SYSTEM DECISION-MAKING II

2.1 DEFINITION: Decision-making can be regarded as the <u>cognitive process</u> resulting in the selection of a belief or a course of action among several alternative possibilities. Every decision-making process produces a final choice that may or may not prompt action. Decision-making is the study of identifying and choosing alternatives based on the values and preferences of the decision maker. Decision-making is one of the central activities of management and is a huge part of any process of implementation.

2.1 Stages of group decision-making

According to B. Aubrey Fisher, there are four stages or phases that should be involved in all group decision-making:

- Orientation. Members meet for the first time and start to get to know each other.
- Conflict. Once group members become familiar with each other, disputes, little fights and arguments occur. Group members eventually work it out.
- Emergence. The group begins to clear up vague opinions by talking about them.
- Reinforcement. Members finally make a decision and provide justification for it.

It is said that critical norms in a group improves the quality of decisions, while the majority of opinions (called consensus norms) do not. This is due to collaboration between one another, and when group members get used to, and familiar with, each other, they will tend to argue and create more of a dispute to agree upon one decision. This does not mean that all group members fully agree; they may not want argue further just to be liked by other group members or to "fit in".

Decision-making steps

Each step in the decision-making process may include social, cognitive and cultural obstacles to successfully negotiating dilemmas. It has been suggested that becoming more aware of these obstacles allows one to better anticipate and overcome them. The <u>Arkansas program</u> presents eight stages of <u>moral</u> decision-making based on the work of <u>James Rest</u>:

1. Establishing community: creating and nurturing the relationships, norms, and procedures that will influence how problems are understood and communicated. This stage takes place prior to and during a moral dilemma.
2. Perception: recognizing that a problem exists.
3. Interpretation: identifying competing explanations for the problem, and evaluating the drivers behind those interpretations.
4. Judgment: sifting through various possible actions or responses and determining which is more justifiable.
5. Motivation: examining the competing commitments which may distract from a more moral course of action and then prioritizing and committing to moral values over other personal, institutional or social values.
6. Action: following through with action that supports the more justified decision. Integrity is supported by the ability to overcome distractions and obstacles, developing implementing skills, and ego strength.
7. Reflection in action.
8. Reflection on action.

Other decision-making processes have also been proposed. One such process, proposed by Pam Brown of Singleton Hospital in Swansea, Wales, breaks decision-making down into seven steps:

1. *Outline your goal and outcome.*
2. *Gather data.*
3. *Develop alternatives (i.e., brainstorming)*
4. *List pros and cons of each alternative.*
5. *Make the decision.*
6. *Immediately take action to implement it.*
7. *Learn from and reflect on the decision.*

Cognitive and personal biases

Biases usually creep into decision-making processes. Many different people have made a decision about the same question (*e.g.* "Should I have a doctor look at this troubling breast cancer symptom I've discovered?" "Why did I ignore the evidence that the project was going over budget?") and then craft potential cognitive interventions aimed at improving the outcome of decision-making.

Here is a list of commonly debated biases in judgment and decision-making.

- Selective search for evidence (aka confirmation bias; Scott Plous, 1993). People tend to be willing to gather facts that support certain conclusions but

disregard other facts that support different conclusions. Individuals who are highly defensive in this manner show significantly greater left prefrontal cortex activity as measured by EEG than do less defensive individuals.[24]

- Premature termination of search for evidence. People tend to accept the first alternative that looks like it might work.
- Cognitive inertia. Unwillingness to change existing thought patterns in the face of new circumstances.
- Selective perception. We actively screen out information that we do not think is important (see also prejudice). In one demonstration of this effect, discounting of arguments with which one disagrees (by judging them as untrue or irrelevant) was decreased by selective activation of right prefrontal cortex.
- Wishful thinking. A tendency to want to see things in a certain – usually positive – light, which can distort perception and thinking.
- Choice-supportive bias occurs when people distort their memories of chosen and rejected options to make the chosen options seem more attractive.
- Recency. People tend to place more attention on more recent information and either ignore or forget more distant information (see semantic priming). The opposite effect in the first set of data or other information is termed *primacy effect*.
- Repetition bias. A willingness to believe what one has been told most often and by the greatest number of different sources.
- Anchoring and adjustment. Decisions are unduly influenced by initial information that shapes our view of subsequent information.
- Group think. Peer pressure to conform to the opinions held by the group.
- Source credibility bias. A tendency to reject a person's statement on the basis of a bias against the person, organization, or group to which the person belongs. People preferentially accept statement by others that they like (see prejudice).
- Incremental decision-making and escalating commitment. We look at a decision as a small step in a process and this tends to perpetuate a series of similar decisions. This can be contrasted with "zero-based decision-making" (see slippery slope).
- Attribution asymmetry. People tend to attribute their own success to internal factors, including abilities and talents, but explain their failures in terms of external factors such as bad luck. The reverse bias is shown when people explain others' success or failure.
- Role fulfillment. A tendency to conform to others' decision-making expectations.

