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An Individual Difference in Betrayal Aversion: Prosociality Predicts More Risky Choices in Social but Not Natural Domains

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The present study investigated the relationship between betrayal aversion, i.e., the tendency to avoid specifically social risks (and not non-social, or "natural" risks), and social value orientation using economic games. Participants engaged in the Faith Game, which requires social trust, and a standard gambling game. Individuals denoted as "proself" were less likely to choose the risky option during the Faith Game as compared to individuals noted as "prosocial"; there was no difference between the groups during the gambling game. We discuss these results in terms of individual differences in betrayal aversion.

Keywords
betrayal aversion, risk aversion, social value orientation

Introduction

Trust is a risk. If an individual proves trustworthy, trust can offer significant benefits; however, if a trustee fails to reciprocate, great costs can result. Therefore, trust can be considered a social risk, similar to other natural risks such as accidents or gambles. Recent studies, however, have demonstrated that people are more likely to refrain from investing in another person while on devices such as computers, because they want to avoid potential betrayal (e.g., Bohnet & Zekhauser, 2004). In the present study, we assessed how people may respond differently to social risks and natural risks, and tested the effect of individual social value orientations.

Individual Differences in Betrayal Aversion

There is a well-known phenomenon, betrayal aversion, whereby people are generally less willing to take a risk when the risk's source is another person as opposed to something in nature. This is the case even though stakes and odds between the two are the same (e.g., Bohnet & Zeckhauser, 2004). Empirical evidence on this phenomenon has accumulated across various fields, such as organizational studies (e.g., Koehler & Gershoff, 2003) and neuroimaging (e.g., Lauharatanahirun, Christopoulos, & King-Casas, 2012).

Previous studies have typically investigated betrayal aversion by comparing averages of the minimum probability with which people accept risks in social vs. non-social domains (e.g., Bohnet & Zeckhauser, 2004). Their primary focus is to prove people's general tendency to avoid betrayal; they attended less to the individual differences. However, some people may be more afraid of betrayal than others. For example, if individuals perceive that their world consists of several trustworthy people, they may foster trusting attitudes toward others and, thus, be less likely to show betrayal aversion. Conversely, if people think that their social environment is filled with selfishness or betrayal, they should express conservative attitudes toward others, leading to strong betrayal aversion.

Social Value Orientation and Betrayal Aversion

The present study aimed to demonstrate such an individual difference in betrayal aversion. Social value orientation (SVO) was the primary focus, which reflects individual motivations to care about others' payoffs (Messick & McClintock, 1968; Van Lange, Otten, De Bruin, & Joireman, 1997). Studies have shown that individuals can be classified into one of three SVO categories: prosocials, those who care about others' payoffs as much as their own; individualists, those who are motivated only to maximize their own payoffs; and competitors, those who are motivated to maximize the superiority of their own payoffs as compared to others. Furthermore, past studies have argued that prosociality influences perception of the social world (e.g., Kelley & Stahelski, 1970; Kuhlman & Wimberley, 1976). Specifically, "proselfs" (individualists and competitors) tend to estimate that proselfs outnumber prosocials in the world, whereas prosocials tend to estimate that prosocials are just as numerous as proselfs. Therefore, it was expected that prosocials would be more likely to trust and invest in another person as compared to proselfs; however, these two groups would not differ in their attitudes toward natural risks. In other words, prosocials would show a relatively weaker betrayal aversion than proselfs.

The present study employed the Faith Game (Kiyonari & Yamagishi, 1999), which is a modified version of the Trust Game (e.g., Bohnet & Zeckhauser, 2004). In the Faith Game, Player 1 decides whether he/she will receive (a) a fixed amount of money or (b) an amount that another player (Player 2) allocates to him/her. Unlike the Trust Game, Player 2 makes this allocation decision without knowing whether Player 1 has placed trust in him/her. Player 2 receives the money that he/she allocates to him/herself regardless of Player 1's decision. Therefore, Player 1's decision only reflects his/her expectation regarding Player 2's allocation generosity but not his/her concern for

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Player 2's feelings or payoff.

Method

Participants

Seventy-eight undergraduates (28 women, 50 men; mean age = 19.69 years, *SD* = 1.15) participated in the experiment in exchange for 900 JPY (approximately $9 USD).

