

Chapter 2

Psychological Determinants of Decision Making

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Abstract Decision making has been a subject of study in many scientific fields. It is psychological studies, however, that have brought significant contribution to understanding mechanisms that underlie making choices by individuals. The purpose of this chapter is first of all the description of mental processes, also referred to as decision-making activities, that are involved in various stages of decision-making. The second purpose is to present two systems of information processing which are engaged in varying degrees in the process. Moreover, the chapter describes the strategy of decision making, i.e. the heuristics allowing for prompt and economical actions. It also defines the role of free will and self-control in the decision-making processes. What is of key importance is the explanation from the psychological perspective of the process of decision making under uncertainty as well as the discussion of potential negative consequences of complex decisions made by individuals, groups and communities.

Keywords Decision making • Cognitive functions • Cognitive dualism • Consequences of decision making

2.1 Introduction

The decision-making mechanisms have been in popular interest for a long time and the related research has been conducted at the interface of many scientific fields. Psychology has made substantial contribution to understanding the decision-making phenomenon. Thanks to theories developed on its basis it has become possible to explain how individuals make their choices in real-life situations. First of all, a distinction should be made between two notions, i.e. between a decision itself and decision making. The simplest definition of the decision states that it is a purposeful and non-random choice of one out of at least two alternatives, while

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decision making is a process that involves various mental functions, both the elementary ones, such as working memory and long-term memory, and the complex ones, such as thinking, reasoning or problem-solving, as well as executive functions lying in the middle, between cognition and action (Hastie and Dawes 2010; Toplak et al. 2010). Moreover, in the process a vital role is played by emotional and motivational functions because while making decisions individuals formulate their cognitive judgments basing on their own emotional experience (Lerner et al. 2015). Also, modern reference literature often discusses conscious and unconscious influences on decision making, including the power of impact of explicit and tacit processes on individual choices and the correlations between these processes (Newell and Shanks 2014). The above mental functions are subordinated to a specific goal, i.e. the choice. Hence, it can be assumed that they are decision-making activities (Falkowski et al. 2008).

The decision-making activities lead to the choice of one of two or more alternatives as well as to the so called alternative choice. For example, when planning their shopping, people do not have to choose the product in advance. If it turns out that product A is fresh, they can buy it, if it is not—they decide on product B as an alternative. In complex decision-making situations, mainly when facing crucial life dilemmas, the choice among a limited number of possibilities is usually preceded by long considerations aimed at reducing the complexity of the dilemma, which consequently leads to an “either-or” choice. For instance, theoretically speaking, a fresh high school graduate can choose among thousands of university courses basing their decision on such aspects as the reputation of the university, their own interests, financial conditions or career prospects. Therefore, the young graduate reduces this excessively complex dilemma to just several options to be considered.

This chapter presents the characteristics of mental processes that are activated at individual stages of decision making followed by the description of two systems of information processing that are responsible for human decision making. Additionally, the purpose of this review is to describe the decision-making strategies, i.e. the heuristics that facilitate prompt and efficient actions and to define the role of free will and self-control in the decision-making processes. What is of key importance is the explanation from the psychological perspective of the process of decision making under uncertainty as well as the discussion of potential negative consequences of complex decisions made by individuals, groups and communities.

2.2 Stages of Decision Making

In the psychological approach decision making is divided into three phases: the pre-decision phase (problem formulation and information gathering), the decision phase (the choice among previously defined options) and the post-decision phase (the evaluation of the decision made) (Svenson 1992). The basic activity in the pre-decision phase is identification of a problem, or in other words—defining the

discrepancy between the present state (no decision has been made yet) and the desired state (the decision has been made). The dilemma situations faced by individuals when making a choice can be categorized according to diverse criteria, such as (a) convergence, when the desired state is relatively well defined and just one solution is possible (Sloane and MacHale 1997), (b) complexity, when more complex problems require processing a considerable amount of data and generating their mental representation in a form of a mental model (Nęcka and Orzechowski 2005) and finally (c) definiteness, when the problem is well defined, which means that it has all the information about the goal, circumstances, the terms of acceptability of future solutions, limitations and other data necessary to find a solution (Reitman 1965). The settlement of a dilemma situation can be achieved by reducing the gap between a hardly satisfying starting point and a desired target point. A crucial element of the problem-solving situation is planning, i.e. examining the problem area in a systematic way and defining the directions of searching for solutions which require a certain budget of attention (Morris and Ward 2004). There are two major methods of planning: modeling (arranging steps of action in the mental space) and analogizing (using the correlations in one area to solve problems in another one). Creating a plan is conditioned by three elementary factors: (a) the complexity of a problem that determine the involvement of the cognitive system (e.g. simple problems engage primarily the working memory while more complicated ones occupy abstract thinking), (b) the impact of situational and environmental context (e.g. the capacity to verbalize the task, which facilitates its realisation) (c) individual preferences (e.g. strategies that help specialists to better cope with certain problems than laypeople, Davies 2004). When defining a problem, the decision makers are basing on boundary conditions understood as some kind of limitations imposed on future choices. They also mark out the level of risk that is acceptable in a given situation. The above restrictions may not be complied with at every stage of decision making. What is more, individuals may but need not rationally assume that the fewer consequences of the decision, the higher the acceptable risk. Therefore, people tend to accept a higher risk when buying less valuable goods, and lower risk when the goods to be purchased are expensive.

