

PROSPECTS THEORY AND INDIVIDUAL STYLE OF ECONOMIC DECISION- MAKING

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Abstract

The purpose of the research was to test the prospects theory of Nobel Prize winner in economics D. Kahneman and A. Tversky, which describes the heuristics of economic decision-making, to the adoption of a decision by a concrete person. The method of the study is the Single Case Study, which is the most basic form of case-oriented research. The empirical material was obtained using the Melbourne decision-making questionnaire. The presence of cognitive biases in the decision-making process was determined based on the framing effect. Many methods were used to test the decision-making style of the research participant N and the components of intellectual-personal potential determined. It shows that there are deviations in the process of concrete economic decision making, which are not the result of heuristics, characterized by D. Kahneman and A. Tversky. The decision of the research participant is based on the rational style of this process and the analytical system of reasoning. There is an interaction between cognitive systems 1 and 2 with the evident dominance of the latter. This system blocks cognitive biases and ensures the achievement of results. At the same time, there is an influence from the properties of the intellectual-personal potential of the research participant, such as rationality, intolerance to uncertainty, emotional intelligence. In conclusion, the prospects theory explains the decision-making process in the case study, but the "systematic errors" which D. Kahneman and A. Tversky speak about are not observed. Therefore, there is an opportunity to continue studying the role of individuality in economic behavior.

Keywords: *behavioral economics, cognitive systems, decision-making style, prospects theory, single case study.*

Introduction

The prospects theory of Nobel Prize winner in economics Kahneman and Tversky describes heuristics of decision making under conditions of uncertainty (Tversky & Kahneman, 1974). Heuristic refers to the decision-making algorithm in a situation of uncertainty as a practical method that does not guarantee accuracy or optimality but is sufficient to obtain a result. According to the theory, in the decision making process, the assessment is carried out with respect to a neutral

starting point – the “level of adaptation”; the principle of sensitivity reduction works both in the sphere of sensations and in the economy – in assessing the changes that are taking place; losses in comparison seem to be greater than gains – the principle of non-acceptance of losses. Kahneman and Tversky found that people use a limited number of heuristics, with the complex tasks of estimating probabilities and predicting values, reduced to simple operations of obtaining judgments, the result of which are errors in decision-making. They call heuristics “simplification schemes in intuitive thinking” and conclude that “these heuristics are highly economical and usually effective, but they lead to systematic and predictable errors” (Ibid, p. 1131).

The prospects theory describes three types of heuristics – Representativeness, Availability, Adjustment and Anchoring. The first heuristic stipulates that the probability of an uncertain event in which objects (processes or events) **A** and **B** appear is determined by the degree to which **A** is represented by **B** – the degree of similarity between **A** and **B**. This way of assessing probability can lead to errors, because the similarity does not necessarily mean the relationship between **A** and **B**. Factors that could affect the probability assessment may not be related to the similarity of **A** and **B**, therefore they are not taken into account. The Availability heuristic involves estimating the probability of occurrence of an event based on an analysis of a collection of similar events known from experience. Accessibility is useful for assessing the probabilities of events that form a wide class (easily reproduced in memory, remembered, happen often, have a high probability), but for events of narrow, less likely classes, this heuristic is not so effective. Errors in assessing situations are also caused by such factors as the degree of resumption of events in memory, the influence of the direction of the search, and the illusory interconnection. According to the Adjustment and Anchoring heuristic, people estimate the probability based on the starting value of a certain value or the initial formulation of a problem specially selected to obtain the final result. When evaluating events complex in structure, a characteristic tendency is to overestimate the probability of conjunctive (for example, success while several conditions are fulfilled simultaneously) and underestimate the probability of disjunctive (risk when at least one factor is triggered). This is a consequence of binding to the starting value – the probability of an elementary event as a component of conjunctive and disjunctive constructions. The binding in assessing the distribution of subjective probability demonstrates that the degree of correct assessment depends on the assessment procedure.

The prospects theory is complemented by the concept of two cognitive systems (Kahneman, 2011). System 1 reacts to the situation automatically and quickly, generates complex, out of conscious control, patterns of thinking, operates with expert knowledge and intuitive heuristics, generates impressions and feelings, which are the main source of beliefs and conscious choices of System 2. The latter works more slowly, implements discursive work, includes a “rational Self”, which plans, controls, is responsible for the choice of decision making. It is not easy for System 2 to distinguish informed decisions from heuristic, intuitive ones, namely the operational qualities of System 1 lead to errors and cognitive distortions.

