

Explore your Decision Making Style with emphasis on Cognitive Neuroscience

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Abstract— Decision making is a locale of intense study in the fields of cognitive neuroscience. Several brain structures like anterior cingulate cortex, orbitofrontal cortex and overlapping ventromedial prefrontal cortex are involved in decision-making process also regarded as cognitive process which based on explicit or tacit knowledge that used to fill the gaps in complex decision-making processes and beliefs. Adolescents have difficulties adequately adjusting beliefs in response from adults in their ability to alter beliefs in response. This creates biased beliefs that affect decision-making process. Adults are commonly better ready to control hazard taking in light of the fact that their psychological control framework has sufficiently developed to control the socioemotional challenge. According to psychologist Daniel Kahneman and Richard West, decision-making is the consequence of an interplay between two forms of cognitive processes: an automatic intuitive system (AIS) and an effortful rational system (ERS) AIS is a latent and bottom-up decision-making mechanism, ERS is a top-down and explicit decision-making method.

The finding of this study is that Rational decision-making style has the highest average value (19.98) with standard deviation value (2.85). Whereas, Intuitive Decision Making Style has average value (19.24) with standard deviation value (2.24), it has treated as the most consistent under this circumstances. General Decision Making Style (Scott & Bruce, 1995) questionnaire was used to collect data (N=50). The study revealed that dominant and consistent Decision Making Style in Adult phase is rational and intuitive respectively.

Index Terms— Decision Making Style, Rational, Intuitive, Cognitive Neuroscience

1 INTRODUCTION

Decision-making is the process of recognition and selection of alternatives based on an individual's interests, desires and beliefs. In psychology, decision-making is regarded as the process leading to the choice of a belief or a course of action among several alternative possibilities. Every decision-making process produces a final choice, which can or might not prompt action.

Decision-making is considered a process which may be more or less rational or irrational and may be supported explicit or tacit knowledge and beliefs. Tacit knowledge is usually wont to fill the gaps in complex deciding processes.

Decision-making is a field where cognitive neuroscience is studied extensively. Different brain parts, including the anterior cingulate cortex (ACC), orbitofrontal cortex and the overlapping ventromedial prefrontal cortex are involved in decision-making processes. Patients with damage to the ventromedial prefrontal cortex have difficulty making advantageous decisions.

A major part of decision-making involves a set of alternatives described in terms of difficulty level. Decision maker's environ-

ment play an important role for making decisions. Any kind of distractor can cause some difficulty to take decision. According to (Driver & Harren, 1979) Decision making styles are theorized to be stable, trait like patterns of approach to situation that call for a decision.

Characteristics of decision-making

- Objectives must first be established
- Objectives must be classified and placed in order of importance
- Alternative actions must be developed
- The alternatives must be evaluated against all the objectives
- The alternative that is able to achieve all the objectives is the tentative decision
- The tentative decision is evaluated for more possible consequences

- The decisive actions are taken, and additional actions are taken to prevent any adverse consequences from becoming problems and starting both systems (problem analysis and decision-making) all over again
- In a situation featuring conflict, role-playing may be helpful for predicting decisions to be made by involved parties.

Decision-making often occurs in the face of uncertainty about whether one's choices will lead to benefit or harm. The somatic marker hypothesis is a neurobiological theory of how decisions are made in the face of uncertain outcome. This theory holds that such decisions are aided by emotions, in the form of bodily states, that are elicited during the deliberation of future consequences and that mark different options for behavior as being advantageous or disadvantageous. This process involves an interplay between neural systems that elicit emotional/bodily states and neural systems that map these emotional/bodily states.

A traditional dichotomous view of hot emotion versus cold cognition has been refuted by research in neuroscience, psychology, and economics over the last decades. Emotion does not equate with irrationality, but is an altogether component of the decision-making process. Not surprisingly, the wide range of various emotions explains why is unrealistic to project all emotions into a one-dimensional category of pleasure versus pain. Loewenstein and Lerner construe emotions according to their place along the time course of the decision process, including deliberation about a choice and the posterior reaction to the outcome. They distinguish between *anticipated* and *immediate* emotions, with *immediate* emotions further classified into *incidental* and *integrated* emotions.

