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Ambiguity attitudes in decisions for others

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HIGHLIGHTS

- We replicate the gain-part of the fourfold pattern of ambiguity attitudes.
- Ambiguity attitudes are not affected by agency situations.
- In this regard ambiguity attitudes seem more stable than risk attitudes.

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ABSTRACT

We probe the pattern of ambiguity aversion for moderate-likelihood gain prospects, and ambiguity seeking for low-likelihood gain prospects, if people make decisions not for themselves but as agents for others. We confirm the pattern both with and without accountability.

1. Introduction

Experimental research on decision making under risk has found marked differences between decisions for oneself and for others (e.g., Chakravarty et al., 2011; Füllbrunn and Luhan, 2015), with accountability being suggested as a moderating factor (Pollmann et al., 2014). Building on this research, we observe that decisions under uncertainty are often characterized by a lack of knowledge about the probabilities attached to the various outcomes. In contrast to decisions under *risk* (where probabilities are known), these decisions are referred to as decisions under *ambiguity*. We study whether the pronounced self-other disparities observed under risk also emerge for decisions involving ambiguity. Given the close similarity to risky decision settings, agency and accountability would be expected to have effects for ambiguity as well.

Previous literature has found a complex pattern of attitudes toward ambiguity, with people being ambiguity averse for moderate likelihood gains (as in the classic Ellsberg 2-color task) and ambiguity seeking for low likelihood gains.[1] Studying decisions for others with and without accountability, we probe the robustness of this pattern outside the context of individual decision-making.

The next section describes the experimental setup. The following section presents the results, showing that the pattern of ambiguity aversion and seeking suggested in the previous literature emerges strongly in both decisions for oneself and for others. We do not observe self-other disparities for ambiguity attitudes. The

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[1] See e.g. Trautmann and van de Kuilen (2015) for a recent review of the literature. The reverse pattern has been observed in the loss domain. Given the complexity of the agency setting, we focus on the gain domain in the current paper, avoiding issues of implementing losses.

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final section discusses these findings in the context of the related literature.

2. Experimental design

2.1. Decision tasks

We measure ambiguity attitudes using Ellsberg-urn tasks with either 2-color urns (moderate likelihood) or 10-color urns (low likelihood) as described in Trautmann and van de Kuilen (2015). We implement these two settings in a between-subjects design. In both settings, participants choose between betting on a red chip drawn from 100-chip bag with a known distribution of colors (risky prospect), and betting on a color of their choice from a 100-chip bag with an unknown distribution of colors (ambiguous prospect).[2] A successful bet yields a prize of €10, otherwise the payoff equals €0. In each setting, participants make seven choices between risky prospects with varying number of red chips, and the ambiguous prospect. In the moderate likelihood task, the bags contain red and blue chips. In the low likelihood task, the bags contain chips of 10 different colors. The seven choices are presented sequentially on separate screens, always starting with the ambiguity-neutral risky prospect. In the 2-color task this bag contains exactly 50 red and 50 blue chips. In the 10-color task it contains 10 red and 90 chips of different color. The seven choices for each task are shown Table 1, in the order they were presented to the participants. Note that our elicitation method makes preference consistency requirements much less salient than commonly used single-screen choice lists with items presented in ascending order.

Our setup allows us to collect two pieces of information. First, decision 1 allows us to determine ambiguity attitudes as typically done in single-choice tasks, unaffected by any considerations of order or choice-list effects. Together with decisions 2–7, we are then able to determine a *probability equivalent* (PE) for the ambiguous prospect, defined as the mid-point between the lowest risky probability for which the decision maker chooses risky and the highest risky probability for she chooses ambiguous. For example, if the decision maker chooses risky in the 2-color task except for risky probabilities 0.35 and 0.40, we calculate her PE as 0.425.[3,4] In both tasks, a lower PE indicates lower tolerance of ambiguity. In contrast to the simple initial choice, the PE provides a more fine-grained measure of attitude with more variation and statistical power.