Researchers working in the field of perspective theory of D. Kahneman and A. Tversky note that the authors of the theory do not take into account individual differences in the decision-making process (Popov & Vihman, 2014; Stanovich & West, 1998). Noteworthy is the statement of D. Kahneman about A. Tversky: “He thought more logically, focused on theory and always adhered to the intended path... I relied more on intuition” (Kahneman, 2011, p. 13). Probably, according to Tversky, the leading among cognitive systems is System 2, and according to D. Kahneman the leading is System 1. The observation by the author of the prospect theory is very valuable and testifies to the relevance of the research.

In psychological studies of the decision-making process, attention is focused on the characteristics of the thinking process of the decision-maker; on the structure of the tasks to be solved; the processes preceding the decision are characterized; the selection process, algorithmic and heuristic strategies used in solving problems are analyzed (Kozielecki, 1979). Researchers often point out the need to study an individual style of making an economic decision (Grant, 2016; Kornilova & Kerimova, 2018; Popov & Vihman, 2014; Stanovich & West, 1998). This problem continues to be relevant. The prospect theory of Kahneman and Tversky does not offer a solution to this problem.

The individual style of economic decision-making has become the focus of the research.

The research hypotheses are 1. Individual decision-making is expressed in deviations from the normative course of this process described by the prospect theory of Kahneman and Tversky. 2. The decision-making by a concrete person is carried out when one of the cognitive systems dominates and is expressed in the individual style of this process. 3. The case of decision-making by a concrete person is consistent with the prospect theory.

Each of these hypotheses follows from the analysis of the research in the field of prospect theory. It can be assumed that not every case of economic decision-making is explained by the action of heuristics (Representativeness, Availability, Adjustment, and Anchoring) described by Kahneman and Tversky. There is a reason to believe that the individual style of economic decision-making associates with the dominance of one of the identified cognitive systems (1 or 2), which D. Kahneman spoke about. It is natural to expect that in general the case of economic decision-making is consistent with the prospect theory of Kahneman and Tversky. It is relevant to test this theory for compliance with the concrete case of economic decision-making and to characterize the individual style of this process.

Research Methodology

General Background

The research method was a Single Case Study. This method is used to study a concrete case of decision-making and allows you to present the results of the study in the form of a certain sequence of intellectual operations of the research participant (Kononovych & Myasoid, 2019; Zaidah, 2007). It is the Single Case Study that is necessary to test the hypotheses of this study. At the same time, it allows not only to investigate a concrete case of decision-making but also to interpret it from the prospect theory of Kahneman and Tversky to confirm or clarify its provisions.

Participants

Research participant – further N, age 50 years, profession – mathematician, experience in making vital economic decisions – 26 years. The research participant was selected from a group of university professors in the amount of 30 people. Initially, the study participant studied the content of the heuristic described at the beginning of the article “Representativeness, Accessibility, Adjustment, and Linking”, and learned to define them using the decision-making examples presented by the researchers. The training was brought to the stage of the formation of the skill of faultless determination of heuristics in each example. Subsequently, he determined the heuristic of his vital decisions to acquire valuable items for personal use. Single Case Study becomes a tool for analyzing the data obtained in order to compare the results with the provisions of the theory of prospect Kahneman and A. Tversky.

Data Analysis and Procedures

The decision-making process was studied with the help of the Melbourne decision-making questionnaire, which allows diagnosing the following factors: Vigilance, Back-Passing, Procrastination, and Hypervigilance (Mann et al., 1997, Russian-language adaptation: Kornilova, 2013). Vigilance factor describes a person's ability to be prepared to act at the right time, to clarify the goals and objectives of the solution, to consider alternatives related to finding information and assimilating it before making a choice. The Avoidance factor testifies to the person's attempt to shift responsibility for the decision to someone else; procrastination – the postponement of decisions until the last moment; Cautiousness is characterized by a “throwing” between alternatives and impulsive decision-making to get rid of the uncertainty situation. The research participant N was involved in the analysis of protocols. As a result of joint discussions of each case, heuristics of economic decision-making was identified, and the action of the congruent systems 1 and 2 were characterized. Single Case Study becomes a combination of the analysis of the authors of this research and the introspection of the research participant.

