RATIONAL CHOICE UNDER CONDITIONS OF RISK: METHODOLOGICAL AND VALUE-BASED GROUNDS[**]

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Summary

The paper presents the author's methodological position that the risk is always connected with the person and the decisions which this person makes. Risk is an integral indicator combining assessments of both the probabilities of implementing a solution and the quantitative characteristics of its consequences. Integration of these assessments is carried out by the person that chooses the alternatives that most fully correspond to the person's goals, other assessments and value system. The paper considers the famous results made by A. Tversky and D. Kahneman that show how the objective limitations of human cognitive capabilities, random access memory, speed of perception and processing of information, etc., influence, and often determine human behavior, and how they became the basis for errors, contradictions, illogicalities in decision-making processes. The rational conclusion that can be drawn from the study of real decision-making practices under the risk conditions is that it is necessary to take into account the irrationality of a person while analyzing these processes. Each individual has his own set of values and reacts to the situation of risk in accordance with his preferences, so the real behavior of a person in such conditions is often far from the "ideal." We think that the decision-making under the risk conditions should be a conscious choice based on rational grounds. At the same time, norma-

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tive models of decision-making serve as guidelines and methodological basis for actions for a person facing a difficult choice problem.

Keywords: rational choice, risk society, decision-making, probability, model, utility, value, uncertainty.

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May a person achieve their aim, can he predict development of eternal powers and oppose to their influence, how free he is in his choice? These questions have always been in a center of philosophers' attention. "Circumstances and decisions are two main elements that construct life," Jose Ortega y Gasset noted [Ortega y Gasset 1989, no. 3, 134], and it is difficult to doubt it. Risk and uncertainty accompany human life since birth to death. Perception of this circumstance is one of philosophical prerequisites of researching processes of choice and decisions making by a person. During centuries-old history of philosophy "main questions" have been consistently changed, and it is important to understand what problems are current now for its development in XXI. In 2011 the paper by J.Hintikka dedicated to a situation of philosophy research in modern world was published in the journal of *Voprosy Filosofii* [Hintikka, 2011]. In my opinion, in this paper, that in the most part is a program work, J. Hintikka raises a question about "what can be a "package of stimulus" for philosophy" [Hintikka 2011, 3], what problems in "theoretical philosophy," in his opinion, are the most current and demanded now

and in a near future. In his paper J. Hintikka dedicated a special section to problems of rationality in decisions making. Particularly, speaking about meaning and assessment of results received from A. Tversky and D. Kahneman he writes that "here philosophical research faces with an important aim as intellectually, as ideologically" [Hintikka 2011, 14].

Richard Thaler has been awarded Nobel Prize in Economics in 2017. He offered not only taking into account human behavior and weaknesses while making economical decisions but also offered a new perception of these factors' impact on the process and a result of choice. The point is that the works by A. Tversky, D. Kahneman and R. Thaler are "challenges" for understanding and explaining humans' rational behavior. One more challenge is realizing the fact that risk and uncertainty are inevitable companions of human life. In the modern world risk is an attribute of everyday life and touches each of us. This circumstance characterizes the majority of the problems connected with human activities such as economics, politics, management or science. People have to make risky decisions every day because stochastic character of nature and social issues does not give an opportunity to predict the events development. Rather often rationality and risk are perceived as antipodes. In reality it is not so, it is possible and necessary to speak about rational risk perception as it will be represented in the present paper.

Firstly, I should point out that a possibility to assess quantitatively a possibility for realization of future events allows differentiating situations of risk and situation of uncertainty conceptually [Diev 2011, Diev 2012]. In conditions of risk there is a quantitative assessment of the results of the accepted decisions that is impossible in a situation of uncertainty, and it is becoming a key factor for differentiating risk and uncertainty. To describe risk you need a set of notions: Subject, Decision, Probability, and Loss. Risk is a consequence of the decision and is always connected with a subject therefore it is impossible to speak about risk without a subject. Some-

one can notice that a subject implicitly exist in a decision, therefore it is not necessary to identify it. Though there is no decision without a subject. However, a subject does not only make a decision but also assesses a probability of possible events and losses connected with them. It is easy to imagine a situation when two people make equal decisions but they differently assess risk that is connected with their realization.

While taking a risk a subject chooses the alternative that is a consequence of its decision although he does not know the consequence of this decision. There will not be a risky situation without making a decision, i.e. there will not be any risk. The key element here is a question about measuring risk because it is not possible to make a rational choice from all possible ways of behavior while risk is not assessed. I should point out that *risk is an integral characteristic* that combines assessments of both probability of the decision's realization and its consequences. The simplest way to take into account as probability of possible events as connected with them consequences (losses, damage, winning) is multiplication of probability of the possible event to its result represented in quantitative characteristics. Such calculation is called as mathematical anticipation of the possible random event in the language of the probability theory. Risk was assessed the same in gambling when a probability theory had just been created. It is necessary to emphasize that even in present time this method is the most popular in the assessment of risks in different branches of human activities beginning from economics and ending up with the assessments of environmental and technical risks. Problems that are connected with the application of such a method of integration of probability and decision consequences' evaluations will be considered a bit later, and now I should note that to assess risk firstly one needs to "measure" uncertainty that appears as a result of decisions making by the subject, i.e. to define and give a quantitative characteristics of the possibility of possible events.