Another important activity in the pre-decision phase is to collect information about the problem, especially about potential solution options. The decision makers search for information in various sources, e.g. external (Internet sites or friends) or internal (semantic or episodic memory). When they are going to buy a computer, they look for technical specification on-line or consult a computer geek they know. When they are actually buying a computer, they mine in their semantic memory for general data for, say, specific components, while the episodic memory provides information about, for instance, a range of brands to choose from. It is worth remembering, however, that the more complex the problem, the more information is required but harder to find. In addition to this, the search for information is biased and made at random, which may lead to a wrong choice. Some research has shown that the relation between the amount of information gathered by an individual and their competences is non-linear. The least information is collected by incompetent

people because they do not know where to look for and are not able to tell which data are useful and which are not. The most data is obtained by those relatively competent as they know where the sources of information are and can distinguish between the relevant and irrelevant data. Interestingly, highly competent decision-makers find the optimum amount of data, looking only for the necessary ones or they recall the ones they have learned about before (Falkowski and Tyszkla 2001).

In the decision phase, the choice is made out of the options previously defined as available (Svenson 2003). It is a step-by-step process and it allows for the choice of one option that is more and more favored in comparison to others, i.e. it is increasingly better justified as logical and subjectively regarded as reliable. Nevertheless, if the decision makers do not restrict themselves to the previously defined options, they can build completely new ones. To this end they change their interpretation of known facts. In the situation when create a new option on their own, they can single it out and justify it by making a decision, simultaneously considerably changing the structure of their knowledge. Such a mode of operation is typical of experts who make decisions using the knowledge, the quality of which differs from the knowledge of laypeople because the former often make decisions that are non-typical for their field of expertise (Shanteau 2012).

In the above phase the collected information is evaluated, which means that relevant data are separated from the irrelevant ones. This particular process is determined by several factors, the most important being cognitive processes, experience and context. When evaluating the information, people derive from their long-term memory as well as employ effective thinking, reasoning and well-operating working memory (Hinson et al. 2003; Zagorsky 2007). Moreover, superior mental functions of cognitive control, termed executive functions, are activated, especially the attentional switch and cued response inhibition (Tranel et al. 1994; Del Missier et al. 2010). The cognitive sphere is also subject to other factors, such as emotions that accompany decisions whose effect can be consistent or inconsistent with cognitive functions employed in decision making (Schwarz 2000; Andrade and Ariely 2009). Additionally, the cognitive processes are modified through anticipating and imagining the consequences of the choice made, through the capability to benefit from feedback as well as through the general decision-making policy (Wood and Bandura 1989; Bandura and Jourden 1991). Another relevant function is the ability to assess risk connected with individual options. No matter what kind of risk the individual can accept, they need to be able to assess that risk and envision the alternative courses of action after the decision has been made. Yet, human imagination is usually not creative enough, therefore people make their choices bearing in mind not what might happen after the decision but what they believe will happen inevitably (Falkowski et al. 2008).

The evaluation of data collected in the pre-decision phase also relies on individual experience which in turn is determined by individual differences in personality, temper and expertise. Certain role is attributed to neuroticism which is associated with the aversion to risk and the propensity to choose the most systematic strategy of information search that helps define the decision-making problem (Falkowski et al. 2008). Additionally, conscientiousness, integrity and openness are

involved in decision making because they are traits that reflect availability in terms of cognitive and behavioral control (Djeriouat and Trémolière 2014). Some authors suggest that in comparison to laypeople, experts are able to tell relevant information from the irrelevant one thanks to their previously obtained knowledge, reasoning schemes and easy access to information stored in their long-term memory (Shanteau 1992; Randel et al. 1996; Zsombok and Klein 2014). Hence, a highly experienced person is able to focus their attention on relevant information, while ignoring the irrelevant one. Yet, in particularly difficult situations (e.g. on the battlefield) experts make mistakes as well because they are not able to extract the most essential information from the noise of data that are irrelevant or even misleading.

Another group of factors that determine the evaluation of information validity is context. It can be problem-related or general, i.e. referring to a specific problem or to environmental conditions (Rohrbaugh and Shanteau 1999). The example of the general context is an overall economic or political situation that must be taken into account when making investment or military decisions. The problem-related context reveals itself depending on the wording used when describing the problem or on the associations evoked in the decision maker's brain. The example of an environmental factor that has a considerable effect on the judgment of the collected data is the pressure of time. In important areas of life, when people have to act under tight time pressure and it is not possible to follow a carefully devised strategy, it is recommendable to use automatic action schemes or to refer to one's intuition (Ordonez and Benson 1997).

In the last phase of decision making the post-decision processes set off that can take a form of doubt if the made choice was the best possible. Individuals can then attempt to convince themselves that they have chosen well by increasing the attractiveness of the selected option and simultaneous depreciation of the remaining alternatives. The mechanism is referred to as the reduction of post-decision dissonance or as the discrepancy between the option and the goal which they have been pursuing (Liang 2016). The strategies of reducing the above dissonance can take various forms, e.g. seeking confirmation of one's decision with other people by comparing oneself with people who made a worse decision in an identical situation or cognitive manipulating the value of information after the choice has been made, i.e. giving value to disadvantages and depreciating the advantages. Despite such efforts the decision maker can experience the so called post-decision regret. The more difficult the decision, the stronger the regret. In such situation individuals take measures to alleviate the emotional repercussions of that regret, thus preventing themselves from changing the decision they have made. This is an example of the decision makers' limited rationality when making critical life choices.