The presence of cognitive biases in the process of economic decision-making was determined based on the framing effect (Kahneman & Tversky, 1981). The authors of the prospect theory found that this process was influenced by insignificant features of the formulation of the problem of choosing the context of the consequences of choice as positive or negative. Thus, when formulating a task guarantee loss, people, seeking the opposite result, tend to risk, while, when there is a guarantee option, they are not risk averse. In this study, the framing effect is illustrated by a task known as “Disease Problem” (Stanovich & West). The research participant is asked to choose between alternatives using examples of different formulations of the choice task, which describes the response through two medical programs to an outbreak of an imaginary Asian disease that can kill 600 people. Example 1: “Program A will save 200 people. The B program will likely save 33.3% of all with a probability of 66.6% not surviving”. Example 2: “According to the C program, 400 people will die. As a result of Program D, 33.3% are unlikely to die, with 66.6% likely to die among all 600 people”. In each case, the question is asked, “Which program would you prefer?” In real terms, the results of programs A and B and C and D are the same, only the formulation of the program (A, C), which guarantees something, and the program (B, D), which, as opposed to the previous one, suggests risk. The risk-opposing selection results, which are due only to the formulations of Examples 1 and 2, are evidence of the framing effect; the absence of such dependence on formulation is a sign of the effect of reframing.

Decision-making style was defined using the General Decision-Making Style (GDMS) scales (Scott & Bruce, 1995). The styles are diagnosed: Rational, Intuitive, Dependent, Spontaneous, Avoidance. The data obtained characterize the structure of the decision-making style inherent to the research participant *N*.

The components of the intellectual-personal potential of the research participant *N* were diagnosed: intolerance/tolerance to uncertainty, rationality, risk appetite, intuitive ability, intuition, reflexivity, self-efficacy, emotional intelligence (Kornilova, Chumakova, Kornilov & Novikova, 2010). Methods of diagnostics of these variables, used by these authors, were applied to this research. The high scientific status of the research participant *N* – the Candidate of physical and mathematical sciences – eliminates the need to test the IQ of this person.

A quantitative analysis of the data was carried out, the data was interpreted based on the prospect theory of Kahneman and Tversky.

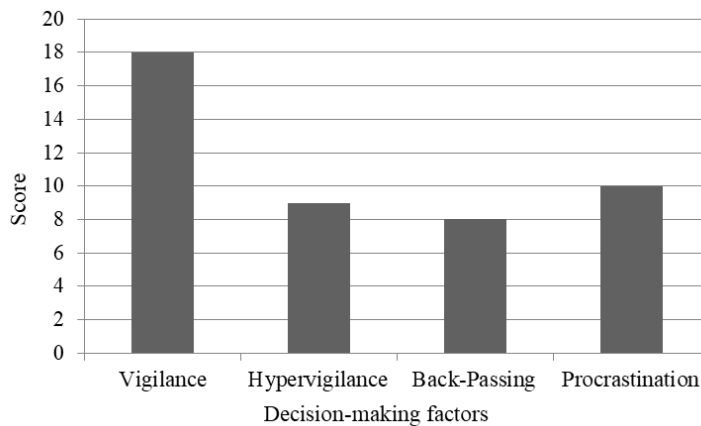
Research Results

The use of the Melbourne decision-making questionnaire showed that the decision-making process by research participant *N* is under the decisive influence of the Vigilance factor (Figure 1). The factors of Back-Passing and Procrastination are found in isolated cases, against this background, the factor Hypervigilance is somewhat distinguished. An analysis of research protocols has shown that the Vigilance factor is associated with a heuristic of Representativeness, Availability, Adjustment and Anchoring. In some comments of research participant *N* in the questionnaire, several heuristics were highlighted. In the comments to Statement 12, there is only one. In three cases, the research participant did not reveal a single heuristic. In three cases, the research participant failed to identify a single heuristic.

An analysis of the protocols of the decision-making process by research participant *N* shows that System 2, which is responsible for the conscious choice of an economic decision, generally dominates over System 1, whose work is characterized by an intuitive, automatic flow of this process. In the case of the factor of Hypervigilance, there is a violation of the dominance of System 2 under the influence of System 1. The factors of Back-Passing and Procrastination indicate an active intervention of System 1, which leads to a change in the dominant in its favor. The research participant noted that heuristics Representativeness, Availability, Adjustment, and Anchoring work in this system precisely in the event that System 2 dominates over System 1. The operation of System 1 did not allow him to identify heuristics while affecting the change in starting positions and the direction of the search. This System also prevented the determination of the worth of alternatives, suspended the decision process and the choice of method for its implementation. The process of the economic decision passed under the control of intuition and depended on the emotional state of the research participant.

