Referee Report for "One Step at a Time: Do Threshold Patterns Matter In Public Good Provision?" MS 273

The authors examine the effect of changing a threshold or provision point in a discrete public goods game. In particular, they compare profits and success under three treatments: an increasing threshold, a decreasing threshold, and a constant threshold. They find that the public good is provided more often in the case of increasing thresholds compared to decreasing thresholds.

The paper has three major closely related, but distinct shortcomings.

Theoretical basis

First, and most important, the authors do not present their design as a laboratory test of a theory. They come closest to fully referencing the Nash Equilibrium predictions for contributions to a discrete public good. Unfortunately, they do so incorrectly. They claim that "standard game theory predicts that equilibrium should be zero contribution no matter the threshold patterns," referencing Palfrey and Rosenthal , 1984 and Bagnoli and Lipman, 1989. In the following sentence they proceed to discuss "difficulty of coordination." The coordination required is on one of many equilibria introduced by the threshold.

Bagnoli and Lipman show that, in contrast to the case of a continuous public good, there are multiple Nash equilibria in a game of contributions to a discrete public good. Furthermore, the equilibria in which the good is provided dominate the inefficient equilibrium of zero contribution. The fact that the threshold does matter is the contribution of their paper: they write "in a simple public goods setting, a very natural game—similar to one often used elsewhere in the literature to model private provision—*in fact fully implements the core of this economy in undominated equilibria*." The emphasis is theirs.

The theoretical structure of the game examined by Palfrey and Rosenthal in their 1984 paper varies substantially from both that of Bagnoli and Lipman's paper and the paper reviewed here. In Palfrey and Rosenthal's design, contribution is a binary choice and a minimum set of contributing players is required. Thus, the strategic consideration of how much to contribute is eliminated. One common feature they all have, however, is that the "standard" game theoretic prediction of the single equilibrium of zero contribution is now replaced by multiple equilibria.

This lack of understanding the theoretical differences between games of contributions to discrete versus continuous public goods is repeated elsewhere in the paper where the authors note that thresholds "can serve as a reference point for contributions, but may also discourage contributions by providing for the possibility of a zero return on investment if other group members do not contribute sufficiently." Again, thresholds do much more that this—they change the theoretical structure of the game (relative to a continuous public good) and the Nash equilibrium prediction. Here the paper misses an important opportunity to formalize a theoretical test.

Contribution of this paper to the literature

Second, a reasonable alternative to explicitly testing a theory is to examine the robustness of stylized facts found in the literature. The authors mention in passing at several points that their results connect to large bodies of literature on behavioral topics such as learning, conditional cooperation, repeated games, and coordination. However, they never make clear how their paper fits into any of these areas nor do they present major findings from the literature on these topics to which they can compare their own findings. Early in the introduction, the paper promises to shed light on the role of past cooperative success and failure on subsequent willingness to cooperate. Later, they note that their primary hypothesis (that treatments with gradually increasing thresholds will result in greater incidence of public good provision) is "really just a reformulation of conditional cooperation." However, it is unclear what is added to and what is replicated from the existing literature. So if the primary contribution of this paper is to be in the arena of conditional cooperation / reciprocity then it should do a better job of formalizing those terms and explaining what has been learned and what remains to be learned on this topic. With respect to the comments above, several authors (many listed in the references) have developed theories of fairness and reciprocity which should have been presented as part of formalizing what it is the paper is testing, thus giving a better foundation and motivation for an experimental test. It is not clear where this paper fits.

Experimental design and procedures

Finally, I have questions about the experimental design and procedures in the paper. Why was a level of 55 chosen for the constant threshold treatment with groups of size four? The paper mentions coordination, but never discuses how subjects coordinated. One possibility in half of the variable threshold treatments is coordination on equal contribution across the four subjects in a group. This opportunity, of course, is unavailable under a threshold of 55—the choice of that level at least merits discussion.

In addition, the directions tell subjects that they are making "contributions to a common pool." This could carry different connotations to different subjects and a more careful and conventional approach would be to restrict instructions to language that is less "loaded." Many examples of instructions that avoid such terminology are available.

Minor comments

Analysis: The authors need to present tests of whether or not the results across sessions of similar types are statistically different from one another in order to justify aggregating the data across sessions.

Hypotheses: What are the salient features of the "middle range" provision points other than that they are timed to occur either after lower or after higher provision points? There are several that we can think of offhand—they allow for provision in spite of trembles, they potentially make coordination on an efficient equilibrium more complex, they allow for reciprocal behavior, etc.