2.3 Dualism of Mental Systems in Decision Making

The way how individuals make decisions has been the subject of interest of researchers representing the range of scientific disciplines. The concepts originating from economics, termed normative theories, assume that decision makers have unlimited capacity, i.e. they are able to gather important information about various decision options, flawlessly analyze the data, correctly calculate the probability and eventually make a right choice. In other words, they always make rational decisions (Neumann and Morgenstern 2007). Psychological theories, defined as descriptive, presume that individuals do not always act in a reflective and logical way and they often make decisions that are satisfying but not optimal (Simon 1956; Zsombok and Klein 2014). Moreover, the cognitive psychology studies confirm that decision-making based on the analysis of all available data and following complex rules of behavior is accurate when performed in laboratory conditions rather than in natural circumstances (Payne et al. 1993; Ranyard et al. 1997; Juslin and Montgomery 2007).

Decision making is associated with a varying level of effort. People often make choices automatically, e.g. they go shopping to stores that are generally considered cheap. But decisions sometimes require conscious involvement and a thorough analysis of information, for instance, when a decision maker is buying a car. It is psychologists who search for an explanation how individuals make decisions, both the simple and the complex ones. In their deliberations they frequently refer to the division into two modes of reasoning proposed by James (1950/1980): intuitive/associative (recreative, based on comparisons) and logical/analytical (creative, based on the analysis of new data). Kahneman and Frederick (2002) claim that decision making depends on two competing systems of information processing. System 1 is called the intuitive system. Information is processed automatically, almost effortlessly, associatively, fast, parallel, unconsciously and often emotionally. This mode of operation is hard to control or to modify. System 2 is referred to as the reflective system. Information is processed in a controllable way, with substantial effort, deductively, slowly, sequentially and consciously. In this system the mode of operation is flexible and governed by general rules. In order to find out if a given mental process runs according to System 1 or System 2, we should observe the resistance to interruption caused by performing two tasks at the same time. In System 1 the operations are resistant to interruption, while in System 2 they can be disturbed (Kahneman 2003). The example is a situation where the subjects are asked to keep in mind several signs and simultaneously they are given another task. They usually respond automatically, following the first association (Kahneman and Frederick 2005). The differences between these two systems also lie in the content of the processed data. In System 1 the data content includes observations, temporary cues and their impressions that are non-voluntary and non-verbalized, based on emotions and specific. They are referred to as prototypes. Whereas in System 2 the data content represent ideas in a form of consciously generated judgments that are abstract and not affective. They create a set. The decision-

making process takes place according to the following scheme: first, System 1 is activated and proposes a solution, then System 2 joins and monitors the quality of mental operations. If the monitoring is disturbed and System 2 does not successfully intervene, what prevails are the judgments generated by System 1 on the basis of primary impressions.

Similar findings were published by Epstein (1994) according to whom individuals make choices relying on two systems that operate in parallel. Epstein calls the first one experiential as it is based on experience. He claims that it not only fast and automatic, but also that its operating manner is holistic, concrete, primarily non-verbal and minimally demanding of cognitive resources. It is highly dependent on emotions and on learning from affective experience, the effect of which is the pursuit of desirable outcomes while avoiding the undesirable ones. The second system is rational, basing on abstract and analytical reasoning. It operates according to general rules, reasoning and evidence. It is associated with culture and not directly affective. Epstein (2003) also believes that the system which is based on experience often gains advantage over the rational system. His opinion has been confirmed by the results of the experiment on the impact of stereotype priming on the accounts of the experiment participants whose responses were not consistent with their views (Bargh 1999). Moreover, Epstein's thesis has been supported by a study on two groups of children (aged 10–11 and 13–14). The study revealed that older children more often overestimate size over ratio than younger children. However, it may happen that System 2 influences System 1. In one of his experiments Epstein (2003) instructed participants to list three thoughts that came to their mind after imagining the following situation: Sophie bought a lottery ticket and crossed some numbers taking advice of a friend rather than following her intuition. Sophie failed to win a lottery. The participant's most common thoughts were that the friend was to blame. However, their next thought was that no one was to blame because the failure was due to chance. The second thoughts show that System 2 was activated.

Sloman (1996) defines the first system as associative and claims that information-processing in this system is based on similarity and temporal contiguity, where the source of information is personal experience. It is a system that is automatic, reproductive but capable of similarity-based generalization and generally referring to the past. The second system is rule-based. Operations realized by the rule-based system are based on language, culture and formal systems. It is responsible for creative and systematic reasoning, abstraction of relevant features from irrelevant ones and strategic processing. Sloman believes that both systems are parallel and can simultaneously participate in solving the same problem. The examples illustrating this particular form of mental information processing are the considerations how to explain the Muller-Lyer illusion. The illusion consists of two parallel arrow-like figures. The fins of the upper arrow point inwards, while the fins of the lower arrow point outwards. The viewer's task is to tell which shaft is longer. At first glance they say that the bottom one is longer (the first system basing on perception is launched), but on the second thought they realize that both lines are of the same length (the second system basing on rules is activated).

