparting a feeling of social usefulness and connectedness (Oliver et al., 2006). Fostering awareness and decision-making capabilities can improve individuals' healthy development and reduce their risk of mental health problems and poor development, especially in young people (Brown, D'Emidio-Caston & Benard, 2001; Oliver et al., 2006). Participating in decision-making processes also reduces or prevents burnout at work (Demerouti et al., 2000).

In the pursuit to happiness, individuals use three cognitive strategies that are correlated to life satisfaction and positive affect: working to achieve a life of pleasure, a life of meaning, or a life of engagement (Bubić & Erceg, 2018). Bubić & Erceg (2018) found that individuals that focus on the present are more oriented toward pleasure and less toward meaning and engagement, and the ones that focus toward the future are more oriented toward meaning and engagement. Individuals that focus toward the future see current suffering or sacrifices as a mean to achieve long-term goals. Meaningful decision-making fosters a feeling of control and connectedness, which are factors in building resilience. It also supports youth development processes, such as identity formation, developing initiatives, emotion regulation, social skills and building meaningful relationships with others (Oliver et al., 2006).

Life satisfaction is related to individuals' proactive behaviour, self-esteem, and their willingness to seek social support (Deniz, 2006; Siebert, Kunz & Rolf, 2020). Individuals who proactively identify information, alternatives, and their decision-making objectives are more likely to achieve their goals. Achieving goals with one's own decisions engenders satisfaction and emotional wellbeing (Siebert, Kunz, & Rolf, 2020). Higher self-esteem improves individuals' belief in their own decision-making abilities, which results in better life satisfaction. Decision-makers who focus on meaningful interactions and their own future have better wellbeing and are happier (Bubić & Erceg, 2018). Avoidance style and procrastination are associated with negative mood and emotional stress (Deniz, 2006).

Optimizing decision-making can have a positive and negative effects on satisfaction and wellbeing. People who optimize/maximize their decision-making process experience life satisfaction from making more engagements (Bubić & Erceg, 2018). On the other hand, Individuals may experience negative emotions from choosing too many alternatives or from having limited alternatives (Moyano-Díaz, Martínez-Molina, & Ponce, 2014). Making complex decisions is a stressful activity itself and affects the decision-making experience. More complex decisions (where there are more alternatives) are perceived as more difficult. Fewer alternatives lead to a better decision process (Shiloh, Koren, & Zakay, 2001). Making difficult decisions sometimes results in regrets and other short-term negative emotional effects, such as anxiety and tension (Moyano-Díaz, Martínez-Molina, & Ponce, 2014). Having decision-making skills and traits is not enough; individuals have to apply those skills in a way that has meaningful impacts on them (Siebert, Kunz & Rolf, 2020, p.1183).

Anxiety and fear influence individuals' coping patterns, especially in a stressful environment (George, 1986). Individuals cope with the situation in different ways. Unconflicted adherence and unconflicted change are adaptive to save time in minor decision-making but often cause poor decision-making on important matters. Avoidance and hypervigilance styles can be beneficial. However, they reduce individuals' chance to avoid loses. Hypervigilant coping style is commonly used in stressful situations where individuals only have limited time to make difficult decisions in which all options have serious risks (Janis & Mann, 1976). Individuals who are sensitive to their inner sensations (more anxious), make poorer decisions. They are more hypervigilant and tend to use non-systematic scanning, be less likely to consider all alternatives, and keep reconsidering incorrect ones (Baradell & Klein, 1993).

The coping patterns above are determined by three conditions: "awareness of serious risks for whichever alternative is chosen (i.e. arousal of conflict), hope of finding a better alternative, and belief that there is adequate time to search and deliberate before a decision is required" (Janis & Mann, 1976 p.658; see Appendix A for an explanation of pre-decisional behaviour characteristics of the five basic patterns of decision-making).

Balneaves and Long (1999) argue that rather than one coping pattern process, decision-making in stressful situations is a complex transactional person-environment relationship. They listed three antecedents influencing the process. First, there is decisional conflict, which Janis and Mann (1976) describe as a situation where there are conflicts about which alternatives result in the most favorable outcome. The second antecedent is personal values, beliefs, and commitment. The third antecedent is environmental or situational factors, for example, battered women who make the decision to leave are aware that they have supports from their family members, friends, and social service organizations (Balneaves & Long, 1999; Haj-Yahia & Eldar-Avidan, 2001). To cope effectively with difficult decisions and achieve immediate effects (e.g. affect, physiological changes) and long-term effects (e.g. psychological wellbeing, health, social functioning), a balance must be achieved between the personal, situational and the relational aspect of a decision (Balneaves & Long, 1999).

