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Nax, Heinrich H

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games

Editorial

The "Black Box" Method for Experimental Economics

Heinrich H. Nax [1,2]

[1] Behavioral Game Theory, ETH Zurich, 8092 Zurich, Switzerland; heinrich.nax@uzh.ch
[2] Markets and Norms, University of Zurich, 8050 Zurich, Switzerland

How humans behave in repeated strategic interactions, how they learn, how their decisions adapt, and how their decision-making evolves is a topic of fundamental interest in behavioral economics and behavioral game theory. The range of motives and decision-making principles that are at play in real-world situations is rich, and there is no easy way to tell what exactly goes on in different contexts, as many factors related to available information, feedback, sophistication, interaction networks, etc., will likely play decisive roles. The economic laboratory has proven a useful sandbox where progress has been made to disentangle some of these factors, but even controlled economic experiments, due to the multiplicity of possible explanations that might produce the same phenomena, still leave a lot of room for interpretation.

Inspired by the more bottom-up approach of behavioral biology and psychological behaviorism, in particular by the work on single-player decision-making experiments in the spirit of (generalized) reinforcement learning (as reviewed in [1]), a new approach to experimentation on learning in games was developed: the "Black Box" control for economic experiments [2–4]. In one set of experiments, subjects play the "standard" economic experiment, including a full description of the payoff matrix of the game they are playing, plus, as the game unfolds, full feedback regarding what others did. Behavior in these experiments is compared with behavior under "Black Box" treatments, where subjects receive only feedback regarding their own realized payoffs, but no structural information about the game that the subjects are indeed playing and no feedback about others, which thus forces subjects into payoff-based learning behaviors, e.g., reinforcement learning.

The Black Box is a useful control to discriminate between conflicting simpler and richer theories and is being deployed increasingly in experimental economics in various contexts. In this Special Issue, in the context of linear Public Goods Games, two innovative articles from this strand of the literature are published. Ref. [5] made a methodological contribution motivating the use of a *Computerized* Black Box, which overcomes some analytical issues resulting from endogeneity and the reflection problem that arise when humans interact with one another, and [6] illustrated an application of this method to conditional cooperation versus confusion.

Conflicts of Interest: The authors declare no conflict of interest.

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References

1. Ido, E.; Haruvy, E. Learning and the economics of small decisions. In *The Handbook of Experimental Economics*; Princeton University Press: Princeton, NJ, USA, 2013; Volume 2, pp. 638–700.
2. Burton-Chellew, M.N.; West, S.A. Prosocial preferences do not explain human cooperation in public-goods games. *Proc. Natl. Acad. Sci. USA* **2013**, *110*, 216–221. [CrossRef] [PubMed]
3. Burton-Chellew, M.N.; Nax, H.H.; West, S.A. Payoff-based learning explains the decline in cooperation in public goods games. *Proc. R. Soc. B-Biol. Sci.* **2015**, *282*, 20142678. [CrossRef] [PubMed]
4. Nax, H.H.; Burton-Chellew, M.N.; West, S.A.; Young, H.P. Learning in a black box. *J. Econ. Behav. Organ.* **2016**, *127*, 1–15. [CrossRef]
5. Burton-Chellew, M.N.; West, S.A. The Black Box as a Control for Payoff-Based Learning in Economic Games. *Games* **2022**, *13*, 76. [CrossRef] [PubMed]
6. Burton-Chellew, M.N.; D'Amico, V.; Guérin, C. The Strategy Method Risks Conflating Confusion with a Social Preference for Conditional Cooperation in Public Goods Games. *Games* **2022**, *13*, 69. [CrossRef]

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