Evans (1984) proposed a slightly different concept of the heuristic and the analytic systems. The former is not directly linked with consciousness, processes information fast and refers to the data associated with a concrete task. The latter is closely embedded in consciousness, processes information in a step-by-step and controllable manner. In contrast to the authors of above mentioned three concepts, Evans maintains that during decision making both systems operate sequentially because the process of analytic information-processing in the second system relies on representations coming from the first system. It often results in biased reasoning as the representations of a problem in the first system are the effect of heuristics (a cognitive shortcut), which means that some relevant pieces of information can be omitted in favor of the irrelevant ones. In his extended concept, Evans (2006) states that the second system operates basing on three rules: (1) generation of a single mental model which represents a single outside world situation, (2) adjustment of mental data collected basing on information coming from the heuristic system, (3) satisfaction which results from testing the solution in a fast, or heuristic, manner. When making decisions, people usually follow the first and the second rule, which reflects their capacity to test one model and abandon it when it is not satisfying.

Similar concepts have been proposed by Stanovich and West (2000). Their concept states that the first system depends on the context, is launched automatically and unconsciously and relies on the heuristic information-processing. Therefore, cognition via the first system will always be burdened with an elementary error, i.e. automatic placement of the problem in a context. This is why individuals often fail to address tasks in accordance with their logical structure, use information originating from the context and interpret the problem situation in reference to the everyday life. The second system in turn is based on analytic reasoning isolated from the context. Mental information-processing taking place in the course of decision making is performed sequentially: initially, the first system instigates an automatic reaction that depends on the context; then, the second system generates the intervention function by stopping and fading out the first system responses on the one hand but, on the other hand, it suggests another, better response based mainly on analytic thinking, thus facilitating the isolation from the context (Stanovich et al. 2008). According to Sokołowska (2005), there is a controversy among the authors as for the characteristics of individual systems. What is questioned is the possibility of the two systems to cooperate (in a parallel or sequential manner) and the involvement of unconscious processes on the lower level (i.e. emotions or intuition).

2.4 Heuristics in Decision Making

In psychological literature the decision-making heuristics are defined as choice strategies. Their two main characteristics are fastness (the time criterion) and frugality (the criterion of the problem complexity and the engagement of processes

necessary to make a decision: Gigerenzer et al. 1999). Due to such strategies individuals can cope in a short span of time with highly complicated decisions, which would not be possible if they attempted to solve the problem in all its complexity. One of the most commonly used heuristics is the elimination-by-aspects strategy where decision makers create a set of criteria and then gradually eliminate the alternatives that do not meet one of the criteria. In the next step, they eliminate options that do not meet the next criterion from the set. Eventually, the number of alternatives is significantly reduced, which facilitates making the final decision (Tversky 1972). Another heuristics is the satisficing strategy which entails searching through the alternatives and finally making the choice which is sufficiently satisfying. Having made a decision a decision maker is satisfied not because their choice has been the best possible, but because it has been good enough, mainly from the point of view of satisfying their needs. This is an example of a compromise of some sort, as the option chosen is not the optimal one, but it has saved time and other resources and, first and foremost, the decision has been made at all. Moreover, it would not be possible to review all the options, particularly that many of them may become unavailable because of other competitors (Simon 2013). The next strategy is choosing what is most important, i.e. following cues of varying relevance. In other words, decision makers select one cue which they consider the most important and then compare individual options in pairs, each time rejecting the one whose value is lower or unknown in terms of the selected cue. If this system turns out ineffective, we can take into consideration the next ranked cue and repeat the process until the decision is made (Gigerenzer et al. 1999). There is another strategy where decision makers rely on what has worked well before. They apply the criterion which proved effective in the last trial of the same kind. The above outlined heuristics are simple decision-making formulas when the number of options exceeds the individual's capacity to analyze all the possible choices. The decision-making strategies not only govern our search for solutions, but also allow us to give up the search when there is no point for them to be continued.

The application of strategies in decision making may or may not be effective. One of the studies reveals that the outcomes of both simple and sophisticated strategies are similar in terms of the decision correctness as well as their universality (or validity in other life situations). What is more, the advantage of simple heuristics is that they the decisions are made faster (Gigerenzer et al. 1999).

However, the application of heuristics can lead to biased decisions. A classical example is replacing the natural probability judgment with the assessment of resemblance. The reason for this is that the probability judgment is more difficult and time-consuming, while the assessment of resemblance is easier and faster. Research has shown that when making choices individuals tend to replace the probability of some phenomenon with its resemblance to another, usually known, one, hence making an assessment error (Kahneman and Frederick 2002). It is an example of a kind of biased reality judgment, i.e. concentrating on irrelevant elements of the situation, which results in a biased decision.