Hajdarevic et al. (2013) examine different decision coping styles in patients with malignant melanoma. They found that perceived level of stress influences the decision-making style used by the patients. Patients with better self-esteem are more vigilant regarding their decision for the treatment. Patients with avoidance style tend to delay their treatment. People with social support, such as having a partner, are more aware about their disease and put more effort in making appropriate decisions. Hajdarevic et al. (2013) also found that men scored higher in buck-passing while women were more hypervigilant and better in self-detecting the disease.

Self-esteem and self-evaluations are predictors of life satisfaction. Adolescents who have higher self-esteem and are aware that they make effective decisions are happier and more satisfied with their decisions and life (Taylor, 2008; Cenkseven-Önder, 2012). Adolescents who have higher self-esteem are more vigilant in making their decisions, and therefore evaluate

information and options before making decisions. Then, they self-evaluate their decisions and their satisfaction regarding that decisions. These individuals are also more resilient when they cope with stressful events and have lower stress levels (Cenkseven-Önder, 2012). Competent decision-making skill empowers vulnerable or at-risk youth to make better life decisions. By focusing on their future and assessing the consequences of their current decisions, they avoid risky behaviours and work toward engagement and achieving their goals (Taylor, 2008). Adolescents with maladaptive decision-making styles, such as panic, avoidance and complacency have less life satisfaction. Their inability to make their own decisions based on their need takes away their independence, which is one of the factors that improves life satisfaction in adolescents (Cenkseven-Önder, 2012).

For women in violent relationships, intrapersonal factors play a significant role in their decision to leave the relationship. Haj-Yahia & Eldar-Avidan (2001) found that previous attempts to leave, or even contemplating the idea, helped women to prepare, emotionally and cognitively, for the final separation. These women felt insecure and doubtful about their decision but tried to cope; some did so by using therapeutic agents, others were empowered by their decisions to act and leave the relationship. Making the decision to leave gave them hope, confidence, freedom, and solutions to their problems (Haj-Yahia & Eldar-Avidan, 2001).

During disasters, people's decision to act is determined by how people interpret hazard events and related information based on their experiences, beliefs, and expectations. Their decision-making analysis and hazards interpretation are based on everyday interactions with families, friends, other community members and civic agencies (Paton et al., 2010). Paton et al (2010) found that cultural beliefs influence people's attitude toward hazard and preparation choices, for example, people who believe that natural hazard cannot be prevented are less likely to prepare. People will consider disasters consequences and strategies to mitigate them based on information and resources they have. In complex and uncertain circumstances where people do not have all information they need, they rely on other people who share the same interests and values. They identify and measure the availability of cooperation and assistance in the community and examine the community capability and resources to deal with challenging situations (Paton et al, 2010). When people cannot find the information they need from their community, they will rely on civic agencies and expert sources. Trust plays an important role when people rely on others to provide information they do not have. People's decisions are not based on information about hazard risk but based on social trust. People tend to rely on civic agents or experts whom they have a fair and empowering relationship. However, when they do not have any confidence in the agency, people are less likely to use the information provided by the agency (Paton et al, 2010).

For people who work in disaster management role, making decisions during disasters where there is time constraint and they do not have complete information, can be stressful. They may have limited or no experience at all with the situation. The effect of acute stress to individuals in disasters can be a mixture of positive (alertness, thinking and acting faster, more

energy) and negative effect (tunnel vision, failure to prioritize, freezing). The negative effect is similar to psychological symptoms of anxiety and fear and appears when the level of pressure increases. Planning and establishing operational system to support the high stress components and exercises and trainings for emergency situations work to reduce the risk of acute stress (Paton & Flin, 1999).

Paton and Flin (1999) describe three decision-making skills used to reach a decision in disasters. *Intuitive* or recognition-primed decision-making is less demanding and is less affected by stress. This style is really adaptive to stressors and is usually used by trained and more experienced individuals. The second style requires more time to remember appropriate responses and procedures in the situation. The third style is analytical decision-making, where individuals consider possible alternatives and choose the best option. This style is commonly used during emergency planning phase (Paton & Flin, 1999).

Police officers use rational decision-making style as their primary style and rarely utilise avoidant style (Grubb, Brown & Hall, 2018). Avoidant and dependent styles are related to self-doubt. Individuals with these styles make worse decisions when they are time pressured and have worse wellbeing at work. People with these two styles also report higher perceived stress, poorer sleep, and worse life satisfaction (Salo & Allwood, 2011). However, hostage and crisis negotiators do not have specific styles. They adopt decision-making styles in situ, based on situational variables involved. To some extent, avoidant style is useful in negotiations, such as for buying time (Grubb, Brown, & Hall, 2018).