Anticipated emotions are those believed to occur following a given decision outcome. This is also known as effective forecasting and typical examples are regret or disappointment.

On the other hand, *immediate* emotions are those experienced while the individual is pondering a choice. Immediate emotions are either *incidental* emotions caused by factors, which are not

related to the decision problem at hand, or *integral* emotions, which are caused by the decision problem itself.

Pfister and Bohm has classified emotion according to its function emphasizing emotion's role in decision-making processes. They consider four categories: *information*, *speed*, *relevance*, and *commitment*.

The *information function* provides evaluative information which weighs in preference construction. Emotions such as joy or distress inform about the degree of (un)pleasantness of choices and consequences. They allow one to map a diversity of experiences on a one-dimensional scale of pleasure and pain.

The *speed function* enables rapid choice and action under time pressure. Affect programs for negative emotions such as fear and disgust trigger immediate avoidance responses. These mechanisms are highly stimulus-specific and presumably have evolved under evolutionary selection pressure.

The *relevance function* focuses attention on particular aspects of potential relevance for the decision-maker. Emotions such as regret or envy constitute a particular appraisal, which implies particular evaluations as well as particular action tendencies.

The *commitment function* enables social coordination by committing people to stick to decisions, even against their short-term self-interest. Guilt, altruism, love, or hate guide decision making in strategic choice situations. Overall, emotions do not have a uniform influence on decision making, but seem to be rather dependent on the context and in the individual circumstances. An example of the pervasive effect of emotion in mental illness is given by the abnormalities in reward processing found in anhedonia and depression.

Unconscious Decision Making

Unconscious knowledge refers to that revealed by task performance alone, subjects being unaware that they are accessing it, whereas we speak of conscious knowledge when subjects are aware of possessing and accessing it. It ranges from basic perceptual processing to spontaneous problem solving. Even though attention to the unconscious had already been studied before

Freud, his work had considerable impact on the 20th century's research on unconscious knowledge. Unconscious or subliminal processing has been described in visual, auditory, somatosensory, and olfactory information. Experimental methods used to tap unconscious processes, include studying subjects who are unaware of the stimuli, because they are too weak, brief, complex, or are masked (i.e., subliminal perception). Other approaches examine states of complete unconsciousness (i.e., sleep, coma, and anesthesia), inability to be conscious of certain kinds of stimuli (i.e., blindsight, hemineglect, and prosopagnosia), or when attention has been diverted to another demanding task.

Examples of cognitive processes found to run at the unconscious level include task-set preparation, conflict detection/resolution, motivation, and error detection. Several "high-level" (prefrontal) cognitive functions, such as response inhibition and task-switching, space integration of multiple unconscious stimuli, ensemble statistics, and play recognition in expert chess players have been observed to be influenced and modulated by subliminal stimuli. Priming research has shown that subliminal information can affect behavior and brain activity for a considerable amount of time, even 24 hours. Last, although controversial, unconscious thought theory, with limitations and detractors, attempts to account for the existence of what it calls "the unconscious" in the empiric observations of people seeming to make better decisions when they leave it to "the unconscious" to do the job.

Aboulomania (from Greek *a-*, meaning 'without', and *boulē*, meaning 'will') is a mental disorder(F45) in which the patient displays pathological indecisiveness. It is typically associated with anxiety, stress, depression, and mental anguish, and can severely affect one's ability to function socially. Although many people suffer from indecision, it is rarely to the extent of obsession. The part of the brain that is tied to making rational choices, the prefrontal cortex, can hold several pieces of information at any given time. This may quickly overwhelm somebody when trying to make decisions, regardless of the importance of that decision. They come up with reasons that their decisions will turn out badly, causing them to over-analyze every situation critically

in a classic case of paralysis by analysis. Lack of information, valuation difficulty, and outcome uncertainty can become an obsession.

General decision-making style (GDMS)

In the general decision-making style (GDMS) test developed by Suzanne Scott and Reginald Bruce, there are five decision-making styles: rational, intuitive, dependent, avoidant, and spontaneous. These five different decision-making styles change depending on the context and situation, and one style is not necessarily better than any other. In the examples below, the individual is working for a company and is offered a job from a different company.