- Underestimating <u>uncertainty</u> and the <u>illusion of control</u>. People tend to underestimate future uncertainty because of a tendency to believe they have more control over events than they really do.
- <u>Framing bias</u>. This is best avoided by using <u>numeracy</u> with absolute measures of efficacy.
  - <u>Sunk-cost fallacy</u>. A specific type of framing effect that affects decision-making. It involves an individual making a decision about a current situation based on what they have previously invested in the situation. A possible example to this would be an individual that is refraining from dropping a class that that they are most likely to fail, due to the fact that they feel as though they have done so much work in the course thus far.
- <u>Prospect theory</u>. Involves the idea that when faced with a decision-making event, an individual is more likely to take on a risk when evaluating potential losses, and are more likely to avoid risks when evaluating potential gains. This can influence one's decision-making depending if the situation entails a threat, or opportunity.

<u>Reference class forecasting</u> was developed to eliminate or reduce cognitive biases in decision-making.

Post-decision analysis

Evaluation and analysis of past decisions is complementary to decision-making; see also <u>mental accounting</u> and <u>postmortem documentation</u>.

Cognitive styles

Influence of Myers-Briggs type

According to behavioralist <u>Isabel Briggs Myers</u>, a person's decision-making process depends to a significant degree on their cognitive style. Myers developed a set of four bi-polar dimensions, called the <u>Myers-Briggs Type Indicator</u> (MBTI). The terminal points on these dimensions are: *thinking* and *feeling*; *extroversion* and *introversion*; *judgment* and *perception*; and *sensing* and *intuition*. She claimed that a person's decision-making style correlates well with how they score on these four dimensions. For example, someone who scored near the thinking, extroversion, sensing, and judgment ends of the dimensions would tend to have a logical, analytical, objective, critical, and empirical decision-making style. However, some psychologists say that the MBTI lacks reliability and validity and is poorly constructed.

Other studies suggest that these national or cross-cultural differences exist across entire societies. For example, Maris Martinsons has found that American, Japanese and Chinese business leaders each exhibit a distinctive national style of decision-making.

Optimizing vs. satisficing[edit]

Main article: Maximization (psychology)

Herbert A. Simon coined the phrase "bounded rationality" to express the idea that human decision-making is limited by available information, available time and the mind's information-processing ability. Further psychological research has identified individual differences between two cognitive styles: *maximizers* try to make an optimal decision, whereas *satisficers* simply try to find a solution that is "good enough". Maximizers tend to take longer making decisions due to the need to maximize performance across all variables and make tradeoffs carefully; they also tend to more often regret their decisions (perhaps because they are more able than satisficers to recognise that a decision turned out to be sub-optimal).[33]

Combinatorial vs. positional

Styles and methods of decision-making were elaborated by Aron Katsenelinboigen, the founder of predispositioning theory. In his analysis on styles and methods, Katsenelinboigen referred to the game of chess, saying that "chess does disclose various methods of operation, notably the creation of predisposition – methods which may be applicable to other, more complex systems."[34]

In his book, Katsenelinboigen states that apart from the methods (reactive and selective) and sub-methods (randomization, predispositioning, programming), there are two major styles: positional and combinational. Both styles are utilized in the game of chess. According to Katsenelinboigen, the two styles reflect two basic approaches to the uncertainty: deterministic (combinational style) and indeterministic (positional style). Katsenelinboigen's definition of the two styles are the following.

The combinational style is characterized by:

- a very narrow, clearly defined, primarily material goal; and
- a program that links the initial position with the final outcome.

In defining the combinational style in chess, Katsenelinboigen writes:

The combinational style features a clearly formulated limited objective, namely the capture of material (the main constituent element of a chess position). The objective is implemented via a well-defined, and in some cases, unique sequence of moves aimed at reaching the set goal. As a rule, this sequence leaves no options for the opponent. Finding a combinational objective allows the player to focus all his energies on efficient execution, that is, the player's analysis may be limited to the pieces directly partaking in the combination. This approach is the crux of the combination and the combinational style of play.

The positional style is distinguished by:

- a positional goal; and
- a formation of semi-complete linkages between the initial step and final outcome.