Xing & Sun (2013) found that Individuals who have better resources have more positive affects and thrive in challenges. They are more inclined to take risks and explore new possibilities which lead to more desirable outcomes in positive situations. Resilient individuals are better in dealing with temporary loss, which might help them achieve their long run goals (Xing & Sun, 2013).

Improving

Core cognitive training and simplifying decision rules can improve decision-making competence and minimize errors. Interventions that improve emotion regulation and frame information in more positive terms also improve individuals' decision-making competence. Another way to improve decision-making is by learning and practicing the application of decision-making principles (Bruine de Bruin, Parker & Fischhoff, 2020).

In a continuously changing environment, dynamic decision-making is needed (Gonzales, 2004). Outcome feedback, cognitive feedback (CFB) and feedforward improve decision-making in dynamic situations. Blazer, Doherty, and O'Coner (1989) write that:

> CFB refers to information about relations rather than outcomes. Specifically, CFB includes relations in the environment, relations perceived by the person, and relations between the environment and the person's perceptions. (p. 410)

Cognitive feedback is done, for example, by providing individuals with an explanation on how to do their task (Gonzales, 2004)**,** while outcome feedback is done by providing individuals with detailed results of their work (Balzer, Doherty & O'Connor, 1989). Feedforward is done by examining the outcomes of possible future decisions, for example, by learning about decisions made by an expert (Gonzales, 2004).

Gonzales (2004) found that outcome feedback and cognitive feedback alone are not effective in improving individual performance. However, feedforward support improves continuous individual performance, even after the support is discontinued. By learning from expert behaviour, individuals can understand the process better and therefore generate better decision-making and problem-solving strategies (Gonzales, 2004).

To help individuals make vigilant decisions, a counselor can help individuals improving their gross estimate of how much time is available to search and deliberate for making decisions. "Advisers may be able to counteract unconflicted adherence, unconflicted change, and hypervigilance by raising questions, presenting corrective information about the risks and costs involved, and giving realistic reassurances about deadlines (Janis & Mann, 1976, p. 662)."

In order to eschew avoidance (whether via substance use or other self-defeating behaviours) as a primary coping strategy, the individual must have skills that enable her to modulate intense (e.g., hyperarousal, intrusive re-experiencing; cravings for substances) and diminished (e.g., emotional numbing; disregard for personal safety and well-being) states of bodily and emotional activation. Planful decision making and effective emotion regulation require the ability to access long-term memory to draw upon past learning and short-term memory to formulate and follow-through with timely and organized immediate choices (Ford & Russo, 2006, p.338).

Interventions

Reducing defensiveness and fostering vigilance

Janis & Mann (1976) list some procedures that may reduce defensiveness and some that were developed to foster vigilance. The procedures below show that preparatory information concerning risks and benefits of all alternatives give individuals reassurance, help them develop contingency plans, and help them to be more vigilant and better at tolerating stress (Janis and Mann, 1976).

Awareness-of-Rationalizations Technique

The procedure starts with introduction to the awareness-of-rationalizations procedure. It emphasizes the importance of honest exploration and acknowledgment of deep-down thoughts and feelings about a goal. The participants then are given a list of eight statements frequently used as excuses and are asked if they use them to rationalize their actions. A lecture refutes the eight rationalizations, followed by two dramatic film about the topic are recorded for the participants. This procedure helps the participants to acknowledge and explore their tendencies for rationalizations.

Emotional-Role Playing

Janis and Mann (1976) explain that by doing emotional role-play of what the participants' future might be after their bad decisions (e.g. heavy smokers play the role of lung-cancer patient), the participants are able to acknowledge their personal vulnerability and therefore make better decisions for themselves. The procedure is effective to induce long-term changes in attitude.

Balance-Sheet Procedure

"The balance-sheet procedure is a pre-decisional exercise that requires a decision-maker to confront and answer questions about potential risks and gains he had not previously contemplated" (Janis and Mann, 1976; p.663). Janis and Mann (1976) explain that the procedure is done by asking the participants a series of questions that help them describe pros and cons of all alternatives. This procedure improves individuals' awareness of major gaps and unfavorable consequences of their choice. Administering the procedure three months before a decision is proven effective in securing individuals' choice and reducing post-decisional regret.

Coping Devices

The coping device procedure is an intervention aims to establish vigilance by giving hope of finding good solutions to the decision-makers (Janis and Mann, 1976). The device is inserted in counselling sessions and is done by encouraging individuals to re-appraise their views of setbacks and losses they might encounter. The individuals are given some examples of realistic positive consequences of their decisions and then are asked to think up additional examples. At the end, they are encouraged to repeat these positive thoughts anytime they feel upset or anxious about their decisions. The procedure helps in reducing stress (Janis and Mann, 1976).