2.5 Decision Making Under Uncertainty

Decisions made in the situations of uncertainty are the ones when we do not know what will happen or when we are not certain what results our actions will cause (Sokołowska 2005). From the economic perspective, the purpose of theoretical models is to provide answer to a question what choices should be made to be considered rational. The most popular concepts in this respect are: (a) maximisation of the expected value depending on which individuals calculate not only the potential losses, but also their probability (Bernstein 1997; Mlodinow 2009), (b) maximisation of the expected utility which means that the subjectively expected value is not a linear function of the objective value because in certain circumstances some people do not maximize the expected value (Bromiley and Curley 1992), (c) maximisation of the subjectively expected utility where the assumptions about the utility and about the subjective resemblance are combined (Bernstein 1998) and (d) minimisation of variance (the portfolio theory) according to which decision-makers minimize risk (variance) while simultaneously maximizing the rate of return, or gains (Markowitz 1952). Yet, the above models cannot be of use in all possible situations in which decision makers have found themselves because they mainly refer to known probability. Psychological studies show that making decisions under uncertainty does not follow the model of subjectively expected utility. Instead of maximizing the expected value, individuals tend to minimize or ignore it. There are several psychological concepts whose authors attempt to explain this discrepancy. One of them is the prospect theory by Kahneman and Tversky (1979). The main elements of this theory stem from the observation of real-life choices. The authors assume that economic decisions under uncertainty are made in two phases: editing and evaluation. In the editing phase we make a decision with a view to simplifying and ordering the decision-making process, usually by means of a specific heuristics (applied consciously or unconsciously). In the evaluation phase we decide on the value of individual alternatives and choose the one that has the highest subjective value. The research conducted by Kahneman (2003) point out that gains and losses are relative and evaluated according to a specified point of reference (e.g. a positive financial value can be perceived as a loss when the corresponding point of reference even more valuable). Moreover, individuals tend to change their risk preference which depends if they are in a loss or gain situation (e.g. when in the gain context the aversion to risk is predominant, while the loss context encourages the propensity to risk). Over the last few decades, plenty of studies have been published that confirm high applicability of the prospect theory, particularly when explaining decision-making mechanisms in business, law or medicine (Sunstein 2000; Camerer 2004; Schwartz et al. 2008). A similar approach is represented by Lopes (1987) who maintains that people make choices in the situations of uncertainty by referring to their adopted level of aspiration and to their individual propensity to risk. Brandstätter et al. (2006) believe that information about outcomes and probability are computed in a sequential manner, which means that in the first step decision makers analyze data about losses, then they focus on

gains. Zaleskiewicz (2011) notes that out of the above outlined models the prospect theory has been most widely recognized by researchers.

2.6 Decision Making and Volition

Making choices is also associated with volition and self-control. Baumeister et al. (1998) claim that the acts of free will and self-regulation require some effort and people are able to exert limited self-control at the same time. Therefore, the resources allowing self-control are depleted. The power of self-control varies individually. The above mentioned authors describe the limitation of volition resources taking place in the course of diverse activities involving self-control (effort) as ego depletion. The loss of self-control may be detrimental to performance in the individual, group or social dimension, such as uncontrollable shopping, overspending, incapacity to save or risky borrowing (Baumeister et al. 2006). Similar views on the involvement of self-control in decision making are shared by Moller et al. (2006) who maintain that the resources are depleted when individuals are forced to make decisions, but they are not exhausted by autonomous decisions. Research has shown that the resource depletion can also be conditioned by the attributes of goods whose quality and prices are most difficult to estimate (Wang et al. 2010). In different situations people make choices in a similar way, which probably reflects the presence of a universal set of cognitive abilities. These abilities may fail at different stages of decision making; therefore some decisions may be perceived as inadequate or illogical (Hastie and Dawes 2010).

2.7 Consequences of Decision Making

Psychological concepts explain how individuals make their choices, including those made under uncertainty. Nevertheless, these concepts do not address the consequences of the decisions. The situations when we are not certain about the outcomes of our choices are usually associated with strong emotions. Yet, in some people they can cause mental conditions, such as severe stress, anxiety or even depression. One of such situations is the lack of job security resulting in an increased number of absentees, more health-related complaints or decreased general well-being (Davis et al. 2003; Quinlan and Bohle 2009). Additionally, people at risk of redundancy more often experience anxiety and depression (Avčín et al. 2011; Snorraddóttir et al. 2013). However, the described above phenomenon has caused considerable controversy. The results of another study revealed that job insecurity is more likely to induce high blood pressure than depression (Modrek and Cullen 2013). Unfortunately, the findings of the aforementioned studies are difficult to compare because some of them are vitiated by methodological errors, e.g. the evaluation of staff's mental problems was made on the basis of their own

declarations instead of objective measurement tools or the analysis covered only the group of employees that were at risk of redundancy, while ignoring the general population of employees.

Usually the predictable consequences of simple decisions are not serious, in contrast to the situations when we are not able to foresee all the effects of our actions, such a decision to take a consumer loan or mortgage. It has not been scientifically proved yet if such a decision can be detrimental to our mental health. This may become a broader problem because mentally ill people tend to accumulate debt more often than the mentally healthy (Jenkins et al. 2009). It emerges that, on the one hand, mentally healthy individuals that become indebted because of various reasons (e.g. gambling, drug addiction or compulsive shopping) are more susceptible to anxiety and depression. On the other hand, however, psychiatric patients lose jobs more often and are less likely to receive government support hence they tend to accumulate debt (Meltzer et al. 2013). Nevertheless, study results reveal that consumer debt (Brown et al. 2005; Taylor et al. 2007), mortgage credits (Drentea 2000; Drentea and Lavrakas 2000) as well as consumer credit and mortgage credits as a whole (Cooper et al. 2008; Bridges and Disney 2010) are linked with diagnosed anxiety and depression. What is more, people who are in debt, disregarding what type, suffer from obsessive-compulsive disorders, phobias and panic attacks (Meltzer et al. 2013). Bentley et al. (2011) suggest that the correlation between mortgage credit and mental disorders is stronger in a group of low-income people. Other researchers have obtained contradictory results, indicating that the socio-economic status does not have effect on the relationship between debt and the prevalence of mental diseases (Drentea and Reynolds 2012; Mauramo et al. 2012). Also in this case the comparison of results is difficult because of the lack of uniform operationalization of debt (Martin-Carrasco et al. 2016).