In present time the most popular is an axiomatic definition of probability that was offered by A. N. Kolmogorov in the 1920s of the last century. I should highlight that there is no methodological problem in existence of several interpretations of probability but there is a problem that an axiomatic definition of probability despite of its universality cannot exchange any vivid definitions. As a part of axiomatic calculation the notion of probability does not have a wide definition. It is considered as an initial notion that was stated in conditions formulated in axioms. The point is that despite the obvious definition that always fixes a class of objects by any way the axiomatic definition essentially never fixes any classes of objects that it can apply to. One of the most popular is frequency, or statistical interpretation of probability. In accordance with this approach probability in essence is identified to relative frequency of mass occasional event during sufficiently long time experiments. From this point of view there is no any individual event that has a frequency, and therefore there is no sense to speak about its probability. Thus, statistical probability can be applied in making decision only for quantitative assessment of such alternatives that have statistical information. However, in many real cases when it is necessary to make decisions under risk conditions a human does not own such information and therefore has to refer to other interpretations of probability.

There are sufficiently many different conceptions of probability that belong to R. Mises, H. Reichenbach, J. Keynes, F. Ramsey, A, Wald, B. de Finetti, R. Carnap, L. Savage, and some other authors. Thus, J. Keynes was in opinion that probability expresses a rational degree of confidence that makes logical connection between a set of assertions (assumed as initial hypothesis) and a certain allegation (assumed as a result). For F. Ramsey probability expresses a subjective grade of confidence that has operational meaning as a wish to act or to avoid risk. According to B. de Finetti degree of a person's confidence or their subjective probability assessments must satisfy ordinary laws of probability.

L. Savage elaborated personalist interpretation where probability is a degree of confidence of ideal, i.e. rational person that behaves according to axioms of the probability theory while making a decision. From the first sight it seems that subjective probability is the subject's belief that is not founded on anything, their arbitrary opinion. But it is not true. Firstly, although probabilities are stated by a subject itself they must be coherent to each other. To be coherent they should satisfy axioms of the probability theory. Secondly, although degree of probability is connected with preferences, aims and wishes of a subject they are in some way defined by effectiveness of these actions. To act successfully a subject must reflect a real situation approximately truly in his assessment of probability. Necessity of probabilities' coherency shows how subjective interpretation is principally different from the subject's belief into one or other event. However, we should not oppose different interpretations of probability. Furthermore, in different risky situations it is more useful to rely on probability assessments applying to different approaches, for instance, as objective as subjective interpretations. In some cases it is necessary to speak about subjective evaluations of objectively existing statistical probabilities. Therefore, it is methodologically true to use subjective assessments of probabilities in making decisions if it does not contradict to axioms of the probability theory. Thus, one of the integral components of risk can be measured if we use mathematical apparatus of probability assessments.

How and what units of measurement we shall use to evaluate consequences of future events? Risk is often connected with possible failure. From the other point of view, risk is understood as an action done with a hope to success. After all, shall a subject evaluate possible winnings or losses while making a decision? It seems that during analyses and evaluations of risks it is correct to speak about possible losses. Such approach allows considering non-received prize as a lost profit, or as a possible loss. If we follow such approach while

playing non-losing lottery it is possible to assess loss as champagne that we did not drink.

To assess risk it is necessary to quantitatively assess possible losses and, as a rule, money as a measure for assessing a cost of other products and services, that play a role of an exchange for products, is used as the unified equivalent. In reality the approach where "cost of losses" is counted in money is not quite perfect and leads to contradictions that can be a confirmation of the proverb "happiness is not counted in money." In 1738 D. Bernoulli published his paper "Exposition of a New Theory on the Measurement of Risk" in the "Commentaries of the Imperial Academy of Science of Saint Petersburg" where he formulated his famous St. Petersburg paradox. I would like to agree with the opinion by P. Bernstein who thinks that this work is one of the most essential among any texts on the problems of both risk and human behavior in a whole [Bernstein 2000, 118]. In his paper D. Bernoulli represents how the suggestion of the risk that is defined only by money as a cost of result and its probability leads to contradiction and paradox. He suggests a thesis that a value of something should likely have utility instead of a cost as a foundation. The notion of utility is associated with profit, desire or satisfaction. Therefore, D. Bernoulli assumes that the variables that must be averaged should not be an actual cash cost of outcome but internal cost of cash meanings. Bernoulli wrote that it is sensible to suggest that internal cost of cash is increased according to the raise of a sum of money but in a decreasing grade. In addition, assessment of the goods utility is not a simple linear function and depends on a person who is in a risky situation. Thus, to know cost and probability is still not enough for defining an assessment of outcome because in each case utility may depend on a subject who is assessing. Each subject has its own system of values and reacts on a risk according to this system.