Figure 1

Decision-making factors by research participant N



Note: based on the results of applying the Melbourne decision making questionnaire.

Analyzing the data obtained using the Melbourne decision-making questionnaire, a field was found to go beyond the heuristic. In some cases, when an economic decision was made, the research participant did not find those “systematic and predictable errors” that were mentioned by D. Kahneman and A. Tversky. According to the analysis of the protocols, the reasons for deviations in these cases were the high value of the decision-making object, insufficient motivation to overcome conservatism, lack of time for a rational analysis of the situation, the presence of motives that do not make themselves known at the beginning of the process.

The Hypervigilance factor, whose influence is stronger than the Back-Passing and Procrastination factors, manifested itself in a delay in decision making, a shift in the boundary value of the set of value judgments, on the basis of which the research participant N made a decision (Figure 2).

Figure 2

The result of the shift of the boundary estimate x_c , reflecting the desire of the research participant N to an unerring choice

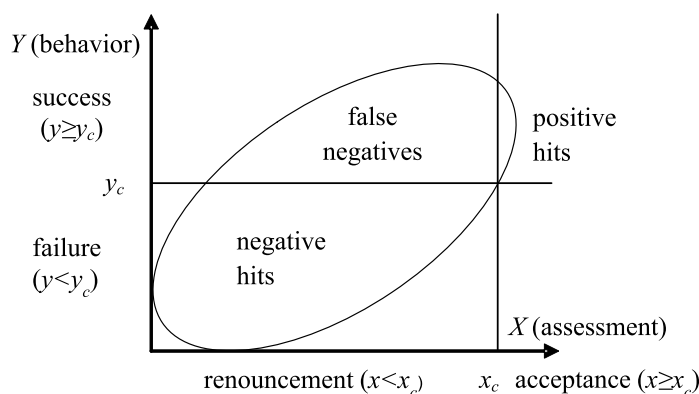


Figure 2 allows to see the dynamics of the economic decision-making process of the research participant N, as well as the area of effectiveness of this process. On the one hand, a shift to the right of the boundary value of x_c entails a complete absence of erroneous choice – false positives, on the other hand – the area of false negatives increases, and the area of positive matches, that is, the right choice remains very small. Opposing forces, one of which carries the desire not to make mistakes, and the other increases the likelihood of success, can also cause a suspension of the process and a delay in decision-making.

The results of determining the presence of cognitive distortion in the thinking of a research participant N are presented in table 1. D. Kahneman and A. Tversky used the concept “decision

frame” to explain the decision-making situation, where the thinking of the subject of this process about the actions, consequences, and probabilities associated with the particular decision is decisive. These results were compared with those obtained by statistical samples (Kahneman & Tversky, 1981). In other words, the assessments of study participant N and those of study participants from D. Kahneman and A. Tversky’s medical programs **A, B, C, D** used in the case of “Asian disease” were compared.

Table 1

The results of determining the framing effect in statistical samples and in research participant N

Selection task	Results			
	Example	Program	Statistical samples	
n			%	
1	A	152	72	+
	B		28	
2	C	155	22	+
	D		78	

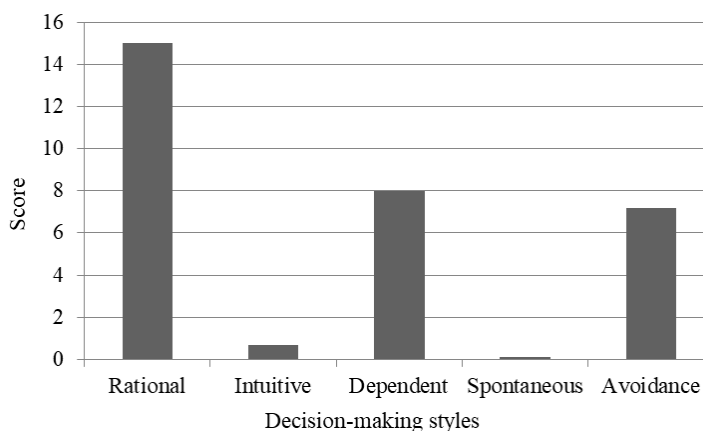
Note: The “+” sign indicates the choice of study participant N, the “-” sign indicates the absence of choice.