2.8 Conclusions

The review of literature about psychological aspects of decision making allows for several elementary conclusions.

First, from the psychological point of view decision making is a complex process consisting of three stages: the pre-decision phase, the decision phase and the post-decision phase, each representing different activities. Mental operations preceding the actual choice presumably follow a similar pattern in all humans.

Secondly, basing on psychological theories, a universal model was built of two systems of computing information involved in decision making. The first one is termed intuitive or affective, while the second one—as analytic or logical. This distinction reflects the classical division existing in psychology into processes that are unconscious, fast and automatic and the ones that are conscious, slow and reflective. The controversy relates to such issues as the interaction between the two systems (parallel or sequential) and the role of unconscious processes in System 1 (emotions or intuition).

Thirdly, when making decisions, individuals tend to apply various strategies called heuristics (cognitive shortcuts). Thanks to heuristics they can make their choices in a fast and frugal manner in both simple and intricate decision-making situations. The authors reveal that the elimination-by-aspects strategy, the satisficing strategy, the strategy of choosing what is the most important as well as the strategy of relying on what has worked well before. However, recourse to heuristics may lead to biased decisions, e.g. by replacing the natural probability judgment with the assessment of resemblance individuals may inaccurately evaluate available options.

Fourthly, it is essential to understand how individuals make decisions under uncertainty, i.e. when they do not know what will happen next or they are not certain about the result of their choice. Concepts that have been built on the basis of economics are not applicable in every decision-making situation because they relate mainly to known probability. Psychological theories in turn aim to explain how individuals make actual decisions in the real world. They provide a way to understand better how brains of people dealing with law, medicine or business cope with decision making.

Fifthly, more and more researchers begin to recognize the role of volition and self-control in the process of decision making. Some psychological theories indicate that individuals can exert self-control only to a limited extent, so their resources become depleted in the process, thus leading to biased decisions.

Sixthly, the decision-making situations, particularly the ones when individuals lack certainty about the outcomes, are accompanied by strong emotions. Some people may experience mental problems, mainly increased anxiety, stress or even depression. Generally, it is essential to comprehend the potential detrimental effects of complex decisions made not only by healthy individuals but also by people suffering from mental disorders.

In sum, psychological theories explain what is happening in the minds of decision makers before, during and after the decision making. Also, the understanding of information-computing mechanisms that are involved in the decision-making process can be particularly useful in practice.

References

- Andrade EB, Ariely D (2009) The enduring impact of transient emotions on decision making. *Organ Behav Hum Decis Process* 109:1–8
- Avčin BA, Kučina AU, Sarotar BN et al (2011) The present global financial and economic crisis poses an additional risk factor for mental health problems on the employees. *Psychiatr Danub* 23:142–148
- Bandura A, Jourden FJ (1991) Self-regulatory mechanisms governing the impact of social comparison on complex decision making. *J Pers Soc Psychol* 60:941–951
- Bargh JA (1999) The cognitive monster. In: Chaiken S, Trope Y (eds) *Dual process theories in social psychology*. Guilford Press, New York, pp 361–382