It is not easy for a subject to assess possible losses in a risky situation because this task is determined by culture, person's value

preferences, and even by a political context. It will be written later about "quirks" of people in risky situations, but now let us focus on the meaning of a value aspect in the risk management. Values mean general views on the most preferable types of goods for a subject and ways for their achievement where his previous experience is concentrated and the choice of the future behavior is held on their foundation. Values characterize preferences, aims and ideals of life purposes of a person; in addition a system of value orientations of a personality is the main characteristics of a person as a representative of a certain type of culture and society. Any risky situation is valued by a person from the aspect of their own values system, "each society, each personality is always given a scale of goods' values according to which they define their actions and evaluate others," F. Nietzsche pointed out [Nietzsche 1997, 88].

After D. Bernoulli's work 200 years were needed when in the 40-s of the last century his ideas have been developed in a theory of utility by J. von Neumann and O. Morgenstern and that allows to find optimal decisions under risk conditions. In the theory by von Neumann-Morgenstern quantitative assessment of utility is introduced that is measured at interval scale and this interval scale is not founded on a metrical notion of utility but on a comparative notion because in some cases it is impossible to express utility by numbers, it can be made only with a comparative notion "more," "less," "equal." However, even such compare is quite effective for researching a problem of utility of various alternative actions [Neumann, Morgenstern 1970]. Theory of utility has a regulatory character and mathematics is applied to represent the most effective way for achieving a particular aim, i.e. it replies the question about optimization of a decision. According to the utility theory rational individual should choose an alternative that maximizes the expected utility.

In the last century the most significant research of people in conditions of risk and uncertainty had been done by psychologists

D. Kahneman and A. Tversky. The most famous was their "prospect theory," or as it is sometimes called in Russia as a "theory of prospects" [Kahneman, Tversky 1979, 1992, 2002]. Prospect theory made if not a revolution but it was a coup in methodological foundations of theories and models of rational behavior because it united empirical knowledge about real behavior of people and normative models. In 2002 D. Kahneman has been awarded a Nobel Prize for "applying psychological insights to economic theory, particularly in the areas of judgment and decisions making under uncertainty." Although it is possible to say that the prospects theory is a modernization of the utility theory its authors started from principally other methodological foundations than Neumann and Morgenshtern. Although they formulated axioms of rational behavior from the most general a priori theoretical views, the psychologists have built their theory based on the empirically revealed real peculiarities of peoples' behavior in risky conditions. The prospects theory was built taking into account three most important behavior effects fixed in numerous experiments and observations. The first is the effect of certainty that comes from the tendency to give much weight to determined outcome. The second effect is the effect of reflection that is connected with the fact that people tend to risk when they lose than win. The third effect is the effect of isolation that comes from the fact that people tend to simplify their choice on the means of excluding the general components of the decisions' variants. One of the most interesting and useful results of the prospects theory is the effect of certainty that demonstrates asymmetry in decisions making directed to achievement of the prize, and the solutions directed to avoiding the loss. When big cash is at stake many people refuse taking risk in the game preferring receiving a guaranteed result. For instance, they prefer earning 100 thousand roubles than to play with 50 to 50 chances to win 200 thousand roubles or win nothing. People do not only avoid uncertainty but also do not want losses. Majority of us insure a flat or a dacha from the fire that means a choice of a

small loss with a hundred percentage certainty that allows avoiding a bigger damage.

Rational conclusion that we can make on the basis of studying the real practice of making decisions under risk conditions is that it is necessary to take into account non rationality of a person during the analysis of these processes. Each person has their own set of values and reacts in risky situations according to their preferences, and therefore their real behavior is often far from "ideal." As a result of many years research that have been conducted by A. Tversky and D. Kahnemann and also by their followers it has been confirmed that objective limit of cognitive abilities of a person, firstly, their random access memory, speed of perception and processing of information, etc. influences and rather often determines a person's behavior. These factors are the foundation of many observed errors, contradictions, illogicality in decisions making processes [Kahneman, Tversky 2002]. But despite all "quirks" in peoples' behavior under risk conditions the authors of the prospect theory come to a conclusion that only a rational choice can be more effective, and the behavior based on the refuse from rationality will be chaotic and non-productive. And there is no any contradiction here. Under risky conditions a person wants to have a rational foundation for making sensible decisions that allows comparing different variants of actions and choosing such a variant that fully correlates with their aims, assessments and system of values. In addition, normative models of decisions making are guidelines and methodological foundation of actions for a person that faces with a difficult problem of choice.

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