Debiasing Training

Fischhoff (1981) examines debiasing using training programs and designing experimental situations in which bias will not appear. He found no effective improvement after debiasing procedures (Fischhoff, 1981). Another example of debiasing strategies are incentives and optimizing choices. Incentives may backfire when implemented. When the incentives are decreased or stopped, people's motivations will also decrease. Increasing incentives also shifts people's motives and push them to make inappropriate decisions. Optimizing choices is done

by giving people more information to make better decisions. However, information can be too complex to comprehend, hindering decisions. Optimizing choices also does not address the underlying causes of biased decisions (Morewedge et al., 2015).

Morewedge et al. (2015) analysed debiasing training interventions to improve decision-making. They compared two different kinds of training.

- *Video:* Participants watched *Unbiasing Your Biases*, a 30-minute training video on bias blind spot, confirmation bias and fundamental attribution error. Another video, *Unbiasing your Biases 2,* explained about anchoring, projection, and representativeness. A narrator first explained about heuristics and how it can sometimes lead to incorrect inferences. The narrator then explained about each of the biases, gave some examples and suggested strategies to mitigate the biases. The videos ended with a two-minute comprehensive review (Morwedge et al., 2015).
- *Game:* participants played *Missing: The Pursuit of Terry Hughes*, a game designed to elicit and mitigate bias blind spot, confirmation bias, and fundamental attribution error. Another game, *Missing: The Final Secret*, elicited anchoring, projection, and representativeness. In these first-person point-of-view games, the player makes judgements. At the end of each level, an expert explains each bias in the game and gives examples. The participants were given personalized feedback at the end of each level and at the end of the game (Morewedge et al., 2015).

The result shows that a single training intervention (e.g. videos or games) have a significant persisting effect in reducing biases. Participants who played the game show greater decrease in cognitive biases compared to the participants who watched videos. In conclusion, personal feedback and training improve people's biases (Morewedge et al., 2015).

Youth Empowerment Programs

Multiple youth empowerment programs were designed to improve young adults' self-efficacy and self-esteem. For example, Youth Action Research for Prevention (YARP) aims to reduce or delay onset of risky behaviours in youths by giving them the opportunity to engage in community activities. Engaging in activities where their opinions are heard, where they make meaningful decisions, and accomplish meaningful activities gives young people a sense of control and builds their self- and collective-efficacy (Oliver et al., 2006; Berg, Coman & Schensul, 2009). Social and cognitive competencies acquired from the program work as individual protective factors in resiliency, while the social connections the participants made work as environmental factors in building resiliency (Oliver et al., 2006). Two examples of youth empowerment programs are *Reach Out!* and *DECIDE.*

Reach Out! Program

Oliver et al. (2006) analysed the *Reach Out!* program, an online service in Australia that connects youths and provides them with information, resources, and stories on managing mental health problems. The program provides a chance for youths to be involved in

meaningful participation and gives them an opportunity to make decisions that affect them. The program focuses on recognising capacity and building skills for young people. The target of this program is young people between 16 and 25-years-old.

There are two tiers in this program (Oliver et al., 2006):

- *Youth Advisory Board*: 18 young people between 16 and 21-years-old from rural, regional and metropolitan areas gather three times per year to share and develop ideas for program development and delivery, marketing, promotion, workshops and training.
- *Youth Ambassador Program:* at the end of their three-month term on the Youth Advisory Board, members are invited to volunteer in the Youth Ambassador Program. Young people can decide their own level of contribution in all program development and delivery, including research and evaluation.

DECIDE Framework

Taylor (2018) performed a pilot community-based intervention of the DECIDE framework, a normative model on how decisions should be made. It reinforces decision-making skills and trains the participants to be more proficient in making decisions. The program was aimed toward vulnerable youth and young adults between 11-18 years old. A series of workshops were designed to serve groups of up to 12 students and be led by three adult leaders. The core principle of the program was empowering young people with information, alternatives, and values and vision of themselves in the future, thus helping them to make better life decisions. Participants were encouraged to use visions of their future selves to inform their present-day decision-making.

The session is divided into three stages:

1. Introduction: The advisors and participants introduced themselves. Then, the lead advisor introduced the program, the roles of the advisors, Code of Conduct and expectations in the program. The participants were asked to fill out a pre-program survey.
2. Applying the DECIDE framework to make decisions and set goals for remaining sessions (See Appendix B for the full framework).
3. Confirm and review participants' goals for regular peer meetings, complete a post-program survey and give participants a certificate of completion.

The program provided inspiring experiences (e.g. community services, extra-curricular activities), resources (e.g., time management training, tutoring), and peer-to-peer mentoring groups after the workshop ends. This program helped participants to make value-focused decisions and produced positive relationships with their advisors and support group (Taylor, 2008).

Assessment

The following measurements can be used in determining individual decision-making style and competence.

