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UNDERSTANDING HOW PEOPLE DECIDE: DECISION-MAKING THEORIES AS MENTAL REPRESENTATIONS[1]

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Abstract: *This paper argues that instead of seeing the most influential theories in decision-making as competitive, one may contemplate the possibility that they are part of a wider theory of decision-making. This theory looks at how people decide based on how they structure a mental representation of a complex reality. Further, it gives a brief presentation of the mainstream theories in decision-making: expected utility theory, prospect theory, bounded rationality, parallel games, Rawls' theory of justice and multi-criteria decision-making. The conclusions suggest that research in the field should include the current theories of decision-making as possible mental representations, while also acknowledging some important epistemological problems in this field.*

Keywords: *mental representations, decision-making, expected utility, prospect theory, bounded rationality, parallel games, justice, multi-criteria decision-making.*

Understanding *how* people decide purports the problem of knowing what *how* means. What is it that we expect to find when studying decision-making of people in real-life situations? How far can we and how far *should* we go in pursuing an answer to this question? Suppose we consider the example of a sculptor who wants to model in clay the portrait of a person. First of all, the task can be summarized as follows: a three-dimensional subject is to be re-constructed in a three-dimensional representation of it. The sculptor should decide at every step where and how a surface should be constructed, usually by using only the eye and the movement of the hand, without the aid of a computer or of a scanner that can transpose the portrait point by point. The decision-making of our sculptor is mostly performed *subconsciously*. On the other hand, constructing a clay model in a *conscious* manner would imply the ability to name and explain *why* each action has taken place, thus giving *justification*. This process is usually called *post-hoc* rationalization. It is usually the basis for the assumption that conscious acts are also logical.

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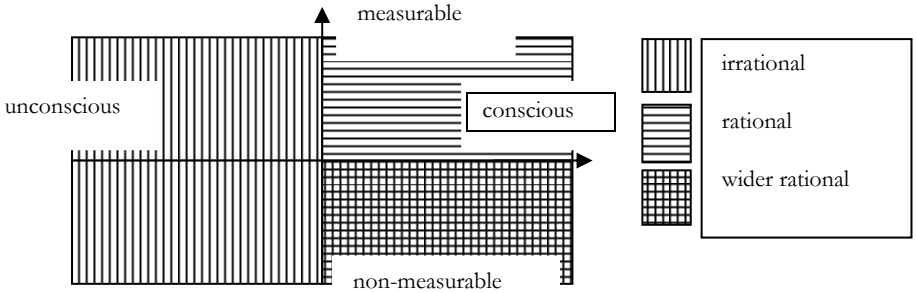
The rationality of an act depends on the definition of rationality. Eilon (1969) argues that conscious decisions can also be irrational if the preferences are circular. For him and the scholars of rational choice theory based on the writings of von Neumann and Morgenstern, rational decisions are decisions based on a set of preferences that an individual is able to rank order. Therefore, if individuals do not "abide by an agreed criterion that specifies how a choice between alternatives is to be made" of if they cannot rank order their preferences, then their actions are considered to be *irrational* (Eilon, 1969: B177). On the other hand, rank ordering preferences implies the use of numbers, ratios, proportions, comparison and/or of quantification. In other words, there is also a problem of measurement in the definition of rationality (Figure 1).

Figure 1*. Framework for understanding rational decisions in terms of measurability and consciousness of decision-making process*