Research participant N solved the choice problem in Example 1 in the same way as in Example 2. The framing effect was not detected, and cognitive distortions in the decision making were not characteristic of him. This is the effect of reframing.

Studies of the style of the economic decision-making process by research participant N showed that in the structure of the decision-making style, Rational is characterized by a value close to the maximum, Dependent and Avoidance are at an average level, Intuitive at a minimum level, and the Spontaneous is absent (Figure 3). The study participant characterizes as a rational decision-making style.

Figure 3

The decision-making styles by the participant in the study N



Note: based on the results of applying the GDMS scales.

Diagnosis of the components of the intellectual-personal potential of the research participant N showed that the person is characterized by intolerance to uncertainty, rationality, and emotional intelligence of interpersonal and personal forms (Table 2). Reflexivity and self-efficacy occupy a subordinate place, intuitive abilities – at a low level.

Table 2

The components of the intellectual-personal potential of the research participant N

Components of the intellectual-personal potential	Quantitative assessment of intellectual-personal potential	Qualitative assessment of intellectual-personal potential
Intolerance / tolerance to uncertainty	37 points (9 stanines) / 26 points (3 stanines)	Intolerance to uncertainty at the highest level. Tolerance to uncertainty is slightly below average
Rationality / risk appetite	9 points / -8 points	Rationality at the highest level. No risk appetite
Intuitive ability. Use of intuition	24 points (2 stanines). 19 points (1 stanines)	Intuitive ability at a low level. Use of intuition at the lowest level
Reflexivity	136 points (6 stans)	Above average reflexivity
Self-efficacy	27 points	Mid-level self-efficacy
Interpersonal intelligence. Emotional intelligence	Interpersonal intelligence – 66 points (9 stans), emotional intelligence – 73 points (9 stans)	Interpersonal and personal emotional intelligence at the highest level

Note: A quantitative assessment of the components of the intellectual and personal potential is given in the form provided for by the methodology.

Discussion

The results of using the Melbourne questionnaire for decision-making showed that in the case of a decision made by the study participant N, deviations from the normative process described by Kahneman and Tversky took place. Heuristic action Representativeness, Availability, Adjustment, and Anchoring were observed, but there were violations: there was a change in the starting position, the direction of the later action, the value of the decision influenced the control of the process. There were no “systematic and predictable errors”, a decision was made, and its result was not regrettable. At the same time, there were cases where heuristics were detected, and deviations in the decision-making process were not recorded. Hypothesis 1, according to which individual decision-making is reflected in non-standard deviations of this process, is confirmed. However, some of them are not the result of heuristics. It was also found that heuristics often do not lead to forecast errors. The reasons for this lie in the characteristics of the cognitive sphere of the research participant N.

Kornilova (2013) identified two types of personality regulation of decision-making strategies. The first is characterized by high rates of the Vigilance factor with lower indicators of the factors Back-Passing and Procrastination; the second is opposite to the first and is characterized by low rates of the Vigilance factor and slightly higher rates of the other two factors. Obviously, the research participant N is characterized by the first type of regulation with high indicators of the Vigilance factor and features that are indicated by low rates of factors of the Back-Passing and Procrastination, with a greater severity of the factor of the Hypervigilance. According to Kornilov, Vigilance is the only coping that allows you to make rational decisions. It expresses in the person’s propensity for active peace, readiness to accept the conditions of uncertainty and flexible strategies of the decision-making process. The subjective contribution to this process expresses in the willingness to think over the goals and alternatives of solutions, collect information and, as much as possible, without relying on intuition, cover the field of alternatives. Kornilova does not reveal the connection of this factor with intelligence and concludes that it should be about styles, and not about cognitive differences in the regulation of decision-making. The results of our study suggest the opposite:

cognitive differences are crucial both in the regulation of decision-making and in the style of this process. The rationale for this position is both indicators of the vigilance factor and the action of cognitive system 2 in this case.

Economic decision making by research participant N appears to be complex organized copying of the uncertainty situation. This is the process of achieving the desired result, where System 2 resists the action of the intuitive System 1 and suppresses the cognitive distortions coming from the heuristic. It is known that System 2 works as analytical intelligence (Stanovich & West, 1998).

