

# A Conceptual Replication of the Male Warrior Hypothesis Using the Outgroup Threat Priming Method

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A conceptual replication of Yuki and Yokota's (2009) study to test the validity of the male warrior hypothesis was conducted. They reported that ingroup bias was triggered by the perceptual cue of outgroup threat, based on the use of a priming method in a minimal group situation among men only. In this study, the stimulus of outgroup threat priming and the measurement of ingroup bias were modified to test the effect of outgroup threat priming on ingroup bias. The results revealed failure to replicate and thus no bias generated by priming among men.

## Keywords

male warrior hypothesis, outgroup threat, ingroup favoritism, conceptual replication

## Introduction

Since the 19th century, researchers have argued that the main evolutionary adaptations governing intergroup conflict are altruism toward ingroup members and discrimination toward members of outgroups (ingroup bias: e.g., Darwin, 1871). Based on the general expectation that selection pressure in the evolutionary history may have shaped the deeply rooted psychological mechanisms specified for men to solve a wide range of adaptive problems, including obtaining access to mates and managing conflicts within and between groups (McDonald, Navarrete, & Van Vugt, 2012; Tooby & Cosmides, 1988; Van Vugt, De Cremer, & Janssen, 2007), some evolutionary psychologists have proposed the “male warrior hypothesis.” Following this hypothesis, ingroup bias (ingroup cooperation and intergroup aggression) should be evoked only by men, not women, in an intergroup conflict situation. It has been assumed that this mechanism enables men to form coalitions and

execute aggression against members of outgroups with the ultimate goal of acquiring or protecting reproductive resources. In lethal intergroup conflict situations, survivors gain but those who die loses, and who will live or die is unknown in advance; thus, the risk of death is in principle distributed randomly. However, if the chance of success of collective aggression can be improved, for instance by a much larger group attacking a much smaller group, participation in collective aggression will benefit aggressor group members and enhance their fitness (Tooby & Cosmides, 1988). Evolutionary psychologists have therefore hypothesized a human, particularly male human, psychological mechanism to cope with the potential risk posed by outgroups (e.g., McDonald et al., 2012).

Yuki and Yokota (2009) tested the validity of the male warrior hypothesis in a minimal group situation (Tajfel, Billig, Bundy, & Flament, 1971) using the priming method (Bargh, 2006). They hypothesized that ingroup bias in the focal intergroup context (minimal groups) could stem from outgroup threat cue in a different context (the “intercultural relations” context). The results showed that men's, but not women's, ingroup bias was a universal behavioral tendency triggered by perceptual cue of threat posed by outgroup members that criticize participants' own culture.

This study aims to conduct conceptual replication of Yuki and Yokota's (2009) experimental study to test the validity of the male warrior hypothesis. Their study had two main limitations. First, the reliability of the priming method was questionable (see, e.g., Harris, Coburn, Rohrer, & Pashler, 2013) because they reported only one study. Second, it should be investigated whether ingroup bias triggered by outgroup threat could be distinguished from ingroup bias based on reciprocity. One major motivation of ingroup bias is expectation of reciprocity among ingroup members (e.g., Balliet, Wu, & De Dreu, 2014; Yamagishi, Jin, & Kiyonari, 1999). Ingroup bias would then be evoked to maintain a generalized reciprocal relationship within a group (e.g., Balliet et al., 2014). In contrast, the male warrior hypothesis predicts that ingroup bias triggered by outgroup threat should be generated without expected reciprocity. The hypothesis assumes that ingroup bias could proceed to formation of coalitions and execution of aggression for enhancement of reproductive success (McDonald et al., 2012). However, no verification of whether ingroup bias driven by outgroup threat will also be influenced by expected reciprocity was demonstrated in Yuki and Yokota's experiment. To test the effect of expected reciprocity on ingroup bias primed by outgroup threat, we adopted the prisoner's dilemma (PD) game to measure ingroup bias, which allowed us to manipulate knowledge of group membership (Jin & Yamagishi, 1997).