- Baumeister RF, Bratslavsky E, Muraven M et al (1998) Ego depletion: is the active self a limited resource? *J Pers Soc Psychol* 74:1252–1265
- Baumeister RF, Gailliot M, DeWall CN et al (2006) Self-regulation and personality: how interventions increase regulatory success, and how depletion moderates the effects of traits on behavior. *J Pers* 74:1773–1802
- Bentley R, Baker E, Mason K et al (2011) Association between housing affordability and mental health: a longitudinal analysis of a nationally representative household survey in Australia. *Am J Epidemiol* 174:753–760
- Bernstein PL (1997) *Przeciw bogom. Niezwykłe dzieje ryzyka*. WIG-Press, Warszawa
- Bernstein PL (1998) *Intelektualna historia wall street*. WIG-Press, Warszawa
- Brandstätter E, Gigerenzer G, Hertwig R (2006) The priority heuristic: making choices without trade-offs. *Psychol Rev* 113:409–432
- Bridges S, Disney R (2010) Debt and depression. *J Health Econ* 29:388–403
- Bromiley P, Curley SP (1992) Individual differences in risk taking. In: Yates JF (ed) *Risk-taking behavior*. Wiley, New York, pp 87–132
- Brown S, Taylor K, Price SW (2005) Debt and distress: evaluating the psychological cost of credit. *J Econ Psychol* 26:642–663
- Camerer CF (2004) Prospect theory in the wild: evidence from the field. In: Kahneman D, Tversky A (eds) *Choices, values, and frames*. Cambridge University Press, Cambridge, pp 288–300
- Cooper C, Bebbington PE, Meltzer H et al (2008) Depression and common mental disorders in lone parents: results of the 2000 National Psychiatric Morbidity Survey. *Psychol Med* 38:335–342
- Davies SP (2004) Planning and problem solving in well-defined domains. In: Morris R, Ward G (eds) *The cognitive psychology of planning*. Psychology Press, Hove, pp 35–51
- Davis JA, Savage G, Stewart RT et al (2003) Organizational downsizing: a review of literature for planning and research/practitioner application. *J Healthc Manag* 48:181–199
- Del Missier F, Mäntylä T, Bruine de Bruin W (2010) Executive functions in decision making: an individual differences approach. *Think Reason* 16:69–97
- Djeriouat H, Trémoilère B (2014) The dark triad of personality and utilitarian moral judgment: the mediating role of honesty/humility and harm/care. *Personal Individ Differ* 67:11–16
- Drentea P (2000) Age, debt and anxiety. *J Health Soc Behav* 41:437–450
- Drentea P, Lavrakas PJ (2000) Over the limit: the association among health, race and debt. *Soc Sci Med* 50:517–529
- Drentea P, Reynolds JR (2012) Neither a borrower nor a lender be: the relative importance of debt and SES for mental health among older adults. *J Aging Health* 24:673–695
- Epstein S (1994) Integration of the cognitive and the psychodynamic unconscious. *Am Psychol* 49:709–724
- Epstein S (2003) Cognitive-experiential self-theory of personality. In: Millon T, Lerner M (eds) *Comprehensive handbook of psychology*. Wiley, Hoboken, pp 156–184
- Evans JSB (1984) Heuristic and analytic processes in reasoning. *Br J Psychol* 75:451–468
- Evans JSB (2006) The heuristic-analytic theory of reasoning: extension and evaluation. *Psychon Bull Rev* 13:378–395
- Falkowski A, Tyszcza T (2001) *Psychologia zachowań konsumenckich*. Gdańskie Wydawnictwo Psychologiczne, Gdańsk
- Falkowski A, Maruszewski T, Nęcka E (2008) Procesy poznawcze. In: Strelau J, Doliński D (eds) *Psychologia. Podręcznik akademicki*. Gdańskie Wydawnictwo Psychologiczne, Gdańsk, pp 339–510
- Gigerenzer G, Todd PM, ABC Research Group et al (1999) *Simple heuristics that make us smart*. Oxford University Press, Oxford
- Hastie R, Dawes RM (2010) *Rational choice in an uncertain world: the psychology of judgment and decision making*. Sage, Los Angeles
- Hinson JM, Jameson TL, Whitney P (2003) Impulsive decision making and working memory. *J Exp Psychol Learn Mem Cogn* 29:298–306

- James W (1890/1950) *The principles of psychology*. Dover Publications, New York
- Jenkins R, Fitch C, Hurlston M et al (2009) Recession, debt and mental health: challenges and solutions. *Ment Health Fam Med* 6:85–90
- Juslin P, Montgomery H (2007) Judgment and decision making: neo-Brunswikian and process-tracing approaches. Psychology Press, Mahwah
- Kahneman D (2003) A perspective on judgment and choice: mapping bounded rationality. *Am Psychol* 58:697–720
- Kahneman D, Frederick S (2002) Representativeness revisited: attribute substitution in intuitive judgment. In: Gilovich T, Griffin D, Kahneman E (eds) *Heuristics and biases: the psychology of intuitive judgment*. Cambridge University Press, New York, pp 49–81
- Kahneman D, Frederick S (2005) A model of heuristic judgment. In: Holyoak KJ, Morrison RG (eds) *The Cambridge handbook of thinking and reasoning*. Cambridge University Press, New York, pp 267–293
- Kahneman D, Tversky A (1979) Prospect theory: an analysis of decision under risk. *J Econ Soc* 47:263–291
- Lerner JS, Li Y, Valdesolo P et al (2015) Emotion and decision making. *Annu Rev Psychol* 66:799–823
- Liang YJ (2016) Reading to make a decision or to reduce cognitive dissonance? The effect of selecting and reading online reviews from a post-decision context. *Comput Hum Behav* 64:463–471
- Lopes LL (1987) Between hope and fear: the psychology of risk. In: Berkowitz L (ed) *Advances in experimental social psychology*. Academic, San Diego, pp 255–295
- Markowitz H (1952) Portfolio selection. *J Financ* 7:77–91
- Martin-Carrasco M, Evans-Lacko S, Dom G et al (2016) EPA guidance on mental health and economic crises in Europe. *Eur Arch Psychiatry Clin Neurosci* 266:89–124
- Mauramo E, Lallukka T, Laaksonen M et al (2012) Past and present socioeconomic circumstances and psychotropic medication: a register-linkage study. *J Epidemiol Community Health* 66:1143–1151
- Meltzer H, Bebbington P, Brugha T et al (2013) The relationship between personal debt and specific common mental disorders. *Eur J Pub Health* 23:108–113
- Młodniow L (2009) *Matematyka niepewności. Jak przypadki wpływają na nasz los*. Prószyński i S-ka, Warszawa
- Modrek S, Cullen MR (2013) Job insecurity during recessions: effects on survivors' work stress. *BMC Public Health* 13:929
- Moller AC, Deci EL, Ryan RM (2006) Choice and ego-depletion: the moderating role of autonomy. *Personal Soc Psychol Bull* 32:1024–1036
- Morris R, Ward G (2004) *The cognitive psychology of planning*. Psychology Press, Hove
- Nęcka E, Orzechowski J (2005) Higher-order cognition and intelligence. In: Sternberg RJ, Pretz JE (eds) *Cognition and intelligence: identifying the mechanisms of the mind*. Cambridge University Press, New York, pp 122–141
- Neumann J, Morgenstern O (2007) *Theory of games and economic behavior*. Princeton University Press, Princeton
- Newell BR, Shanks DR (2014) Unconscious influences on decision making: a critical review. *Behav Brain Sci* 37:1–19
- Ordóñez L, Benson L (1997) Decisions under time pressure: how time constraint affects risky decision making. *Organ Behav Hum Decis Process* 71:121–140
- Payne JW, Bettman JR, Johnson EJ (1993) *The adaptive decision maker*. Cambridge University Press, New York
- Quinlan M, Bohle P (2009) Overstretched and unreciprocated commitment: reviewing research on the occupational health and safety effects of downsizing and job insecurity. *Int J Health Serv* 39:1–44
- Randel JM, Pugh HL, Reed SK (1996) Differences in expert and novice situation awareness in naturalistic decision making. *Int J Hum Comput Stud* 45:579–597