2.2. Treatment manipulation

We implement the above-described decision task in three treatments. In treatment SELF, participants make the decision for their own account. In treatment OTHER, they (agent) make the decision for another participant (principal) who remains passive in the task. In treatment REWARD, they make the decision for another participant who is then asked if she wants to reward the decision maker for her choice. All participants in all treatments receive a fixed payment of €2 (on top of a show-up fee of €3). In treatment REWARD, the principal can use this amount to transfer a reward to the agent. Specifically, one of the seven decisions made by the agent is randomly selected and implemented for real. The principal observes the choice and the outcome, and is then asked which amount between €0 and €2 she wants to transfer to the agent (in increments of €0.20). Both principals and agents know the procedure and the available amounts. Thus, agents can anticipate the effect of their choice on their potential rewards.

In conditions OTHER and REWARD, half the participants make choices as agents in the 2-color task and the other half make choices as agents in the 10-color task. Subsequently, each agent serves a principal in the other task. That is, the initial choice behavior is not affected by their later experience as a principal. Participants learn about the details of the other task only after they made choices in the task in which they act as agents. One of the two settings was selected for payment.[5]

2.3. Lab procedures

The experiment was programmed using z-Tree (Fischbacher, 2007). Participants were invited from the participant pool using hroot (Bock et al., 2014). All participants received a show-up fee of €3, a fixed payment of €2, and could earn €10 from the choice task. The experiment took about 4 min, for which participants earned €7.16 on average.

Before each session, the ambiguous bags were filled anew with 100 chips which were drawn from larger bags containing 100 chips of each color. The risky bags were checked to contain the correct distributions of colored chips. The physical bags were visibly placed on the experimenter's table and could be inspected by participants after each session.

After all choices were made, one setting (2-color or 10-color task) was randomly selected, and uncertainty was then resolved by drawing chips physically with the help of a volunteering participant. Results were entered into the program. For each participant or each agent–principal group, the computer randomly selected one choice problem and calculated payoffs. In REWARD, at this point the principals learned about the decision by the agent and their outcome, and made their decision about the reward. Final payoffs were calculated; participants answered a demographic questionnaire, were paid and dismissed from the lab.[6]

3. Results

In total, 194 student subjects participated in the experiment (SELF: 38, OTHER: 78, REWARD 78), of which 47.9% (93) are female, and 36.6% (71) are economics students. Consistency in the two choice tasks is high, given that decisions are not presented in ascending order of probability and are shown on separate screens. In the 2-color task 73.3% (85) of the decision makers were

2 Having participants choose their own winning color prevents the ambiguous bags from being strategically filled to the participants' disadvantage. This problem does not obtain for the known-distribution risky bags. For practical reasons thus, participants cannot choose their winning colors for the risky prospects, because it would require a large number of additional bags to cover all possible color choices and chip distributions.

3 For some participants the PE is not defined by the procedure because they choose ambiguous for risky probability p and risky for risky probability q, with $q < p$. In this case we define an indifference range, i.e. we consider the risky probability at which the participant first switches from the ambiguous to the risky prospect and the last choice item at which the participant switches back from the risky to the ambiguous prospect. We then define the participant's probability equivalent as the midpoint of this indifference range. Our results remain unchanged if we only use observations with a single switching point instead.

4 For participants who always choose risky (ambiguous), we define the PE as 0.325 and 0 (0.675 and 0.205) in the 2-color and the 10-color tasks, respectively.

5 In condition SELF, for participants in the 2-color (10-color) task, the second part of the experiment had them make choices in the 10-color (2-color) task, to keep the two-part structure equivalent to the agency condition. We only use the initial (between-subjects) choices that are unaffected by order effects to keep the structure identical to the agency condition. Our results remain qualitatively unchanged if we use all choices of treatment SELF instead.

6 All files necessary for replicating the experiment and the results are available at https://heidata.uni-heidelberg.de/dvn/dv/awiexeco.