New Frameworks of Rationality

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Keywords: rationality; bounded rationality; reasoning; probabilistic reasoning; deductive reasoning; decision making; heuristics

Introduction

The nature and extent of human rationality is an issue of ongoing debate. In the last two decades, this debate has been enlivened by the development and application of new theoretical frameworks. These include Bayesian notions of adjusting and using uncertain beliefs in an inductive manner as well as deductive probability-based logics as normative guidelines against which to weigh human judgments and decisions; the notion of ecological rationality based on lean and frugal heuristics well adapted to the structure of the environment; the notion of meta-cognitive myopia according to which people are accurate and sensitive in the processing the information in a given sample of observations, but are blind and naive to the history and validity of the sampled data; and game theory.

Virtual Agreement: A Rational Framework for Joint Action and Communication (Nick Chater)

Game theory typically models interactions between agents in terms of players that are rational at the level of the individual. But when people need to coordinate their behaviour, which arises in joint action and communication, a vicious circle arises. What is rational for each player depends on what the other does; but figuring out what the other will do is no easier than figure out what one should do oneself. I will describe an approach which assumes that players can resolve this problem by a process of "virtual agreement" – that is, the players figure out what they would agree to do, if they could discuss or bargain. Where the answer is well-defined, the agreement can be reached "virtually", i.e., without any information being exchanged. Virtual agreement requires common aims and knowledge – and can fail when players mis-estimate this common ground. Interesting, the process of reaching agreement can, in some cases, be modeled by conventional game theory.

Cognitive Myopia (Klaus Fiedler)

What I have come to call "meta-cognitive myopia" (MM), using a term once suggested by Robyn Dawes, is the phenomenon that people are pretty accurate in utilizing even large amounts of stimulus information, whereas they are naive and almost blind regarding the history and validity of the stimulus data. This uncritical reliance on the information given is the most conspicuous when the task context makes it crystal-clear that the stimulus data should not be trusted. In the introduction, MM is located within a broader framework of meta-cognition research, and several examples are provided to illustrate the phenomenon. The central message is laid out that MM offers an alternative account of many biases in judgment and decision making, which have been traditionally explained in terms of capacity constraints, limited reasoning ability, motivational forces, or severely biased environmental input. The explanatory power of the MM construct, and its theoretical potential to predict new findings, is

then demonstrated in a major review section with reference to five paradigms: inability to discard irrelevant information; utilization of selectively sampled information; conditional inference biases; sample-size neglect; and myopia for the impact of aggregation levels. The final discussion is concerned with the learning origins of MM and the question of why evolution did not equip Homo sapiens with more effective metacognitive tools. An analysis of the costs and benefits will reveal that MM may serve important adaptive functions, and that eliminating MM may have maladaptive effects. Nevertheless, in the context of many real decision problems, the costs and irrational consequences of MM cannot be denied. The final discussion therefore focuses on possible ways to avoid and alleviate MM and its irrational consequences.

Less Is More: Simple Solutions for Complex Problems (Gerd Gigerenzer)

In worlds of known risks, probability theory can provide the optimal course of action. In uncertain worlds, however, simple heuristics can result in smart solutions by focusing only on a few cues and ignoring the rest. The heuristics in the "adaptive toolbox" are anchored in the mind and the environment. They are embodied in the sense that they can exploit capacities of the human mind (such as recognition memory), which allow judgments to be quick. They are anchored in the environment in the sense that they can exploit statistical or social structures (such as signal-to-noise ratio). The study of the ecological rationality of heuristics and the bias-variance dilemma provides a general account to understand why and when less can be more.

New Paradigms and Old Insights: Integrated Theories of Reasoning and Dynamic Inference (Mike Oaksford)

The new paradigm in reasoning, based on the probability conditional and dual process theory, offers new insights into human rationality. However, as with any psychological theory, there are a range of algorithmic issues concerning representations and processes that the new paradigm must address. We argue that doing so may require integrating these new insights with old insights from previous theoretical frameworks. In particular, the cognitive system needs to build small-scale models of the world which elaborate on information given in the premises and which are interrogated in reasoning. The nature of these processes has consequences for the new paradigm. For example, elaborative processes mean that conditional reasoning is most often dynamic and nonmonotonic involving changes in the probability distributions over which inference is defined. We draw out these consequences and sketch an integrative theory for conditional inference.

What Linda Did Next: Relations Between an Interpretative Approach to Reasoning and the Judgment and Decision Literature (Keith Stenning and Michiel van Lambalgen)[1]

Stenning and van Lambalgen (2008) proposed that multiple logics are necessary to model human cognition, prominently a nonmonotonic logic known as Logic Programming (LP), which provides a cognitive model of fast frugal automatic reasoning from large human knowledgebases, to interpretations of current input. Much of the data from supposedly classical logical reasoning tasks (e.g. conditional reasoning, syllogisms, Wason's Selection Task) is derived from mixtures of subjects many of whom have nonmonotonic understandings and goals. This talk will position this program of research with regard to the judgment and decision literature on heuristic reasoning as exemplified by the Heuristics and Biases (H&B) program of Kahneman and Tversky and the ecological fast and frugal heuristics of Gigerenzer and the ABC Research Group (ABC).

A multiple logics approach shares concerns with the ecological heuristic reasoning of the ABC group: with multiple methods of reasoning; with "automatic" rather than reflective reasoning; and with contextualisation. We illustrate with the well known Linda problem. The problem gives a personality description of Linda appropriate to the beginning of a story, but then asks a question ("Which is more likely? That Linda is a bank teller, or Linda is a bank teller and an active feminist?") from probability theory. Although there have been disagreements between H&B and ABC, they share the assumption that this task is interpreted as calling for extensional reasoning. Of course there is no doubt it is intended as such an exercise, or that it is educationally important that students learn to recognise it as such. But we suggest that most subjects initially regard this task as an intensional reasoning problem, as readily developed within LP. This proposal points to the neglect of theories of the rationality of intensional reasoning. We sketch how such a program might look, and draw out some consequences for theories of reasoning, judgment and decision, and for theories of rationality more generally.

Acknowledgments

This symposium was supported by the priority programme SPP1516 "New Frameworks of Rationality" by the Deutsche Forschungsgemeinschaft (DFG).

References

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[1]This work has benefited greatly from discussions with Laura Martignon