Gambling Game (Natural Risk)

During each trial, a fixation point was presented for 3 seconds, followed by two options (Figure 1). Participants chose either a risky option or a safe option. When risky options were chosen, a computer drew lots. When participants won, they received 600 or 1,500 JPY but received nothing when they lost. When the safe options were chosen, participants received a fixed amount of money, ranging from either 60 to 540 JPY in increments of 60 JPY or 150 to 1,350 JPY in increments of 150 JPY. These fixed values corresponded to 10% to 90% of the stake for the risky options. Options were shown on the screen until participants made a selection. Each trial had no feedback. Participants did not know the probability of winning. There were 18 trials, and stimuli were presented in a random order (i.e., nine types of safe options [10–90% of the stake] for each stake [600 or 1,500 JPY]).

Faith Game (Social Risk)

Trials for the Faith Game were essentially the same as the Gambling Game, except for how "winning" was determined. When risky options were chosen, a computer randomly selected a target person, who had already played the Dictator Game (Kahneman, Knetsch, & Thaler, 1986) in the pre-experiment, as the proposer (see Supplementary Materials for details). Participants received 600 or 1,500 JPY if the target had chosen to share, whereas they received nothing if the target had chosen not to share. Participants understood how the prior experiment had been conducted and that their choices would not influence targets' rewards. A random target was presented for each trial.

Procedure

Participants were informed that they would engage in two tasks and could receive additional rewards contingent on their performance. Participants were given specific instructions before they played the Gambling Game. Participants then read instructions before playing the Faith Game. Task order was fixed among participants. After completing both tasks, participants filled out a post-experiment questionnaire, including a question regarding the estimated proportion of people who had chosen to share in the pre-experiment (i.e., the estimated probability of winning in the Faith Game [0–100%]), a question regarding the estimated probability of winning during the Gambling Game (0–100%), the Social Value Orientation Scale (Van Lange et al., 1997), and demographic questions. Participants were then paid their compensation.

The proportion of choosing risky options in each condition was calculated and used as a dependent variable (see Supplementary Materials for the pattern of risk choices and its relationship with betrayal aversion). Additionally, following the procedure of Van Lange et

