From Skinner Box experiments to Black Box games: radical behaviorism for experimental game theory

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Morgan's Canon of Interpretation:

In no case is an animal activity to be interpreted in terms of higher psychological processes if it can be fairly interpreted in terms of processes which stand lower in the scale of psychological evolution and development. (Morgan 1894, p.59)

We analyze data from six experimental games that were run in a Black Box setting and under standard non-Black Box conditions with full instructions and feedback as play goes on. The six games share the following common features. All games have a one-dimensional action space, where whatever is kept in the private account has a risk-free rate, and whatever is placed in the black box has a non-negative return. Specifically, the six games are Cournot competition, Tul- lock contest, competition with strategic substitutes, competition with strategic complements, the standard linear public goods game, and a variant of the lin- ear public goods game where full contribution is the dominant strategy. Data pertaining to the Black Box treatment of the first four games is reported in this study for the first time. Data from the latter two was previously analyzed (see Burton-Chellew and West 2013; Burton-Chellew et al. 2015; Nax et al. 2016).

First, we compare the aggregate convergence patterns from Black Box with standard information. Figure 2 illustrates. Second, we fit a simple payoff- based learning model to the Black Box data. Finally, using the Black Box parameters of the learning model as priors, we adapt a Bayesian estimation framework to estimate how much of the non-Black Box data can be explained by belief-based learning and best response. In line with Morgan's Canon to not over-interpret simple learning behavior as best response behavior, the Black Box control allows to place lower (and upper) bounds on the weight that hybrid models such as EWA ought to place on belief-based learning in the standard experimental setting of full information and feedback.