General Decision-Making Style Measurement (Scott & Bruce, 1995; Appendix C)

- Reflecting individuals' cognitive style.
- 5-point scale from strongly disagree to strongly agree.
- 25 items covering five sub-styles; i.e. rational, intuitive, avoidant, dependent and spontaneous.

Adult Decision-Making Competence (A-DMC) Scale (Bruine de Bruin, Parker & Fischhoff, 2007; Appendix D)

- Consists of seven components; i.e. *Resistance to Framing*; *Recognizing Social Norms*; *Under/Overconfidence*; *Applying Decision Rules*; *Consistency in Risk Perception*; *Resistance to Sunk Costs* (the ability to ignore prior experience when making a decision); and path independence (measure a normative equivalent preference when making choices between two items).

Decision Outcome Inventory (Bruine de Bruin, Parker & Fischhoff, 2007; Appendix E)

- A self-report measure of success in avoiding having negative decisions outcomes.
- 41 items of negative decisions outcome.
- "The overall DOI score is calculated by weighting each negative outcome that a respondent could have experienced by the proportion of participants who have not experienced it (as a proxy for outcome severity). The average score across items is then subtracted from zero so that higher scores reflect better outcomes" (p. 947).

The Regret and Maximation Scales (Schwartz et al., 2002; Appendix F)

- A scale to assess the tendency to satisfice or maximize and the tendency to experience regret.
- 18 items of self-reported scale, with 13 items assessing maximization in decision-making and 5 items assessing regrets.
- Analysis is done using principal-component analysis.

Child and Adolescent Decision-Making Questionnaire (O'hare, Winter & McGuinnes, 2016; Appendix G)

- 10 items to measure child and adolescent participation in decision-making.
- The items are ranged from strongly agree=1 to strongly disagree=6, with lower score denoted a higher level of decision-making participation.

Revised Adolescent Decision-Making Questionnaire (Tuinstra et al., 2000; Appendix H)

- A revised version of Adolescent Decision-Making Questionnaire (Friedman & Mann, 1993). Revised-ADMQ has 22 items instead of 30.
- The questionnaire consists of five subscales: self-confidence, vigilance, panic/hypervigilance, evasiveness (cop-out) and complacency (Friedman & Mann, 1993):

- Each item is scaled as: “not at all true for me” (scored 1); “sometimes true” (scored 2); “often true” (scored 3); and “almost always true” (scored 4).
- Data were analysed using Pearson correlations and MANOVA.

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Appendix A: Pre-decisional behaviour characteristics of the five basic patterns of decision-making

Janis & Mann (1976)

Table 1. predecisional behaviour characteristics of the five basic patterns of decision-making (from Janis and Mann, 1976)

Pattern of coping with challenge	*Thorough canvassing of alternatives*	*Thorough canvassing of objectives*	*Careful evaluations of consequences of*		*Thorough search for information*	*Unbiased assimilation of new information*	*Careful re-evaluation of consequences*	*Thorough planning for implementation and contingencies*
			(1) current policy	*(2) new policies*				
Unconflicted adherence	-	-	-	-	-	+	-	-
Unconflicted change	-	-	+	-	-	+	-	-
Defensive avoidance	-	-	-	-	-	-	-	-
Hypervigilance	-	-	±	±	±	±	-	-
Vigilance	+	+	+	+	+	+	+	+

Note: + = the decision-maker meets the criterion to the best of his ability

- = the decision-maker fails to meet the criterion

± = the decision-makers performance fluctuates, sometimes meeting the criterion to the best of his ability and sometimes not

All evaluative terms such as *thorough* and *unbiased* are to be understood as intrapersonal comparative assessments, relative to the person's performances under the most favourable conditions that enable him to display his cognitive capabilities to the best of his ability.

Appendix B: DECIDE Framework

Table 2. DECIDE decision framework (Taylor, 2018)

D= Determine what the decision is	**Clarify what you can and cannot control, When the decision needs to be made and Who should be involved. Your decision statement should sound like: "I need to decide___ by ___ and talk to ___".**
E= Express your values	What do you value long-term? What do you want to happen as a result of this decision? What do you not want to happen? How does this decision help you get what you value long-term?
C= Create a set of alternatives	Think creatively to see a good set of very different alternatives.
I= Identify missing information a.k.a. what "I" need to know	This is the information that you do know and that may influence your decision. It includes facts about the past and likely guesses about the present and future. Identify people and sources to check with to find out what you do not know.
D= Decide the "most valuable alternative"	This is the alternative that gets you mostly what you value given the information you have. You should be able to complete the statement: "I am choosing this alternative because I want __ and because I don't want __"
E= Execute the most valuable alternative and envision success	Set aside time and money to carry out the MVA and to prepare to overcome future obstacles.

