Europe's Journal of Psychology
ejop.psychopen.eu | 1841-0413

Book Reviews

Okasha, Samir, & Binmore, Ken (Eds.). (2012). *Evolution and Rationality: Decisions, Co-Operation and Strategic Behaviour*. Cambridge, United Kingdom: Cambridge University Press. 296 pp. ISBN 9781107017788.

Evolution and Rationality: Decisions, Co-Operation and Strategic Behaviour

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Europe's Journal of Psychology, 2014, Vol. 10(2), 405–407, doi:10.5964/ejop.v10i2.783
Published (VoR): 2014-05-28.
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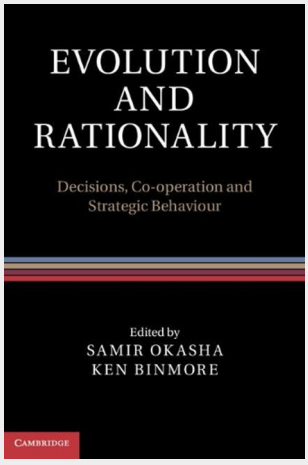
Evolution and Rationality highlights the connection between the Darwinian evolutionary theory and the theory of rational choice. This volume is based on an assumption that there is a conceptual connection between utility (in the economical sense) and fitness (in the biological sense) as the notions of optimization and maximization are central to both of these areas. *Evolution and Rationality* is emerged from a series of workshops and conferences by the eminent and leading researchers in the fields of evolutionary biology, philosophy of science, experimental economics, game theory and psychology which was held at the University of Bristol between 2008 and 2011, edited by Samir Okasha, Professor of Philosophy of Science at the University of Bristol and Kenneth Binmore Professor Emeritus of Economics at University College London. This volume contains notable remarks regarding the recent criticisms of the "model-based theories", and in what follows the overview of all eleven chapters of this volume is dealt with altogether.



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In economics and game theory, Nash equilibrium is a stable state of a system involving the interaction of different participants, in which no participant can gain by a change of strategy if the strategies of the others remain unchanged. Firstly, in this volume, Nash equilibrium, "the most successful solution concept of classical game theory" (p. 9) is criticized for not being applicable in realistic situations, purely theoretical and far from actual behaviour of real people as the agents are not rational and would rather act based on intuition and routine

teachings. Organisms due to their different constraints cannot be maximizers in a perfect way and cannot even reach the optimality. Also people because of different life experiences, environmental and knowledge changes would employ different strategies to fulfill the same evolved preferences which do not always match the predictions of rational choice models. In addition, possessing cognitive adaptations for problem solving, strategic thought, learning plasticity, behavioural flexibility and accumulative cultural knowledge in humans, make them unique and different from other non-human animals. Furthermore, it is argued that not only rational behaviour, but also the irrational behaviour can also be given an evolutionary explanation. Therefore, one criticism on model-based theories is the inability of economic tools in explaining organism's behaviour as humans strive “to maximize their inclusive fitness over their lifetimes, yet in imperfect and non-optimal, but often predictable, ways” (p. 42).

Not only stability of Nash equilibrium is criticized, but also its refinement, Evolutionary Stable Strategy (ESS), (i.e., a state of a population, once reached, cannot be invaded by a small groups of mutants) fails because it is more simple than an explicitly dynamic methodology and “does not properly take into account the dynamic possibilities one already has in baseline dynamical models” (p. 81). In addition, it should be considered that the non-ESS states are widespread and many of them evolutionary significant, “sometimes more significant than ESS states” (p. 82).

Another point that we encounter in this volume is the criticism of the validity of models and their relevance to the outside world. Through investigation of the relationship between organism and the environment the limitation and validity of the rational actor model regarding large worlds is considered. While it seems that the models in small worlds are optimal, in a large world the uncertainty affects the external validity of model and “when factors known to compromise the internal and external validity of the model are at play, declarations of rationality and optimality become less and less meaningful” (p. 95).

Although game theoretic models have been successful in illuminating many biological phenomena, next criticism highlights the inability of classical game theory in the prediction of the play related to notions of team reasoning and cooperation. For example, the prisoner’s dilemma and the stag hunt which are closely identified with the problem of cooperation have more than one Nash equilibrium, therefore “standard game theory has no way to advocate one over the other without introducing new assumption” and consequently “playing a strategy that is not a part of a Nash equilibrium is never rational” (p. 189). Other problems with the theories of team reasoning are lack of common knowledge of group identification and the need to assume that there is a group objective for each player to reach the conclusion whether one should choose cooperation.

Rational decision theory is based on decision mechanisms that are optimized for a specific environment for maximizing organisms’ fitness. Therefore another criticism of the rational decision model is that human behaviours are affected by the ecological constraints as it is argued that there exists a systematic connection between environmental challenge and agent response. Evolutionary forces have shaped the rationality in human’s ancestral societies and it should be considered that our environment has changed and is changing dramatically from that of our ancestors. Other scholars argue that human choice is not illogical and irrational, as deliberate decision making is one of distinguishing characteristics of human brain. They argue that the “coevolutionary process has endowed us with preferences that go beyond the self-regulating concerns emphasized in traditional and economical theory” (p. 215). Additionally, optimal choices are state-dependent and the transitivity of choices would be violated if dependent on animal’s internal variables therefore, it seems that we do not have the correct view of the decision maker’s options. Final caution is that models might not be applicable across all human history and indi-

vidual action might be influenced by variable cultural factors which make the model implausible in real-world system.

Overall it could be concluded that “educative models of maximization under constraint and evolutionary modeling are both somewhat weak. However without them…we will not be able to arrive at an adequate understanding of the world around us” (p. 130).

Evolution and Rationality is a very interesting book and serves as a useful and an essential resource for professional readers, researchers and students interested in evolutionary biology, game theory, philosophy of science, and economics.

Funding

The authors have no funding to report.

Competing Interests

The authors have declared that no competing interests exist.

Acknowledgments

The authors have no support to report.