- The *Rational* style is an in-depth search for, and a strong consideration of, other options and/or information prior to making a decision. In this style, the individual would research the new job being offered, review their current job, and look at the pros and cons of taking the new job versus staying with their current company.
- The *Intuitive* style is confidence in one's initial feelings and gut reactions. In this style, if the individual initially prefers the new job because they have a feeling that the work environment is better suited for them, then they would decide to take the new job. The individual might not make this decision as soon as the job is offered.
- The *Dependent* style is asking for other people's input and instructions on what decision should be made. In this style, the individual could ask friends, family, coworkers, etc., but the individual might not ask all of these people.
- The *Avoidant* style is averting the responsibility of making a decision. In this style, the individual would not make a decision. Therefore, the individual would stick with their current job.
- The *Spontaneous* style is a need to make a decision as soon as possible rather than waiting to make a decision.

this style, the individual would either reject or accept the job as soon as it is offered.

The aim of this research is to explore different kinds of Decision Making Style among female young adults with the emphasis on cognitive neuroscience.

Methodology

The population of the study consisted of 50 young adult participants. General decision-making style (GDMS) is used to determine the dominance nature of the decision making styles. Descriptive statistics are used for statistical analysis of different Decision Making Styles.

Objectives:

- To understand the decision making as a higher mental function within the Cognitive Neuroscience field.
- To draw a distinct idea about Decision making styles.
- To explore the dominant Decision making style among female adults.

Results:

DECISION MAKING STYLE	MEAN	SD	COEFFICIENT OF VARIATION
INTUITIVE	19.24	2.24	11.64
RATIONAL	19.98	2.85	14.26
DEPENDENT	17.92	2.51	14
AVOIDANT	15.18	3.95	26
SPONTANEOUS	15.68	2.93	18.69

It has been observed from this present study that, among all five decision making styles the Rational decision making style has the highest average value (19.98) according to the given response by the respondent with a low standard deviation value (2.85). Whereas, Intuitive decision making style has the second highest average value (19.24) with minimum standard deviation value (2.24).

For checking the consistency between these two methods we found the Coefficient of variation (CV) and it has been observed that, Intuitive decision making style has less CV value than Rational decision making style and it has been treated as the most consistent method for decision making under this present circumstances.

Discussion

The study has shown that among all five decision making style, the Rational Decision Making style has the highest value (19.98) according to the given response by the respondent with a low SD Value (2.85). Whereas, Intuitive Decision Making Style has the second highest average value (19.24) with minimum SD value (2.24).

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As per the results, adults make the decision with their logical understanding of the situation which is going match with their intuition. As, anterior cingulate cortex contribute a significant role in impulse control and ventromedial prefrontal cortex is concern for risk taking behavior. Thus, it can be said that above mental two parts of brain playing a significant role to make decisions for adults.

Gender stereotypes characterize men and women as fundamentally different, even from different “planets” (Gray, 1992). Women are stereotyped as “intuitive” and men as “rational”. However, research investigating gender differences in reports of intuitive and rational decision-making styles yields mixed results. Undergraduate women are more likely than men to report intuitive styles (Sadler-Smith, 2011). Using a mood induction that asked people to describe feelings about winning or losing a competition, women reported using more intuition, and men reported using more reason (Sinclair, Ashkanasy & Chattopadhyay, 2010).

Peter Drucker (1967) argued that effective executives made decisions by using a systematic process. The rational model requires a step-by-step approach, including problem definition, generating alternatives, and implementing a solution after examining all options (Kowalski, 2013). This model is based on the notion that decision makers will have the time and insight needed to uncover different options and predict the outcomes of each. Tanner and Williams (1981) argued that the rational approach was popular

because of its focus on accomplishing goals by minimizing subjectivity and political influence. However, Simon (1993) found limits to the rational model. Specifically, decision makers do not always have the time or abilities to fully comprehend the problem, search for multiple solutions, and accurately predict the possible outcomes. Therefore, Simon introduced the process of “satisficing” to describe when administrators use intuition, advice from others, experience, and creativity to develop compromise solutions. Kowalski (2013) and Lunenburg (2010) noted that the conflicting demands placed on school administrators and the political context in which they work cause them to engage in satisficing behaviors by implementing acceptable (rather than ideal) solutions.

