

Decision Making

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Decision making can be regarded as the mental processes (cognitive process) resulting in the selection of a course of action among several alternative scenarios. Every decision making process produces a final choice. The output can be an action or an opinion of choice.

Overview

Human performance in decision terms has been the subject of active research from several perspectives. From a psychological perspective, it is necessary to examine individual decisions in the context of a set of needs, preferences an individual has and values they seek. From a cognitive perspective, the decision making process must be regarded as a continuous process integrated in the interaction with the environment. From a normative perspective, the analysis of individual decisions is concerned with the logic of decision making and rationality and the invariant choice it leads to.

Yet, at another level, it might be regarded as a problem solving activity which is terminated when a satisfactory solution is reached. Therefore, decision making is a reasoning or emotional process which can be rational or irrational, can be based on explicit assumptions or tacit assumptions.

Logical decision making is an important part of all science-based professions, where specialists apply their knowledge in a given area to making informed decisions. For example, medical decision making often involves making a diagnosis and selecting an appropriate treatment. Some research using naturalistic methods shows, however, that in situations with higher time pressure, higher stakes, or increased ambiguities, experts use intuitive decision making rather than structured approaches, following a recognition primed decision approach to fit a set of indicators into the expert's experience and immediately arrive at a satisfactory course of action without weighing alternatives. Recent robust decision efforts have formally integrated uncertainty into the decision making process. However, Decision Analysis, recognized and included uncertainties with a structured and rationally justifiable method of decision making since its conception in 1964.

A major part of decision making involves the analysis of a finite set of alternatives described in terms of some evaluative criteria. These criteria may be benefit or cost in nature. Then the problem might be to rank these alternatives in terms of how attractive they are to the decision maker(s) when all the criteria are considered simultaneously. Another goal might be to just find the best alternative or to determine the relative total priority of each alternative (for instance, if alternatives represent projects competing for funds) when all the criteria are considered simultaneously. Solving such problems is the focus of multi-criteria decision analysis (MCDA) also known as multi-criteria decision making (MCDM). This area of decision making, although it is very old and has attracted the interest of many researchers and practitioners, is still highly debated as there are many MCDA / MCDM methods which may yield very different results when they are applied on exactly the same data. This leads to the formulation of a decision making paradox.

Problem Analysis vs Decision Making

It is important to differentiate between problem analysis and decision making. The concepts are completely separate from one another. Problem analysis must be done first, then the information gathered in that process may be used towards decision making.

Problem Analysis

Analyze performance, what should the results be against what they actually are

Problems are merely deviations from performance standards

Problem must be precisely identified and described

Problems are caused by some change from a distinctive feature

Something can always be used to distinguish between what has and hasn't been effected by a cause

Causes to problems can be deducted from relevant changes found in analyzing the problem

Most likely cause to a problem is the one that exactly explains all the facts

Decision Making

Objectives must first be established

Objectives must be classified and placed in order of importance

Alternative actions must be developed

The alternative 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

There are steps that are generally followed that result in a decision model that can be used to determine an optimal production plan.

Everyday techniques

Some of the decision making techniques people use in everyday life include:

Pros and Cons: Listing the advantages and disadvantages of each option, popularized by Plato and Benjamin Franklin

Simple Prioritization: Choosing the alternative with the highest probability-weighted utility for each alternative (see Decision Analysis)

Satisficing: using the first acceptable option found

Acquiesce to a person in authority or an "expert", just following orders

Flipism: Flipping a coin, cutting a deck of playing cards, and other random or coincidence methods
Prayer, tarot cards, astrology, augurs, revelation, or other forms of divination

Decision-Making Stages

Developed by B. Aubrey Fisher, there are four stages that should be involved in all group decision making. These stages, or sometimes called phases, are important for the decision-making process to begin

Orientation stage- This phase is where members meet for the first time and start to get to know each other.

Conflict stage- Once group members become familiar with each other, disputes, little fights and arguments occur. Group members eventually work it out.

Emergence stage- The group begins to clear up vague opinions by talking about them.

Reinforcement stage- Members finally make a decision, while justifying themselves that it was the right decision.

Decision-Making Steps

When in an organization and faced with a difficult decision, there are several steps one can take to ensure the best possible solutions will be decided. These steps are put into seven effective ways to go about this decision making process (McMahon 2007).

The first step - Outline your goal and outcome. This will enable decision makers to see exactly what they are trying to accomplish and keep them on a specific path.

The second step - Gather data. This will help decision makers have actual evidence to help them come up with a solution.

The third step - Brainstorm to develop alternatives. Coming up with more than one solution allows you to see which one can actually work.

The fourth step - List pros and cons of each alternative. With the list of pros and cons, you can eliminate the solutions that have more cons than pros, making your decision easier.

The fifth step - Make the decision. Once you analyze each solution, you should pick the one that has many pros (or the pros that are most significant), and is a solution that everyone can agree with.

The sixth step - Immediately take action. Once the decision is picked, you should implement it right away.

The seventh step - Learn from, and reflect on the decision making. This step allows you to see what you did right and wrong when coming up, and putting the decision to use.

Cognitive and personal biases

Biases can creep into our 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 decision making outcomes.

Below is a list of some of the more commonly debated cognitive biases.

Selective search for evidence (a.k.a. Confirmation bias in psychology) (Scott Plous, 1993) - We 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.

Premature termination of search for evidence - We tend to accept the first alternative that looks like it might work.

Inertia - Unwillingness to change thought patterns that we have used in the past in the face of new circumstances.

Selective perception - We actively screen-out information that we do not think is important. (See 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 or optimism bias - We tend to want to see things in a positive light and this can distort our perception and thinking.

Choice-supportive bias occurs when we distort our memories of chosen and rejected options to make the chosen options seem more attractive.

Recency - We 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 (Plous, 1993).

Repetition bias - A willingness to believe what we have 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 - We reject something if we have a bias against the person, organization, or group to which the person belongs: We are inclined to accept a statement by someone we 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 - We tend to attribute our success to our abilities and talents, but we attribute our failures to bad luck and external factors. We attribute other's success to good luck, and their failures to their mistakes.

Role fulfillment (Self Fulfilling Prophecy) - We conform to the decision making expectations that others have of someone in our position.

Underestimating uncertainty and the illusion of control - We tend to underestimate future uncertainty because we tend to believe we have more control over events than we really do. We believe we have control to minimize potential problems in our decisions.

Reference class forecasting 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 mental accounting.

Cognitive styles

Influence of Briggs Myers type

According to behaviorist Isabel Briggs Myers, 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 Myers-Briggs Type Indicator (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

Herbert Simon coined the phrase "bounded rationality" to express the idea that human decision-making is limited by available information, available time, and the information-processing ability of the mind. Simon also defined 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).

Combinatorial vs. positional

Styles and methods of decision making were elaborated by the founder of Predispositioning Theory, Aron Katsenelinboigen. 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."

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 in a 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

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

The positional style gives the player the opportunity to develop a position until it becomes pregnant with a combination. 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."

Neuroscience perspective

The anterior cingulate cortex (ACC), orbitofrontal cortex (and the overlapping ventromedial prefrontal cortex) are brain regions 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 personal volition or following directions from someone else. Patients with damage to the ventromedial prefrontal cortex have difficulty making advantageous decisions.

A recent study 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.

Emotion appears 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.

Although it is unclear whether the studies generalize to all processing, there is evidence that volitional movements are initiated, not by the conscious decision making self, but by the subconscious. See the Neuroscience of free will.

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