Appendix C: General Decision-Making Style Measurement

Scott & Bruce (1995)

Items	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I double-check my information sources to be sure I have the right facts before making decisions.					
I make decisions in a logical and systematic way.					
My decision making requires careful thought.					
When making a decision, I consider various options in terms of a specific goal.					
I explore all of my options before making a decision					
When making decisions, I rely upon my instincts.					
When I make decisions, I tend to rely on my intuition.					
I generally make decisions that feel right to me.					
When I make a decision, it is more important for me to feel the decision is right than to have a rational reason for it.					
When I make a decision, I trust my inner feelings and reactions.					
I often need the assistance of other people when making important decisions.					
I rarely make important decisions without consulting other people.					
If I have the support of others, it is easier for me to make important decisions.					
I use the advice of other people in making my important decisions.					
I like to have someone to steer me in the right direction when I am faced with important decisions.					

I avoid making important decisions until the pressure is on.					
I postpone decision making whenever possible.					
I often procrastinate when it comes to making important decisions.					
I generally make important decisions at the last minute.					
I put off making many decisions because thinking about them makes me uneasy.					
I generally make snap decisions.					
I often make decisions on the spur of the moment.					
I make quick decisions.					
I often make impulsive decisions.					
When making decisions, I do what seems natural at the moment.					

Appendix D: Sample Adult Decision-Making Competence Scale Items

Table 3. A-DMC Component Measurement (Bruine de Bruin, Parker, & Fischhoff, B. 2007)

A-DMC Component	Score	Response Scale
Resistance to Framing	Absolute difference between ratings of related frames	1-6 rating
Recognizing Social Norms	Rank correlation between judged proportion and actual proportion	(a) 0-100% (b) Yes/no
Under/overconfidence	1—absolute difference between mean confidence and percentage correct	(a) true/false (b) 50% - 100%
Applying Decision Rules	Percentage of correct answers	Multiple choice
Consistency in Risk Perception	Percentage of consistent risk judgements	0%-100%
Resistance to Sunk Costs	Average rating across items	1-6 rating
Path Independence	Percentage of consistent choice pairs	Multiple choice

A. Resistance to Framing

Part I

Imagine that recent evidence has shown that a pesticide is threatening the lives of 1,200 endangered animals. Two response options have been suggested:

> If Option A is used, 600 animals will be saved for sure.
>
> If Option B is used, there is a 75% chance that 800 animals will be saved and a 25% chance that no animals will be saved.

Which option do you recommend to use?

1	2	3	4	5	6
Definitely would choose A					Definitely would choose choose B

Part II

Imagine that recent evidence has shown that a pesticide is threatening the lives of 1,200 endangered animals. Two response options have been suggested:

> If Option A is used, 600 animals will be lost for sure.
>
> If Option B is used, there is a 75% chance that 400 animals will be lost and a 25% chance that 1,200 animals will be lost.

Which option do you recommend to use?

1	2	3	4	5	6
Definitely would choose A					Definitely would choose choose B

B. Recognizing Social Norms

Part I

Do you think it is sometimes OK to steal under certain circumstances?

Yes No

Part II

Out of 100 people your age, how many would say it is sometimes OK to steal under certain circumstances?

0	10	20	30	40	50	60	70	80	90	100
No one										Everyone

C. Under/Overconfidence

Alcohol causes dehydration.

This statement is [True/False].

50%	60%	70%	80%	90%
Just guessing				absolutely sure

D. Applying Decision Rules

LaToya only wants a DVD player that got a “Very High” rating on Reliability of Brand.

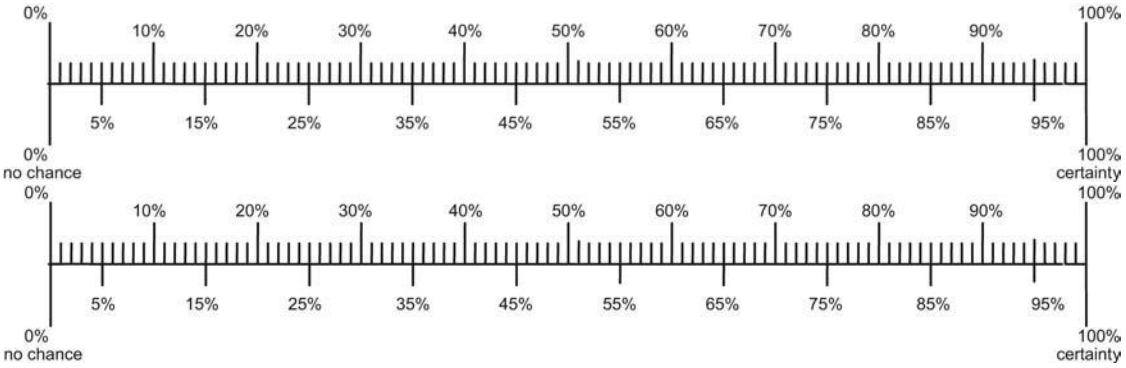
Which **one** of the presented DVD players would LaToya prefer?