The definition of “intuition” continues to be refined, as the theoretical research base becomes more nuanced over time (Akinci & Sadler-Smith, 2012; Volz & Zander, 2014). Intuition has been described as a quick, affectively charged, subconscious understanding of a complex situation related to experience-based, holistic associations (Dane & Pratt, 2007; Myers, 2002), which can serve as a catalyst for or a warning against quick action (Goleman, 1988). Sadler-Smith and Shefy (2004) noted that intuition is instinctive, and that decision makers find it difficult to describe their reasons for intuitive decisions beyond noting how they felt. Recent developments in neuroscience, particularly the use of brain imaging, have enhanced our understanding of intuition (Dreyfus, 2010). Kandel (2007) noted that all mental functions, including memory, stem from physiological processes and molecular events, many of which are nonconscious. Neurological research also suggests a link between emotions and intuition, as the neural mechanisms that play a central role in engendering the associations that spur intuitive judgments are aroused by positive affective stimuli (Koch, 2015; Liberman, 2007).

However, intuition plays an important role in decision making. Ignoring the intuitive feel that something is not right can result in the implementation of bad decisions, whereas the overemphasis on data analysis suggested by the rational model can result in missed opportunities (Hayashi, 2001). Intuition may also be integral to completing complex tasks with short time horizons (Crandall, Klein, & Hoffman, 2006). Combining intuition with objec-

tive analysis can result in an effective management style in which intuitive judgments are intelligently used (Haidt, 2001).

Argyris and Schön (1974) suggested a possible link between beliefs, decisions, and intuition, as individuals often state that their beliefs guide their actions. However, Argyris and Schön also noted that tacit knowledge often affects decisions in ways that do not always align with those stated beliefs. More recently, Kahneman and Klein (2009), proponents of the naturalistic decision making approach, noted a link between the decision maker’s experience with a particular environment and the effectiveness of the resulting decision. Salas et al. (2010) also described the level of expertise as a contextual factor, arguing that intuition becomes more useful as the decision maker’s expertise within a specific domain increases.

Both rational and intuitive processes are postulated to play a role in self – construction and adaptive behaviour and people can shift between them. Individual differences in the use of the two cognitive styles have been found. (Berzonsky, 2008)

Wiersema and Bantel (1992) point out that an individual’s age is expected to influence the strategic decision making perspective as well as the choices they make. Age is considered as an indicator of experience and as a signal for risk and change in attitude. With age, flexibility and risk taking may decrease whereas resistance to change may increase (Wiersema and Bantel, 1992, cited in: Goll and Rasheed, 2005: 1004).

Women are more affected by the environment; they look for more information, and dedicate more time to the decision process (Gill et al., 1987, cited in: Sanz de Acedo et al., 2007: 384), while men are more dominant, assertive, objective and realistic (Wood, 1990, cited in: Sanz de Acedo et al., 2007: 384). There is also a prevalent view in the literature that women, when making decisions, are much more influenced by emotions, compared to men whose decision making is largely based on objective facts. Considering the fact that the number of women in leadership positions is increasing from year to year, it is useful to identify how and in what manner they differ from men during the decision making process. Women are generally thought to be more intuitive and empathetic compared to men who are seen as analytical and logic problem solvers (Riaz et al., 2010: 43).

Conclusion

- The finding reveals, consistent style of decision making of adult is Intuitive, although as the mean of Rational decision making style is high, thus indicates it is playing a dominant role in researched participants also.
- However, Mitroff (1983) and Hunt et al.(1989) argued that decision making style has both analytical contributes. Although in the present research, as intuitive style indicates initial feeling and reaction to the given stimuli and rational style defined as the compatibility between choice and value, thus it can concluded that adults are more prone to make decision based on their intuition and logic.

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