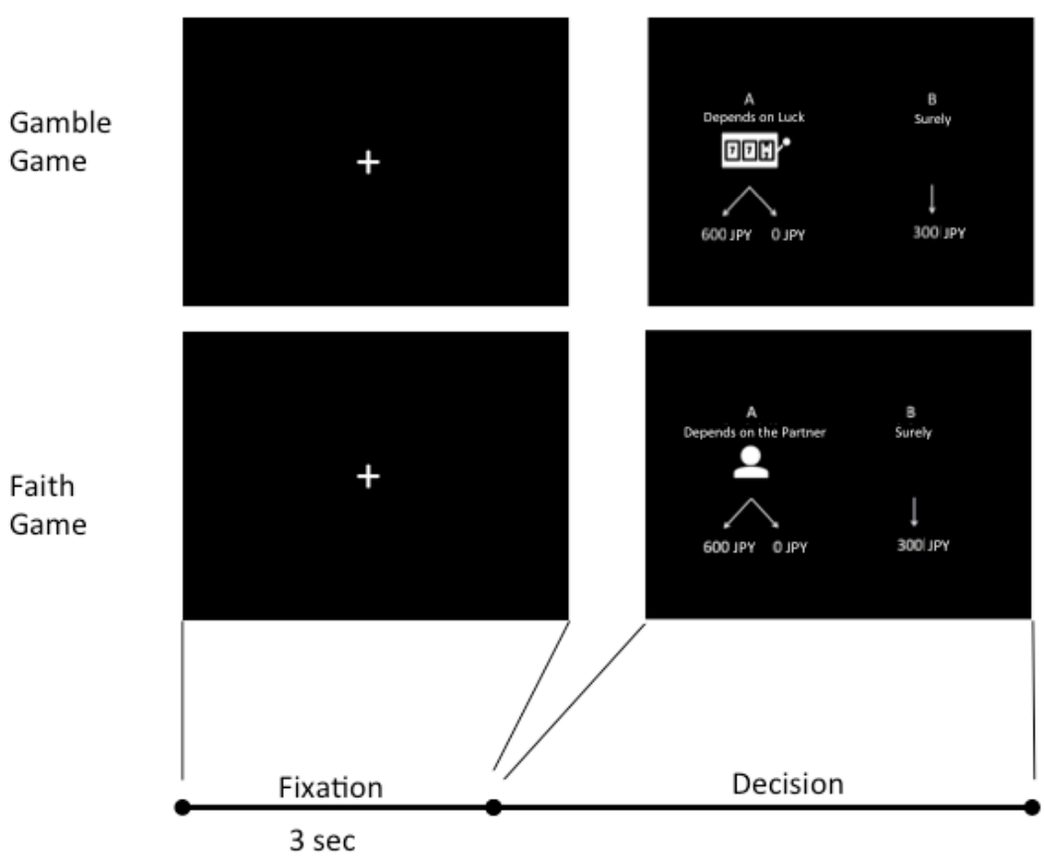

Figure 1. A trial sequence. The original material was presented in Japanese.

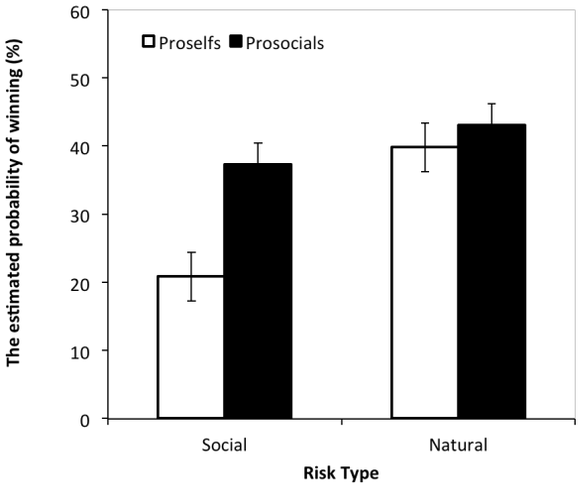

Figure 2. The mean estimated probability of winning during each game by SVO group

al. (1997), participants were classified as "prosocial" (n = 42), "proself" (individualists and competitors; n = 32), and "etc." (n = 4). Participants who were classified as "etc." on the SVO scale were not used in the present analyses. Due to skewed distributions, the estimated probability of winning during each game was log-transformed.

Results

First, a 2 × 2 mixed-design analysis of variance (ANOVA) using risk type (social or natural) and SVO (prosocials or proselfs) as factors was conducted on the estimated probability of winnings (i.e., perceived social vs. natural risk) for each game (raw score averages and standard errors are shown in Figure 2). The main effects of risk type and SVO group were both significant, $F(1, 72) = 22.70$, $p < .001$, partial $\eta^2 = .24$ and $F(1, 72) = 5.23$, $p = .025$, partial $\eta^2 = .07$. Particularly, the interaction between SVO and risk type was significant, $F(1, 72) = 4.44$, $p = .038$, partial $\eta^2 = .06$. As expected, a post-hoc comparison (Holm method) revealed that prosocials reported a higher level of trust in others compared with proselfs, $F(1, 144) = 9.63$, $p = .002$, partial $\eta^2 = .12$. In contrast, there was no difference between SVO group during the Gambling Game, $F(1, 144) = 0.21$, $p = .65$.