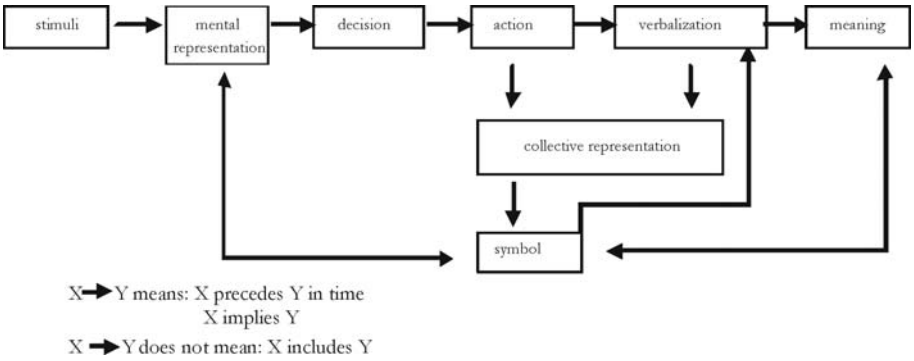
What scholars usually call rational decisions are conscious decisions based on *measurable* preferences. Irrational decisions are usually unconscious (Kahneman, 2011) or based on both conscious and non-measurable preferences. Not far ago, rationality was defined as also emotion-less, until sociological critique (Archer & Tritter 2000) and psychological research has shown that decisions are impossible without emotions (see for example Sacks, 2011; Schwartz et al., 2002) and that preferences are influenced by emotions (Andrade & Ariely, 2009).

However, it is not decisions or choices that are rational, at least not in the sense of decision as resolution. Instead, the mental representations on which they are based and the way in which these representations are built can be rational or irrational. A mental representation in this case is a mental re-construction of a perceived reality or a cumulated set of perceived stimuli. In decision research this is a relatively new term[1] which has the potential to de-construct the classical boundaries between different decision theories (Loewenstein, 2001; Mazur, 2015; Arentze et al., 2008; Huber et al.,

[1]however not new in psychology and linguistics (Mental Models and Reasoning Lab n.d.; Wittgenstein, 1922)

2011). It is important to note that this is not a strictly psychological definition as the stimuli does not have to be strictly external or based only on the human sensorial organs. A mental representation can be made based on the perception of an "intangible, formless idea" (Solomon, 1991: 12). In this way, a representation is a symbol, but it can also be a representation of a symbol. Thus, the perception of stimuli generates a mental representation based on which decisions are made, followed by actions in the chosen direction. Actions are followed by verbalization which leads to meaning (Figure 2).

***Figure 2**. The construction of meaning in decision-making*



The very idea of decision frames proposed by Tversky & Kahneman (1981) touches on the idea of mental representations presented here when it describes frames as "the decision-maker's conception of the acts, outcomes, and contingencies associated with a particular choice. The frame that a decision-maker adopts is controlled partly by the formulation of the problem and partly by the norms, habits, and personal characteristics of the decision-maker" (Tversky & Kahneman, 1981: 453). The difference between the notion of frames used by Tversky and Kahnmann and the notion of mental representations used here is that mental representations are not necessarily in terms of acts, outcomes and contingencies associated with a particular choice. Mental representations can be constructed in any terms an individual wishes, from justice, to prospects, to power or social relations. The structure of a mental representation is left at the individual's choice. It is also close to the concept of cognitive image used by Zamfir (2005). Taught representations are socially constructed and can be transmitted from generation to generation. Loewenstein (2001) shows how previous research in decision-making points out that people "figure out what kind of situation they are in and then adopt choice rules that seem appropriate for that situation" (p. 503).

The construction of mental representations requires an act of "seeing" not only in the sense of visual stimulation of the eye, but in the sense of absorbing information about the environment in any form and in this way making sense about it. In her brilliant article on what a line is, Solomon (1991) points out the paradox of the line as both a

discrete physical object and a continuous representation of it in an attempt to emphasize the difficulties of understanding "the experience of 'seeing' which is the core of inquiry" in general (p. 12). It is this very difficult of the experience of 'seeing' that is at the core of decision-making as well.

Scientists have mostly proposed models of decision that are meant to reveal human judgment errors or normative models of how decisions should be made in order to achieve the desired goals. In this sense, scientists have been "seeing" the world in many ways. But what is it that they have exactly "seen" when looking at how people make decisions?