		Features				
		Picture Quality	Sound Quality	Programming Options	Reliability of Brand	Price
DVD	A	3	5	5	1	$369
	B	1	2	1	2	$369
	C	5	5	4	4	$369
	D	5	3	4	2	$369
	E	4	5	2	2	$369

E. Consistency in Risk Perception

What is the probability that you will get into a car accident while driving during the next year?

What is the probability that your driving will be accident-free during the next year?



F. Resistance to Sunk Cost

After a large meal at a restaurant, you order a big dessert with chocolate and ice cream. After a few bites, you find you are full and you would rather not eat any more of it. Would you be more likely to eat more or to stop eating it?

1 2 3 4 5 6

Most likely to eat more Most likely to stop

G. Path Independence

Which do you like best, (1), (2), or (3)?

(1) *Flip a coin,* if Heads, win **$100**
(2) *Sure win,* win $50 for sure

(3) *Does not matter to me*, if Tails win $0

If you had already flipped once and it came up heads, which do you like best, (1), (2), or (3)?

(1) *Flip a coin,* if Heads, win **$100**
(2) *Sure win,* win $50 for sure
(3) *Does not matter to me*, if Tails win $0

Appendix E: Decision Outcomes Inventory

Bruine de Bruin, Parker & Fischhoff (2007)

In the last 10 years, have you ever….

1. a. Rented a movie
   b. Returned a movie you rented without having watched it at all
2. a. Bought new clothes or shoes
   b. Bought new clothes or shoes you never wore
3. a. Gone shopping for food or groceries
   b. Threw out food or groceries you had bought because they went bad
4. a. Done your own laundry
   b. Ruined your clothes because you didn't follow the laundry instructions on the label
5. a. Been enrolled in any kind of school
   b. Been suspended from school for at least one day for any reason
6. a. Had any kind of job
   b. Quit a job after a week
7. a. Had a driver's license
   b. Had your driver's license taken away from you by the police
8. a. Driven a car
   b. Been accused of causing a car accident while driving
   c. Gotten more than 5 parking tickets
   d. Gotten more than 5 speeding tickets
   e. Gotten lost or gone the wrong way for more than 10 minutes while driving
   f. Locked your keys in the car
9. a. Bought any kind of car
   b. Had to spend at least $500 to fix a car you had owned for less than half a year
10. a. Taken a trip by airplane
    b. Missed a flight
11. a. Taken the train or the bus
    b. Taken the wrong train or bus
12. a. Had any form of ID (driver's license, passport, birth certificate)
    b. Had your ID replaced because you lost it
13. a. Lived in a rented apartment or other rental property
    b. Been kicked out of an apartment or rental property before the lease ran out
14. a. Carried a key to your home
    b. Had the key to your home replaced because you lost it
    c. Locked yourself out of your home
15. a. Been responsible for electricity, cable, gas or water payments
    b. Had your electricity, cable, gas or water shut off because you didn't pay on time
16. a. Been responsible for a mortgage or loan
    b. Foreclosed a mortgage or loan

17. a. Been responsible for rent or mortgage payments
    b. Paid a rent or mortgage payment at least 2 weeks too late
18. a. Used checks
    b. Had a check bounce
19. a. Had a credit card
    b. Had more than $5,000 in credit card debt
20. a. Invested in the stock market
    b. Lost more than $1,000 on a stock market investment
21. a. Been to a bar, restaurant, or hotel
    b. Been kicked out of a bar, restaurant, or hotel by someone who works there
22. a. Loaned more than $50 to someone
    b. Loaned more than $50 to someone and never got it back
23. a. Had a romantic relationship that lasted for at least 1 year
    b. Cheated on your romantic partner of 1 year by having sex with someone else
24. a. Been married
    b. Been divorced
25. a. Had sex
    b. Been diagnosed with an STD
    c. Had an unplanned pregnancy (or got someone pregnant, unplanned)
26. a. Had sex with a condom
    b. Had a condom break, tear, or slip off
27. a. Had an alcoholic drink
    b. Consumed so much alcohol you vomited c. Received a DUI for drunk driving
28. a. Been out in the sun
    b. Got blisters from sunburn
29. Been in a jail cell overnight for any reason
30. Been in a public fight or screaming argument
31. Declared bankruptcy
32. Forgotten a birthday of someone close to you and did not realize until the next day or later.
33. Been diagnosed with Type 2 diabetes
34. Broke a bone because you fell, slipped, or misstepped