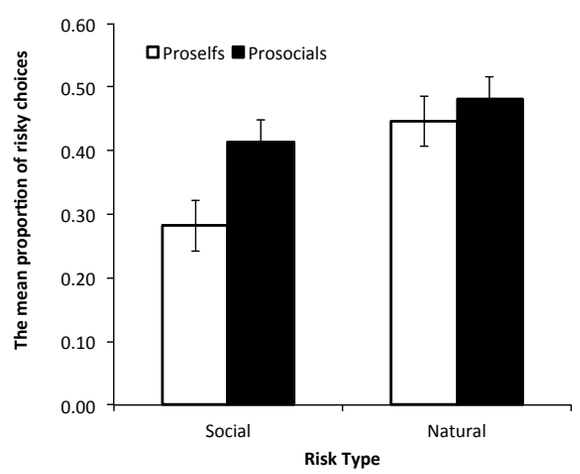

Figure 3. The mean proportion of the risky choice during each game by SVO group

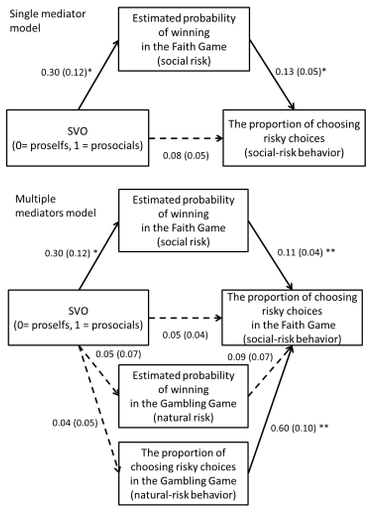

Figure 4. Mediation models showing the relationship between SVO and risky choice. Unstandardized regression coefficients are shown, and standard errors are given in parentheses. Asterisks indicate significant coefficients (**p < .01, *p < .05).

Next, a 2 × 2 × 2 mixed-design ANOVA using stake (600 or 1,500 JPY), risk type, and SVO as factors was conducted on the proportion of those choosing the risky option. The main effect of stake was significant, $F(1, 72) = 42.51$, $p < .001$, partial $\eta^2 = .37$, with participants more likely to choose a risky option when the stake was smaller. The main effect of risk type was also significant, $F(1, 72) = 20.89$, $p < .001$, partial $\eta^2 = .23$, with a greater proportion of risky choices for natural than social risk tasks. Importantly, this effect was qualified by an interaction between risk type and SVO, $F(1, 72) = 2.82$, $p = .097$, partial $\eta^2 = .04$, though this effect was marginal. As expected, a post-hoc comparison revealed that prosocials were more likely to choose risky options during the Faith Game as compared to proselfs, $F(1, 144) = 5.03$, $p = .026$, partial $\eta^2 = .07$, but there was no difference between SVO groups during the Gambling Game, $F(1, 144) = 0.49$, $p = .48$, partial $\eta^2 = .01$. No other interaction achieved statistical significance, Fs < 2.35, ps > .13.

Finally, we explored whether the relationship between SVO and risk choice during the Faith Game was mediated by perceived risks. The stake factor was collapsed, and the average proportion of choosing risky options was used. First, the proportion of choosing risky options during the Faith Game was significantly predicted by the SVO group, $b = 0.11$, $SE = 0.05$, $t(72) = 2.17$, $p = .034$. When perceived social risk was entered into the model, the effect of prosociality became non-significant, $b = 0.08$, $SE = 0.05$, $t(71) = 1.49$, $p = .14$ (Figure 4). Analysis of the indirect effect (bootstrap method; 10,000 times) revealed that perceived social risk mediated the relationship between SVO and risk choice during the Faith Game, with a point estimate of 0.034 and a 95% bias corrected bootstrap CI [0.0001, 0.099]. This mediation effect remains the same when entering the estimated probability of winning and the proportion of choosing risk options during the Gambling Game as multiple mediators (Preacher & Hayes, 2008),

with a point estimate of 0.035 and a BC 95% CI [0.005, 0.089].

Discussion

The present study reveals a unique variance component to risky choices in the social domain influenced by individual SVO. Instead of simply comparing averages, the present study investigated the relationship among personality traits, individual estimates of risks, and risky choices. In a sense, this study successfully replicated previous studies on betrayal aversion in a more sophisticated way.

Moreover, the present study employed the Faith Game instead of the Trust Game, which has been traditionally used. Since the Trust Game includes allocation of resources to others, this task is under the influence of both prosociality and one's general estimates of trustworthiness. In contrast, the Faith Game assesses participants' "pure" trust in others as a behavioral measure. By using this Faith Game, the present study eliminated the possibility of confounding the effects of trust and prosociality. Therefore, it can be said that the present study clearly demonstrated a relationship between individual prosociality and trust.

There are several limitations to note, as well as future research directions. First, although the present study demonstrated that prosocial orientation predicts attitudes toward social risk, it is not clear as to what personality traits selectively predict attitudes towards natural risk. Thus, it would be interesting to observe a personality trait that predicts attitudes toward only natural risk. Second, the present study is a behavioral experiment. Given the prevalence of neuroimaging and neurophysiological research in this domain, studies using fMRI and/or oxytocin may be promising. Such investigations should help reveal how people trust each other and how they perceive, believe, and construct social and natural worlds.

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