

SUMMARY

In general this thesis deals with the question whether or to what extent human thinking is rational in terms of the optimality of the way people achieve their goals and in terms of the consistency between people's beliefs and the structure of the world. This question is quite difficult to answer unequivocally because the answer will always depend on the nature of the particular task and the exact way in which we define rationality. Among other things, that's the reason why we can meet two contradictory schools of thought within the so-called Great Rationality Debate, one of which is convinced of the systematic irrationality of human thinking (in the sense of the systematic deviation of human thinking from normative predictions stemming from the principles of rational thinking as they are captured by the statistical theory of probability, formal logic or decision theory), while the other one considers human thought to be more or less rational, and finds the source of its (alleged) failure elsewhere. In the case of the latter, however, the question is how to explain the apparent existence of irrational behavior and interindividual differences in such behavior.

One possible answer to this question is illustrated by Griffiths and Tenenbaum's Bayesian model of causal reasoning based on perceived coincidences. This model stands in opposition to the traditional conception of coincidences as unlikely (types) of events and as a frequent source of erroneous and irrational conclusions about the existence of causes that (supposedly) explain observed events. The Griffiths and Tenenbaum's model assumes that coincidences play a key role in the rational process of causal reasoning within the discovery and revision of theories, and that people in evaluating coincidences (either as mere random coincidences or, on the contrary, as evidence in favor of the alternative hypothesis about the causal functioning of the world) proceed in accordance with the rational principles of Bayesian reasoning. In particular, this model assumes that people are guided in their judgment by the ratio of the posterior probabilities of the alternative and the null (currently assumed) hypothesis, which is a function of the ratio of the likelihoods and a priori probabilities of these hypotheses. The apparent fact that people often arrive at various irrational beliefs on the basis of perceived coincidences is explained by this model as a consequence of the incorrect calibration of the a priori probability of alternative hypotheses in people's minds. According to this model, whether people on the basis of perceived coincidences arrive at a significant discovery or just some superstition is thus not due to the fact that people reason about coincidences in qualitatively different ways (as

suggested, for example, by the heuristics and biases research tradition), but because of the different degree of adequacy of the setting of one quantitative parameter within one and the same mechanism of reasoning. In this way, the model in question includes both the rational principles of the functioning of human thinking and the tendency of human thought to be subject to various cognitive illusions and irrational conclusions.

In the empirical part of the dissertation, I have tested within two pre-registered research studies some predictions resulting from this Bayesian model of perception of coincidences and at the same time, through this model, I have investigated the connection between the perception of coincidences and selected dispositional and situational factors.

In the first study, the collected data supported three basic predictions of Griffiths and Tenenbaum's Bayesian model of coincidences, suggesting that at least in some tasks people are able to evaluate the available statistical evidence and adequately combine this statistical evidence with their a priori knowledge of the plausibility of the hypotheses under consideration. The collected data also supported the hypothesis that the primary source of irrationality associated with the perception of coincidences is the overestimation of the a priori probability of alternative hypotheses and not the inability to evaluate the available statistical evidence correctly. This hypothesis was supported by three different findings. The first one was the zero correlation between the tendency of probands to believe in the existence of unexpected causal relationships (i.e., the a priori probability attributed by probands to alternative hypotheses) and their ability to evaluate statistical evidence intuitively. The second one was that there were systematic differences between probands in their tendency to believe in the existence of unexpected causal relationships but not in their ability to evaluate the available statistical evidence intuitively. The third one was that it was only the tendency of probands to believe in the existence of unexpected causal relationships (but not their ability to evaluate statistical evidence intuitively) that tended to relate meaningfully to the various aspects of their cognitive functioning, which are, according to the results of other studies, associated with (ir)rational thinking. Based on the results of the exploratory analysis, it was also possible to formulate the hypothesis that the tendency to believe in the existence of unexpected causal relationships is more related to the degree of intellectual skepticism than to the degree of the unusualness and intensity of perception and experience. The limitation of this research lies particularly in a small number of types of tasks used to estimate some of the key characteristics of probands; the small heterogeneity

of the research sample that was recruited predominantly from the university environment; the possible problem with the limitation of the range of values of some variables that could distort the estimation of some correlations; and the relatively small research sample, which, especially in the case of smaller effects, did not always allow the predictions of the null and alternative hypothesis within Bayesian hypothesis testing to be differentiated sufficiently. Overall, however, the results of this study supported the plausibility of Griffiths and Tenenbaum's Bayesian model of coincidences as an alternative to the more traditional concept of coincidences.

In the second study I have examined the question whether it is possible for the a priori plausibility of alternative hypotheses in a person's mind to be affected by whether it is more advantageous for that person in a given situation to exploit the existing cognitive resources necessary to grasp or solve that situation or to explore the notional space of new cognitive resources. In particular, I have tested the hypothesis that situations people perceive as less comprehensible will cause these people to be more inclined to explore the notional space of new cognitive resources, i.e., that they will be more inclined to believe in the existence of unexpected causal relationships. When using the task of matchstick algebra as a tool for the experimental manipulation of the perceived comprehension of the situation, I was unable to obtain data that would support this hypothesis - the probands from the control and experimental groups showed a similar tendency to believe in the existence of unexpected causal relationships. In addition to the fact that the estimate of the effect under investigation is burdened with a relatively high degree of uncertainty, the interpretation of the possible absence of the effect is also complicated by the fact that, due to the chosen research design, it can be explained by a number of different ways - e.g., by the ineffectiveness of the chosen method for the manipulation of the perceived comprehension, by the unsuitable way of measuring the major dependent variable, or by the real absence of a causal relationship between the perceived comprehension of the situation and the tendency to believe in the existence of unexpected causal relationships. Given the above mentioned questions related to the outcomes of this study, at the present moment we should refrain from any strong conclusions about the non-existence of the studied phenomenon. To eliminate some of these questions, a larger research sample, usage of several different tools for the experimental manipulation of the independent variable, or

usage of several different tasks for measuring the dependent variable could be helpful in any follow-up research.

Within my dissertation research project, I have also conducted a pilot localization of five different psychometric tests that were later used in two of the studies described above to measure some of the dispositional characteristics of probands. Specifically, I have localized a new extended version of the Cognitive Reflection Test - Long2 (*CRT-L2*), Heuristics and Biases Test (*HBT*), Personal Need for Structure (*PNS*), Rational-Experiential Inventory (*REI-40*), and Revised Paranormal Belief Scale (*PBS-R*).

Key Words: rationality, coincidences, causal reasoning, Bayesian statistical reasoning, dispositional and situational factors