Let us consider how decision making can be studied by:

1) looking at what decisions people make

2) looking at how they justify their decisions

3) looking at how neuronal networks in the brain are activated when making decisions

In short, there are three proxies that scholars use in order to understand how decision-making is performed: actions, language and the bio-physical. However, these proxies do not provide information about the way in which information is used or aggregated in the mind, either consciously or unconsciously. In decision-making, research has been performed by observing actions and language (Slevin et al., 1998; Laughlin, 2011; Hinsz, 1999; Sniezek, 1992; Schwartz et al., 2002; Frederick et al., 2002) as well as neuronal networks (Wang 2008; FitzGerald et al. 2015). In the case of observing decisions from language there is a problem of double-reflection. Unlike in the formal representations of language (Reach, 1939: 59) human language in itself is yet another representation of the mental representation of the perceived situation and not a direct representation of the objective world (Wittgenstein, 1922). This is why observing decisions through language is like looking at the back of your head by using two self-facing mirrors: you can see everything, except the back of your head. However, if two mirrors are not positioned to reflect each other, there is potential to actually see the back of the head. In other words, the main problem for a researcher is to understand not just which of the elements of the stimulus (or situation) are chosen to make up the mental representation, but also why these elements are more important than others. Norretranders (2009) shows that mental representations cannot be identical reproductions of the situation or element that is being reproduced because of the known limitations of mind. The problem of understanding which of the elements of the stimulus are chosen to make up the mental representation purports the usual problems of mathematical modelling. The problem of why the chosen elements have been deemed more important than others is a problem of sociology. The issue of how the information that has been considered important is aggregated is associated with the cognitive sciences (Thagard, 2005).

Mental Representations in Decision-Making

The theory that has been briefly presented in the previous section regards most decision-making theories as potential mental representations of the decision-making

situation. In the following section several such candidates will be described and their constitutive elements emphasized in a way that allows their view as mental representations.

Expected Utility Theory

Expected utility theory in sociology is part of the wider theory of rationality or of rational choice, which comprises of game theoretical applications to social situations. In 2013 I synthesized the history and the evolution of this theory (Gheondea-Eladi, 2013). Game theory predicts certain behaviours only if certain assumptions are met, like comparability, transitivity and contextual stability of pay-offs and complete or incomplete knowledge (Colman, 2003; Dixit & Skeath, 1999). In recent publications, game theory has been developed by models which relax assumptions. For example the fact that the rules of the game are given is replaced by inductive trial and error attempts until knowledge is acquired about the rules of the game (Kaneko & Kline, 2006; Kaneko & Mitra, 2011; Kaneko & Matsui, 1999).

Another direction in rational choice theory was drafted by Daniel Kahneman and Amos Tversky (1979), called *Prospect Theory*. Utility is replaced by value functions which take into consideration relative gains and losses instead of pay-offs (Kahneman & Tversky, 1979b; Tversky & Kahneman, 1981). Yet another theory developed as a response to expected utility is called *bounded rationality* proposed by (Simon, 1965) and developed by many others (Kahneman et al., 1982; Heckathorn et al., 1996; Gigerenzer & Gaissmaier, 2011; Gigerenzer & Brighton, 2009). Bounded rationality states that since cognitive abilities of human decision-makers are limited, certain judgment heuristics are employed to compensate these limitations. In general rational choice theory has been the target of criticism (Frisch, 2001; Archer & Tritter, 2000; Colman, 2003; Martin, 1978).

Other contemporary problems of decision-making added more weight to the questions above: the inconsistency between game theoretical predictions and human behaviour in ultimatum games (Gil-White, 2004; Marlowe, 2004; Henrich, 2000); the lack of arguments sustaining the modelling of social factors as additional costs/benefits and adding them into one game's final pay-offs (as is done in (Alesina & Angelotos, 2005; Rabin, 1993); the lack of alternatives to this modelling choice; the inconsistency between game theoretical assumptions of transitivity and non-contextual nature of preferences (Colman, 2003; Archer & Tritter, 2000; Rawling, 1990; Bondareva, 1990; Philips, 1989). Most game-theoretical models introduce fairness or social constraints or relational variables as costs in one model (Alesina & Angelotos, 2005; Rabin, 1993). In doing so, they assume that such variables can be commoditized. Although not all game theoretical applications assume that the pay-offs can be commoditized, they do assume that they are comparable, even in such widely applied games as the Prisoner's Dilemma (PD). In the PD, it is not the absolute value of the pay-offs which is of importance, but the relations between them that matters and this implies that the pay-offs are comparable, namely that it is always possible to say that, for example, either $x < y$ or that $y < x$. The problem of the comparability of pay-offs appears from the properties of *binary relations* which are usually employed when using game theoretical models to

explain social phenomena and interactions. The use of binary relations in economy appeared mainly as an answer to the problem of not being able to commoditize all possible pay-offs (Bridges & Mehta, 1995).

