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A hybrid public good experiment eliciting multi-dimensional choice data

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ABSTRACT

Similar to Fischbacher and Gachter (2010) we suggest an elicitation method for exploring the motivation of participants when contributing to a public good in the role of "leader" or "follower". In the Hybrid Public Good experiment each of two interacting contributors chooses an independent contribution level as well as three adjusted contribution levels when (s)he, as the only adjusting player, learns that the other's independent contribution is smaller, equal or larger than the own one. To approximate the border cases of simultaneous contributing as well as sequential contributions we systematically vary the probability that one player can adjust, based on such qualitative information, but maintain that no adaptation at all and adaptation by only one occurs with positive probability. Adaptation is framed in two ways, once by additively changing the own independent contribution and once by stating new contribution levels. Surprisingly, the framing effect becomes stronger with experience. Reacting to coinciding independent contributions implies impressive conformity in contributing. Reacting to higher, respectively lower independent contributions implies average upward, and, more strongly, downward adaptation.

1. Introduction

Inspired by Revealed Preference theory (Samuelson, 1938, Varian, 2006), the Revealed Motive approach of experimental economics tries to infer motives like preference relations, aspiration levels, inclinations towards risk and ambiguity, other-regarding concerns, etc. purely from experimental choice data. In this paper, we do not question this but suggest an elicitation technique to assess more directly the motives when contributing in a public good and demonstrate its potential by running an experiment with different treatments in order to show how its multidimensional choice data can be more informative than the usual one-dimensional contribution data.

Recently, other scholars have attempted a similar goal. Fischbacher and Gächter (2010), for example, study experimentally a normal form version of a sequential public good game with one randomly determined first mover and three followers. All four participants are asked to choose an independent contribution and, as followers, a response strategy specifying their reaction to the leader's choice. Here, the strategic uncertainty of the three followers, who do not know the other followers'

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response strategies, renders the interpretation of response behavior ambiguous. To avoid this problem, we consider a two-player game ruling out strategic uncertainty when "following" but maintain the advantage of Fischbacher and Gächter (2010) to elicit from each participant both the choice as "leader" as well as "follower".

This does not exclude free-riding as frequently confirmed in one-off interactions of public good provision and Prisoner's Dilemma games, the latter mostly also involving only two players. Of course, group size will matter. But when distinguishing "leaders" and "followers", there exist two groups, namely the leader (in Fischbacher & Gächter, 2010, a singleton group) and the follower group, what would imply a rather complex case distinction[1] which we wanted to avoid. Furthermore, when varying the group size in public good provision, the difficulty of maintaining similar freeriding and efficiency incentives arises.

In our design, each participant chooses an independent contribution as well as adjusted contributions depending on how the other's independent contribution qualitatively compares with the own one (see, related to this, Keser & Van Winden, 2000 and, less closely, Kurzban & Houser, 2005): adjustment conditions only on whether the other's independent contribution is higher than, lower than, or equal to the own one. Either none or only one contributor can adapt the independent contribution according to a commonly known probability p, i.e. the probability of one of them being allowed to adjust is the unique "within subject" treatment variable.[2] When being able to adjust, irrespective of p, the qualitative information received and " framing", one can always adjust to all possible contribution levels.

We consider three different probability levels: low ($p = 2.5\%$), middle ($p = 33\%$), and high ($p = 49\%$). When the probability p of adjustment is low, it is very unlikely that either contributor can adjust, hence the situation is close to a standard public good game with free riding being dominant. As p increases, the nature of the game changes[3]: while the same prediction for optimal choices follows from once repeated elimination of dominant strategies,[4] it becomes more likely that one will be able to adapt and the game gets closer to a trust game. Indeed, suppose that the probability of adjustment is $p = 49\%$: since the probability that none can adapt is only 2%, contributors essentially face a symmetric trust game with both players assuming the trustor and the trustee role with 49% probability each.[5] In this case, the independent contribution can be interpreted as a trustor's investment in trustworthiness, while the adapted contribution reveals trustworthiness of a trustee. Altogether we vary the crucial parameter p rather systematically but kept it generic, i.e. we approximate but never directly analyze the border cases of truly simultaneous, $p = 0$, respectively sequential contributions, $p = 1/2$. The obvious advantage of this is that by varying only one numerical parameter, p, we can approach very different games by using the same, except for the p-level verbal instructions.

Our two between subjects treatments differ in the way how contributions are adjusted. In the Pure Adjustment (thereafter PA) treatment, subjects state an independent contribution and then are asked what to add to or subtract from the independent contribution in order to determine the final contribution. To maintain the independent contribution, the adjustment can be set equal to zero.

This way of asking for adjustment of (independent) contributions may trigger quite different reactions such as:

- opposition/inertia/resistance to change ("I want to maintain my independent contribution!");
- an obligation to change when new information is provided;
- a desire for flexibility allowing for both, positive and negative adjustments.

To control for this (demand) effect, we consider the Contribution Choice (thereafter CC) treatment: contributors choose an independent contribution and then the contributions by which they react to qualitative information. One basic reason for framing the contribution adjustments differently is that framing effects are often shown to influence behavior in one-off decision tasks and maybe used for nudging (see Thaler & Sunstein, 2008) at least inexperienced decision makers. However it is largely unexplored whether framing effects persist when decision makers become quite experienced. Our hypothesis that learning weakens the framing effect could, however, not be confirmed. Another reason is more subtle: having to adjust one's independent contribution seems slightly more cumbersome than deciding anew. Thus the two frames do not differ in choices set but possibly in cognitive demands.

Rather than running our hybrid public game (HPG hereafter) just once, we wanted to explore how experience affects play without endangering the one-off character of the game. We thus let participants play recursively but with new randomly selected partners.

Given our experimental design, we test how contributions react to the different frames and probabilities of adjustment across rounds of playing the HPG. To anticipate our findings: average independent and adapted contributions are generally higher in treatment CC and increasing with the probability of adaptation. The greater probability of adjustment sustains

[1] In case of more than one "leader" one could ask "follower(s)" to react to their mean or median (when the number of "leaders" is odd) contribution. To maintain that only one "follower" reacts to the leader contribution, one could rely on random dictatorship in "following", i.e. the choice of a randomly selected follower is imposed on all other followers.

[2] Since we have expected more heterogeneity across matching groups than – at the least in the later rounds with the same p parameter – for the sequence of p-parameters, we opted for the possibility to compare p-effects within matching groups.

[3] Another interpretation of the nature of our game refers to leadership in voluntary contribution games, see e.g. Croson, Fatas, and Neugebauer (2005) and Levati, Sutter, and van der Heijden (2007).

[4] Fischbacher and Gächter (2010) rely on this stronger rationality postulate and thus somewhat weaken the dilemma aspect of their experimental game.

[5] Similarly to Berg, Dickhaut, and McCabe (1995) and the experiment of Fischbacher and Gächter (2010) trustor and trustee can choose among different contribution levels. However, trustees can condition their choice only on qualitative information. In this sense our setup resembles sequential Prisoners' Dilemma (PD) experiments with binary choice sets.