Manipulation of participants' knowledge of group membership can reveal whether ingroup bias is motivated by expected reciprocity (e.g., Jin & Yamagishi, 1997). If both participants and their partners in the PD game are aware of their (in) group membership, then they

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will expect reciprocal returns, because the salience of the group boundary lets them expect a generalized reciprocal relationship within a group (Yamagishi et al., 1999). However, asymmetry of knowledge of group memberships (i.e., participants know their partner's group memberships, and also know that the partner does not know the participant's group membership) fails to lead to expectation of reciprocal return. The male warrior hypothesis predicts ingroup bias in this asymmetrical knowledge situation.

## Methods

### Design and Procedure

This study was carried out in accordance with the recommendations of the ethics committee of the Faculty of Humanities and Human Science at Hiroshima Shudo University, who approved the protocol for the study. All participants provided written informed consent in accordance with the Declaration of Helsinki.

Participants were 167 undergraduate students (90 women and 77 men) at Kobe University (in Kobe, Japan). The experimental design was 2 (gender)  $\times$  2 (threat: between)  $\times$  5 (knowledge: within). We explain the outline of the procedure below (see the supplementary 1 for the detailed procedure).

Participants were seated in a private booth, where they provided their informed consent. The experimental session comprised two ostensibly unrelated experiments in sequential order. The first experiment was a so-called "language task," which was the prime for outgroup threat. The task required participants to circle all nouns in three essays within five minutes. In the outgroup threat condition, the second essay was supposedly written by a person from another culture who was criticizing the attitude of the participants' own country regarding a territorial issue (i.e., using the word "war"; Sugiura, Mifune, Tsuboi, & Yokota, 2017). In the control condition, the theme of the second essay was art. Participants then engaged in a distraction task.

The second experiment comprised two decision-making tasks. In the first task, participants were asked about their preferences between 28 pairs of abstract paintings. Participants were divided into either a "Klee group" or a "Kandinsky group," based on the number of paintings by Klee or Kandinsky they chose.

In the second task, participants played the PD game. Participants engaged in several rounds (the exact number was unspecified) of "transactions" with other participants. Their transaction partner would change each round. Participants were given 200 JPY at the beginning of each transaction and decided how much of the 200 JPY they would provide to their transaction partner ("reward"). The money they provided would double in value before being delivered to their partner, while the remaining amount was theirs to keep. Their partner would simultaneously make the same decision. Participants were not informed of how much they had earned at the end of each transaction; their decisions (how much they gave to their partner in each round) were not disclosed to other participants or to the experimenter.

Actually, participants played six trials of the PD game. In each trial, participants' knowledge of their transaction

partner's group membership was manipulated (see supplementary 1). In the unknown condition, in which two trials were conducted, participants were not informed of the group membership of their partner. In the two trials belonging to the bilateral condition, the in-/outgroup membership of both players was simultaneously revealed to participants and their partners; in this condition, expectations of reciprocity were expected to be enhanced only toward ingroup members. In the remaining two trials, called the unilateral condition, participants played with a member of their own or another group who was not informed of the participants' group membership.

When all trials were completed, participants received a post-experiment questionnaire booklet including demographic questions. Once participants had completed all questions, they signed a receipt to collect their earnings from the study and left the laboratory. The entire experiment took appropriately one hour to complete.

### Predictions

Based on the male warrior hypothesis, it was expected that among men, in the threat condition, rewards in the two ingroup trial conditions (bilateral and unilateral) would be expected to be higher than the unknown condition (ingroup cooperation) and those in the two outgroup conditions (outgroup derogation), while in the control condition, the rewards in the ingroup-bilateral condition would be higher than in the other four conditions (ingroup cooperation based on reciprocity). Among women, the same pattern as in the men's control condition was expected in both threat and control conditions.