Parallel Games Models

In a different line of thought, George Tsebelis' theory of *nested games* unveiled a new perspective in political science. He observed that more than one game may be played in parallel in different arenas. Together with Alt & Eichengreen (1989), Hausken (1995), Bednar & Page (2007) and myself (Gheondea-Eladi, 2013b) they form a theoretical paradigm built around *parallel games*. Tsebelis (Tsebelis, 1988; Tsebelis, 1990; Tsebelis, 2010) argues that the actor and the observer may not share the same view over an objective situation. Therefore, he proposed that players play "games in multiple arenas" and "nested games with institutional design" (Tsebelis, 1990). However, he did not formalize his theory and despite the intuitive nature of his theory it lacks the rigour that allows testing and further applications outside of political science (Poulson, 2009; Croissant, 2004; Zuber, 2010; Schedler, 2002). On the other hand Alt and Eichengreen (1989) defined "parallel games" and "overlapping games". They show that cooperation is fostered within parallel and overlapping games. Parallel games involve simultaneous games with the same players, while overlapping games involve simultaneous games with different players. Similarly, Putnam (1988) proposed the notion of "two level games" to describe national and international games that may develop in parallel. In my Ph.D. theses (Gheondea-Eladi, 2013b) I placed the bases of a parallel games model with non-comparable pay-offs. Considering that people decide within multiple games that are played at the same time on different abstraction levels, with different players and for different types of pay-offs, the problems of non-comparability, intrazitivity and contextual instability of preferences are given a solution. Each game is built around a certain type of pay-off which allows a certain ordering of the alternatives of action. However, the pay-offs from different games are not comparable. The same objective action may lead to two or more types of pay-offs in two or more games.

Hausken (1995) identifies several directions in the study of multiple games such as: network studies, two-level, nested or hierarchical games, collective games and versions of the principal-agent theory (p. 471). However, he gives no consideration to the problems of commodification and non-commodification of certain pay-offs such as prestige, appreciation, self-esteem and so on. A more recent research in parallel games is given by Bednar & Page (2007) who wish to explain cultural differences. They create a formal model for parallel games played by finite state automata which move the player from one state to another. Just like most of the researchers in this field they do not discuss the way in which the utility function can be built or how it may be created based on non-comparable pay-offs. However, they only assume that pay-offs are comparable, such that only the order between the pay-offs is important and not their value.

Rawls' Theory of Justice

In Rawls theory, justice 'is the first virtue of social institutions, just as the truth is the first virtue of systems of thought" (Rawls,1971/2011: 26). Justice for Rawls is also fairness, which according to the Romanian Dictionary refers to two aspects. On the one hand, it is „righteousness, equity and honour; humanity" and on the other hand is an "ethical and legal principle at the basis of all social relations in the spirit of righteousness, equality, collaboration and mutual respect" (Academia Română, Institutul de Lingvistică „Iorgu Iordan", 2009). Although the notion of fairness appears also in the expected utility models as a result of experimentation and thereafter in the behavioural game theoretical models, the two theories differ only in the degree of relativization of social equity. In this way, "the principles of justice are the principles which *free, rational and self-interested* persons would choose in an initial state in which equality defines the fundamental terms of their association" and that "would govern all other subsequent agreements" (Rawls, 1971/2011: 33, emphasis added). This vision represents for Rawls the "theory of justice as equity" (p. 33).