"Unlike the combinational player, the positional player is occupied, first and foremost, with the elaboration of the position that will allow him to develop in the unknown future. In playing the positional style, the player must evaluate relational and material parameters as independent variables. ... The positional style gives the player the opportunity to develop a position until it becomes pregnant with a combination. However, the combination is not the final goal of the positional player—it helps him to achieve the desirable, keeping in mind a predisposition for the future development. The pyrrhic victory is the best example of one's inability to think positionally."

The positional style serves to:

- create a predisposition to the future development of the position;
- induce the environment in a certain way;
- absorb an unexpected outcome in one's favor;
- avoid the negative aspects of unexpected outcomes.

Katsenelinboigen writes:

"As the game progressed and defense became more sophisticated the combinational style of play declined. ... The positional style of chess does not eliminate the combinational one with its attempt to see the entire program of action in advance. The positional style merely prepares the transformation to a combination when the latter becomes feasible."[36]

Neuroscience

Decision-making is a region of intense study in the fields of systems neuroscience, and cognitive neuroscience. Several brain structures, including the anterior cingulate cortex (ACC), orbitofrontal cortex and the overlapping ventromedial prefrontal cortex are believed to be involved in decision-making processes. A recent neuroimaging study found distinctive patterns of neural activation in these regions depending on whether decisions were made on the basis of perceived personal volition or following directions from someone else. Patients with damage to the ventromedial prefrontal cortex have difficulty making advantageous decisions.

A common laboratory paradigm for studying neural decision-making is the two-alternative forced choice task (2AFC), in which a subject has to choose between two alternatives within a certain time. A study of a two-alternative forced choice task involving rhesus monkeys found that neurons in the parietal cortex not only represent the formation of a decision but also signal the degree of certainty (or "confidence") associated with the decision. Another recent study found that lesions to the ACC in the macaque resulted in impaired decision-making in the long run of reinforcement guided tasks suggesting that the ACC may be involved in evaluating past reinforcement information and guiding future action.[40] A 2012 study found that rats and humans can optimally accumulate incoming sensory evidence, to make statistically optimal decisions.[41]

Emotion appears able to aid the decision-making process. Decision-making often occurs in the face of uncertainty about whether one's choices will lead to benefit or harm (see also risk). 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 recent lesion mapping study of 152 patients with focal brain lesions conducted by Barbey and colleagues provides evidence to help characterize the neural mechanisms of emotional intelligence.

Although it is unclear whether the studies generalize to all processing, subconscious processes have been implicated in the initiation of conscious volitional movements. See the Neuroscience of free will.

Decision-making in adolescents vs. adults[edit]

During their adolescent years, teens are known for their high-risk behaviors and rash decisions. There has not, however, been that much research in this area. Recent research has shown, though, that there are some differences in cognitive processes between adolescents and adults during decision-making. Researchers have concluded that differences in decision-making are not due to a lack of logic or reasoning, but more due to the immaturity of psychosocial capacities, capacities that influence decision-making. Examples would be impulse control, emotion regulation, delayed gratification and resistance to peer pressure. In the past, researchers have thought that adolescent behavior was simply due to incompetency regarding decision-making. Currently, researchers have concluded that adults and adolescents are both competent decision-makers, not just adults. However, adolescents' competent decision-making skills decrease when psychosocial capacities become present.

Recent research has shown that risk-taking behaviors in adolescents may be the product of interactions between the socioemotional brain network and its cognitive-control network. The socioemotional part of the brain processes social and emotional stimuli and has been shown to be important in reward processing. The cognitive-control network assists in planning and self-regulation. Both of these sections of the brain change over the course of puberty. However, the socioemotional network changes quickly and abruptly, while the cognitive-control network changes more gradually. Because of this difference in change, the cognitive-control network, which usually regulates the socioemotional network, struggles to control the socioemotional network when psychosocial capacities are present.

When adolescents are exposed to social and emotional stimuli, their socioemotional network is activated as well as areas of the brain involved in reward processing. Because teens often gain a sense of reward from risk-taking behaviors, their repetition becomes ever more probable due to the reward experienced. In this, the process mirrors addiction. Teens can become addicted to risky behavior because they are in a high state of arousal and are rewarded for it not only by their own internal functions but also by their peers around them.

This is why adults are generally better able to control their risk-taking because their cognitive-control system has matured enough to the point where it can control the socioemotional network, even in the context of high arousal or when psychosocial capacities are present. Also, adults are less likely to find themselves

in situations that push them to do risky things. For example, teens are more likely to be around peers who peer pressure them into doing things, while adults are not as exposed to this sort of social setting.[