- Ranyard R, Crozier WR, Svenson O (1997) Decision making: cognitive models and explanations. Psychology Press, London
- Reitman WR (1965) Cognition and thought: an information processing approach. Wiley, Oxford
- Rohrbaugh CC, Shanteau J (1999) Context, process, and experience: research on applied judgment and decision making. In: Durso FT (ed) Handbook of applied cognition. Wiley, Chichester, pp 115–139
- Schwartz A, Goldberg J, Hazen G (2008) Prospect theory, reference points, and health decisions. *Judgm Decis Mak* 3:174–180
- Schwarz N (2000) Emotion, cognition, and decision making. *Cognit Emot* 14:433–440
- Shanteau J (1992) Competence in experts: the role of task characteristics. *Organ Behav Hum Decis Process* 53:252–266
- Shanteau J (2012) Decision making by experts. In: Shanteau J, Mellers BA, Schum DA (eds) Decision science and technology. Reflections and contributions of ward edwards. Springer, New York, pp 105–132
- Simon HA (1956) Rational choice and the structure of the environment. *Psychol Rev* 63:129–138
- Simon HA (2013) Administrative behavior. The Free Press, New York
- Sloane P, MacHale D (1997) Perplexing lateral thinking puzzles. Sterling, New York
- Slooman SA (1996) The empirical case for two systems of reasoning. *Psychol Bull* 119:3–22
- Snorradóttir Á, Vilhjálmsson R, Rafnsdóttir GL et al (2013) Financial crisis and collapsed banks: psychological distress and work related factors among surviving employees. A nation-wide study. *Am J Ind Med* 56:1095–1106
- Sokołowska J (2005) Psychologia decyzji ryzykownych. Ocena prawdopodobieństwa i modele wyboru w sytuacji ryzykownej. Wydawnictwo SWPS Academica, Warszawa
- Stanovich KE, West RF (2000) Advancing the rationality debate. *Behav Brain Sci* 23:701–717
- Stanovich KE, Toplak ME, West RF (2008) The development of rational thought: a taxonomy of heuristics and biases. *Adv Child Dev Behav* 36:251–285
- Sunstein CR (2000) Behavioral law and economics. Cambridge University Press, New York
- Svenson O (1992) Differentiation and consolidation theory of human decision making: a frame of reference for the study of pre- and post-decision processes. *Acta Psychol* 80:143–168
- Svenson O (2003) Values, affect and processes in human decision making: a differentiation and consolidation theory perspective. In: Schneider SL, Shanteau J (eds) Emerging perspectives on judgment and decision research. Cambridge University Press, New York, pp 287–326
- Taylor MP, Pevalin DJ, Todd J (2007) The psychological costs of unsustainable housing commitments. *Psychol Med* 37:1027–1036
- Toplak ME, Sorge GB, Benoit A et al (2010) Decision-making and cognitive abilities: a review of associations between Iowa gambling task performance, executive functions, and intelligence. *Clin Psychol Rev* 30:562–581
- Tranel D, Anderson SW, Benton A (1994) Development of the concept of “executive function” and its relationship to the frontal lobes. In: Boller F, Grafman J (eds) Handbook of neuropsychology. Elsevier, Amsterdam, pp 125–148
- Tversky A (1972) Elimination by aspects: a theory of choice. *Psychol Rev* 79:281–299
- Wang J, Novemsky N, Dhar R et al (2010) Trade-offs and depletion in choice. *J Mark Res* 47:910–919
- Wood R, Bandura A (1989) Impact of conceptions of ability on self-regulatory mechanisms and complex decision making. *J Pers Soc Psychol* 56:407–415
- Zagorsky JL (2007) Do you have to be smart to be rich? The impact of IQ on wealth, income and financial distress. *Intelligence* 35:489–501
- Zaleśkiewicz T (2011) Psychologia ekonomiczna. Wydawnictwo Naukowe PWN, Warszawa
- Zsombok CE, Klein G (2014) Naturalistic decision making. Psychology Press, New York

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