## Results

Six participants were excluded from the analysis because they did not complete the second essay regarding "outgroup threat" in the priming task. This analysis was performed using the statistical software packages HAD (Shimizu, 2016) and SAS 9.3. Because there were two identical 'unknown' rounds in the six rounds, the two data points from those rounds ( $r = .81, p < .01$ ) were averaged for the subsequent analyses.

Figures 1 and 2 show the means of rewards as a function of the threat and knowledge conditions in each gender (error bars show standard errors). To investigate whether the pattern by knowledge condition differed according to gender and/or threat condition, we conducted a 2 (gender)  $\times$  2 (threat)  $\times$  5 (knowledge) ANOVA. The results revealed significant main effects of gender ( $F(1, 157) = 4.30, p < .04, \eta_p^2 = .03$ ) and knowledge ( $F(4, 628) = 22.18, p < .01, \eta_p^2 = .12$ ), but no significant main effects of threat ( $F(1, 157) = 0.15, p = .70, \eta_p^2 = .00$ ). There were no significant interaction effects ( $F_s(1, 157), (4, 628) < 1.79, p_s > .16, \eta_p^2_s < .02$ ). These results showed no effect of outgroup threat priming on ingroup bias (see the supplementary 2 for additional analyses such as post-hoc comparisons).

## Discussion

To test the replicability of the effect of outgroup threat priming on ingroup bias in the minimal group situation, we conducted a conceptual replication in which the

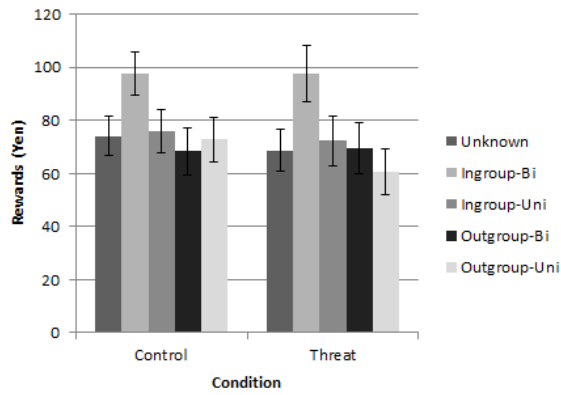


Figure 1. Rewards by conditions in women

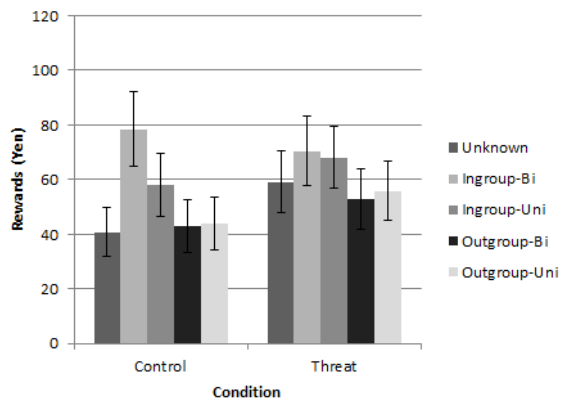


Figure 2. Rewards by conditions in men

priming stimulus and the measurement of ingroup bias were modified. However, the results showed that no ingroup bias was generated by outgroup threat priming; thus, the replication failed. On the other hand, the results of this experiment (except the pattern observed for men in the threat condition) confirmed the results of previous studies.

One possible reason for the failure to replicate outgroup threat priming is that participants may have had a high estimate of the formidability (possible fighting ability) of the primed outgroup (McDonald et al., 2012) because the outgroup threat priming stimulus included more aggressive words compared with the one in Yuki and Yokota's study. The male warrior hypothesis argues that perception of higher formidability will evoke an avoidance-oriented strategy rather than aggression. Thus, more replications should be conducted in the future to explore this possibility.

One future issue is lack of the manipulation check of outgroup threat priming. In the next study, some measurements for the manipulation check should be included.

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### Supplementary Material

Electronic supplementary material is available online.

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