Although in both expected utility and in the theory of justice individuals act in a rational manner for the promotion of their interests, starting from a position of equality but based on conflicting or cooperative interests, the criteria of evaluation of the alternatives are different. One is based on the evaluation of expected utility, which is a subjective measure for the individual, and the other is based on the evaluation of justice or equity/fairness. Another element of differentiation is that in the theory of justice players are in a "vail of ignorance", unable to know their social position, status, class or power offered by certain natural assets. This "vail of ignorance" ensures the position of equality which is at the onset of the fair social contract (p. 33). Nevertheless, Rawls defines "good" as "rationality" such that "a good for a person is determined by the most rational life plan, given certain sufficiently favourable conditions" (p. 353). In essence, the theory of justice has been built to offer an alternative for the expected utility theory. For the purposes of this paper, this theory proposes in fact that there is another possible criterion for decision-making: justice, as equity or fairness.

Multiple objective decision-making and multi-criteria decision analysis

The expected utility model and the theory of justice assume that there is a single criterion based on which pay-offs may be ordered. To address this limitation, multiple-criteria decision-analysis has been proposed (Roy, 1996; Keeney & Raiffa, 1976). It encompasses a generalization of the expected utility theory for the case in which pay-offs can no longer be ordered based on a single criterion. One such order is the lexicographic order (the order in which words in dictionaries are ordered). Other situations which purport multiple criteria comparisons are given by the choice of cars based on safety, security, esthetics, consumption level or carbon dioxide emissions and so on (Roy, 1996).

In multiple criteria decision-making there are two main schools of thought: the American and the French (Lootsma, 1992). The French school is based on the model proposed by Bernard Roy in 1985 and translated in English in 1996 (Roy, 1996), while

the American school departed from the sistematization performed by Keeney and Raiffa (1976). Although both models begin by successive comparisons of evaluation criteria, they use different mechanism of preference aggregation (Lootsma, 1992). Moreover, the ELECTRE algorithm, built by Roy allows the possibility that after evaluating all criteria a series of main alternatives is built (Lootsma, 1992: 254). By means of the Analytic Hierarchy Process built by Saaty (1980) based on the models of Keeney and Raiffa (1976), the "value of the impact score which approximates subjective values of the alternatives" for each criterion and the corresponding weights are obtained in order to be aggregated in a unique value, similar to a utility function for each single criterion. Despite the critiques of the general utility theory of Keeney and Raiffa (Treadwell and Myiamoto, 1996), multiple criteria decision analysis lead to the construction of computer programs meant to assist decision-makers, as well as a series of "interactive methods" which "alternate computation steps with consultation steps" (Vincke, 1989/1992: 79).

Conclusions

In the process of understanding how decisions are made, the current decision-making theories seem to be only parts of a bigger picture. Expected utility, the theory of justice, parallel games, multi-criteria decision-making are all possible mental representations of complex social situations proposed by researchers who are also human decision-makers. Unlike Loewenstein (2001), who dismisses these theories as possible mental representations, in this paper I argue that they may in fact be used by some people, alongside other representations. Two implications arise from this. First, instead of seeing these theories as competitive theories, they may be integrated in a wider paradigm of mental representations. Secondly, further research should comparatively test the extent to which either one of these theories or any other theories not included in this review are actually used by human decision-makers. However, such an endeavor is bound to the perils of differentiating between what is part of the human decision-making abilities and what is socially or culturally acquired or simply learned. To conclude, understanding how people decide brings important epistemological issues such as: (1) understanding how people say they decide vs. understanding why they choose what they choose; (2) understanding how people are naturally equipped to decide vs. what people learn about how to decide; (3) understanding how people create mental representations of decision-making situations vs. understanding why they choose certain aspects and not others.

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short story, if not an entire novel in every family photo. And there is also a challenge in every painting.

The Balkan Conclusion

Expressionism Movement is just at its beginning. Time will tell whether this artistic movement will impact universal art as the previous art movements did.

The Balkan expressionism movement arose and is making the world aware that the artists from the Balkans are ought not to be forgotten or left aside. There is a culture that is in a continuous development without forgetting the tradition. There is a pure outcry: we are here; we are worthy!

The Balkan artists pride in the confidence they have in their creative ideas as they find their inspiration in the Balkan folklore, the surrounding stories in the urban areas. There is a story behind every Balkan expressionism painting and one can wonder if the world is prepared to witness the emergence of a new art that combines life in reality in such a way that it trespasses times and ages.

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