Appendix F: Regret and Maximization Scales

Schwartz et al. (2002)

Regret scales

1. Whenever I make a choice, I'm curious about what would have happened if I had chosen differently.
2. Whenever I make a choice, I try to get information about how the other alternatives turned out.
3. If I make a choice and it turns out well, I still feel like something of a failure if I find out that another choice would have turned out better.
4. When I think about how I'm doing in life, I often assess opportunities I have passed up.
5. Once I make a decision, I don't look back. (R)

Maximization Scale

1. When I watch TV, I channel surf, often scanning through the available options even while attempting to watch one program.
2. When I am in the car listening to the radio, I often check other stations to see if something better is playing, even if I'm relatively satisfied with what I'm listening to.
3. I treat relationships like clothing: I expect to try a lot on before I get the perfect fit.
4. No matter how satisfied I am with my job, it's only right for me to be on the lookout for better opportunities.
5. I often fantasize about living in ways that are quite different from my actual life.
6. I'm a big fan of lists that attempt to rank things (the best movies, the best singers, the best athletes, the best novels, etc.).
7. I often find it difficult to shop for a gift for a friend.
8. When shopping, I have a hard time finding clothing that I really love.
9. Renting videos is really difficult. I'm always struggling to pick the best one.
10. I find that writing is very difficult, even if it's just writing a letter to a friend, because it's so hard to word things just right. I often do several drafts of even simple things.
11. No matter what I do, I have the highest standards for myself.
12. I never settle for second best.
13. Whenever I'm faced with a choice, I try to imagine what all the other possibilities are, even ones that aren't present at the moment.

Note: Item marked by "R" was reverse scored in the analysis.

Appendix G: Child and Adolescent Decision-Making Questionnaire

O'hare, Winter & McGuinnes (2016)

The items were presented as Likert Scale items (strongly agree=1 and strongly disagree=6).

1. Information to make a decision is presented in a way I understand
2. I am given the full information to make a decision
3. I feel involved in making decisions in my life
4. I am given the opportunity to weigh up the pros and cons to make a decision
5. I have the ability to weigh up the pros and cons to make a decision
6. I can gather the right information to make a decision
7. Others ask my opinions when making decisions
8. Young people should be involved in the decision-making process
9. When I make a decision this is followed through by action that I want
10. I make decisions on big things

Appendix H: Adolescent Decision-Making Questionnaire

Adolescent Decision-Making Questionnaire (Friedman & Mann, 1993) and Revised Adolescent Decision-Making Questionnaire (Tuinstra et al., 2000)

Self-confidence

SELFC1 I feel confident about my ability to make decisions.
SELFC2 I am not as good as most people in making decisions.
SELFC3 It is easy for other people to convince me that their decision is the correct one.
SELFC4 I feel so discouraged that I give up trying to make decisions.
SELFC5 The decisions I make turn out well.
SELFC6 I think that I am a good decision maker.

Vigilance

VIGIL1 I take a lot of care before make my choice.
VIGIL2 Once I have made a decision then I don't change my mind.
VIGIL3 I like to think about a decision before I make it.
VIGIL4 When I make a decision, I feel that I made the best one possible.
VIGIL5 I like to make decisions myself.
VIGIL6 When I decide to do something, I get right on with it.

Panic

PANIC1 I panic if I have to make decisions quickly.
PANIC2 I feel as if I'm under tremendous time pressure when making decisions.
PANIC3 I can't think straight if I have to make a decision in a hurry.
PANIC4 The possibility that some small thing might go wrong causes me to immediately change my mind about what I'm going to do.

Evasiveness

EVASIV1 I avoid making decisions.
EVASIV2a I put off making decisions.
EVASIV3 I'd rather let someone else make a decision for me so that it won't be my problem.
EVASIV4 I prefer to leave decisions to others.
EVASIV5[a] When I have to make a decision, I wait a long time before starting to think about it.
EVASIV6 I don't like to take responsibility for making decisions.

Complacency

COMPLA1 When faced with a decision, I go along with what others suggest.
COMPLA2 Whenever I get upset by having to make a decision, I choose on the spur of the moment.
COMPLA3 I put a little effort into making decisions.
COMPLA4 When I'm forced to make a decision, I couldn't care which way I choose.
COMPLA5[a] I choose on the basis of some small detail.
COMPLA6 I tend to drift into decisions without thinking about them.
COMPLA7 When making decisions I tend to choose the first alternative that comes to mind.
COMPLA8 I prefer to do what others choose because I don't like to be different.

Note: [a] Item omitted in revised version ADMQ

R2

For more information about R2 or to discover how you can bring the program to your organization, business or educational setting, please contact us.

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