When studying the framing effect, approximately 6% of participants showed the effect of reframing (Kahneman & Tversky, 1981). Similar results obtained other authors – 5.8% and 7.1% (Stanovich & West, 1998). Namely in this group falls the research participant N. Significantly higher results of reframing received Russian researchers – 37.8%, 60% (Popov & Vihman, 2014), 56% (Kornilova & Kerimova, 2018). Perhaps because, while translating the text into Russian, they simplified the wording. The effect of reframing is a “minority phenomenon,” which is expressed in the desire to avoid risk in all circumstances (Frisch, 1993). The framing effect is explained by the properties of System 1, i.e. a quick, intuitive solution to the choice problem (Kahneman, 2011). Research participant N solved this problem according to the rules of System 2 while referring to the experience of analysis and formalization of mathematical problems. Cognitive distortion does not occur, which is consistent with data on the lack of a framing effect in individuals with high analytical abilities (Stanovich & West, 1998). Hypothesis 2 appears to be a statement: research participant N makes decisions in the conditions of dominance of System 2, and the peculiarity of the decision-making style consists of its rationality. This is showed by the Vigilance factor diagnosed using the Melbourne decision-making questionnaire (see Table 1) and the data obtained using the GDMS scales (see Figure 3). Different techniques reveal the property of the same decision-making style. The coincidence of the results by the Back-Passing parameter is also indicative. A rational decision-making style characterizes the willingness to act at the right time, clarify the goals of the decision, analyze the alternatives, make an informed choice, and not to involve evading the decision.

Kornilova did not find a connection between intuition and decision-making factors. In our case, this can be explained by the fact that intuition, being peculiar to System 1, is blocked by System 2 when a participant in research N makes a decision. This also applies to the research participant's aversion to risk: a rational decision-making style does not imply risk.

It was found that when making a decision, the following properties of the intellectual and personal potential are productive: intolerance to uncertainty, rationality, reflexivity, self-efficacy, the personal component of emotional intelligence (Kornilova, 2013). In our case, coincidence occurs only intolerance to uncertainty and rationality (see Table 2). Reflexivity and self-efficacy of the research participant N – at an average level, emotional intelligence declares itself in both a personal and interpersonal form. These are the components of a heuristic, fundamentally unified, rational decision-making process.

The high value of the situation in which study participant N made a decision causes a change in the direction of the search. The choice may not be the best in terms of maximizing the expected utility, but the best of the subjective value of the decision. Within the subjectively valuable and not necessarily rational direction of the search, a rational choice between the alternatives takes place, due to the rationality inherent in the study participant. In the described case, the effect of the “value of beliefs” factor manifests itself (Bénabou & Tirole, 2016). Two decision-making strategies are combined – “maximization” and “pleasure”: the first is triggered within a given direction of the search, which is selected by the second strategy (Grant, 2016).

Analysis of the decision-making process by research participant N does not reveal those “systematic and predictable errors” that are described by D. Kahneman and A. Tversky. Non-standard deviations exist, but not all of them are the result of the use of heuristics. The analytic intelligence of the research participant N and the procedurally dominant System 2 control this process, although they do not exclude the possibility of deviations due to heuristics. The absence of a framing effect indicates the analytical structure of the cognitive sphere of research

participant N. Hypothesis 3 does not find confirmation: the considered case of making an economic decision is only partially covered by the theory of prospects of D. Kahneman and A. Tversky and reveals non-standard deviations.

It should be expected that other cases will reveal new patterns, for the explanation of which it will be necessary to turn to the prospect theory of Kahneman and Tversky and clarify its position.

Conclusions

In the process of making a vital economic decision, research participant N discovers non-standard deviations that are not the result of heuristics described by the prospect theory of Kahneman and Tversky. The decision-making process is based on the rational style inherent in study participant, and characteristic of his analytical system of reasoning, aimed at achieving the most useful result. There is a complex organized stopping of the situation of uncertainty, which blocks the possibility of cognitive biases. In this concrete case, there is an interaction between cognitive systems 1 and 2 with a clear dominance of the latter. It is this system that blocks cognitive distortion and ensures the achievement of the expected result. Properties of the intellectual-personal potential of the research participant N: rationality, intolerance to uncertainty, emotional intelligence. They are an integral part of the heuristic and at the same time peculiar process of economic decision-making in a concrete case.

The prospect theory of Kahneman and Tversky does not cover the studied case as a whole, but allows one to explain its course and opens up the possibility to continue studying the unique role of human personality in economic behavior. Single Case Study is an adequate method of such a study and deepens the field of research in the field of behavioral economics. It is relevant to determine the psychological factors operating in this area in combination with decision-making heuristics.

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