



Intergroup cooperation in the United States and Japan: Revisiting Yuki's (2003) theory on the cultural difference in the conceptualization of group boundaries

Hiroataka Imada^{a,*}, Gen Tsudaka^b, Nobuhiro Mifune^c, Keiko Mizuno^d, Joanna Schug^e, Kodai Kusano^f

^a Royal Holloway, University of London, the United Kingdom

^b New School for Social Research

^c School of Economics & Management, Kochi University of Technology, Japan

^d Kwansai Gakuin University

^e College of William and Mary

^f New York University Abu Dhabi

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ABSTRACT

Social identity theory posits that individuals perceive the in-group as a homogenous entity comprised of depersonalized individuals, and this theory has provided a foundation to understand intergroup processes for many years. Cross-cultural research has suggested social identity theory may not apply to East Asians, who conceptualize their in-groups differently than those in from Western cultures. Specifically, Yuki and colleagues contend that East Asians perceive in-groups as networks wherein each individual is connected through personal ties, rather than homogenous entity comprised of depersonalized individuals. Furthermore, prior research has shown that East Asians are more likely to trust out-group members with potential personal connections, similarly to how they trust actual in-group members. This reflects their group boundary perception based on personal linkages rather than categorical membership. Conversely, individuals from Western cultures tend to trust in-group members more than out-group members, regardless of potential personal connections. Our preregistered study ($N = 332$ Japanese and 345 American university students) aimed to conceptually replicate key findings that support Yuki's account and expand upon the theory in the context of intergroup cooperation. Overall, we failed to find evidence for the network-based and category-based cooperation and trust among Japanese and Americans, respectively. Consequently, our results highlight the need for further experimental investigation and validation of Yuki and colleagues' theoretical framework.

Social identity theory (Tajfel, 1974; Tajfel and Turner, 1979; Turner, 1975), together with its extensions such as self-categorization theory (Turner et al., 1987), has long guided social psychological research on intergroup behavior. Since the development of the minimal group paradigm (Tajfel et al., 1971), many studies have demonstrated that the mere exposure to group categories (in-group vs. out-group) results in various forms of in-group biases (for reviews, see Hewstone et al., 2002; Hogg and Abrams, 1988). Yet, this well-established theory is no exception to recent concerns regarding the generalizability of psychological theories to diverse populations (Rad et al., 2018), and several studies have explored whether social identity theory provides sound explanations for intergroup processes among non-Western cultures (Falk

et al., 2014; Feitosa et al., 2012; Kavanagh and Yuki, 2017; Smith and Long, 2019; Yuki, 2003; Yuki et al., 2005).

Yuki and colleagues (Kavanagh and Yuki, 2017; Yuki, 2003; Yuki et al., 2005) proposed a socio-ecological framework to understand cultural variation in intergroup processes, proposing that people in East Asian and Western cultures differently conceptualize *groups* and arguing that the influence of group categorization on intergroup behavior would vary in different cultures. Based on their proposition of cultural differences in the conceptualization of groups, the present research aims to examine intergroup cooperation in the United States and Japan. We seek to confirm whether individuals in these two cultures refer to group categorization in the same manner when deciding to what extent they

* Corresponding author at: Department of Psychology, Royal Holloway, University of London, Egham, Surrey, TW20 0EX, UK.

E-mail address: Hiroataka.Imada@rhul.ac.uk (H. Imada).

would like to cooperate with others.

According to the social identity approach (Tajfel, 1974; Tajfel and Turner, 1979; Turner, 1975; Turner et al., 1987), depersonalization plays a pivotal role in intergroup processes. Namely, when individuals identify with a group, their personal identity is merged into the collective self, and the group becomes represented as a homogenous entity consisting of such depersonalized individuals. As such, individuals define themselves at a collective level, and they perceive themselves as being interchangeable with typical group members. Once identified, they are typically motivated to establish a positive social identity distinctiveness (Hogg and Abrams, 1988; Rubin and Hewstone, 1998; Tajfel and Turner, 1979; Turner, 1975; Turner et al., 1987), and, thus, the evaluation of the in-group is calibrated in reference to a specific out-group in a given context. This, in turn, is known to lead to in-group biases.

Drawing upon the empirical literature on traditional cultural psychology with focuses on the individualism vs. collectivism dichotomy, Yuki (2003) argued that the cognitive representation of the in-group in East Asian cultures differs from that of Western cultures (i.e., a crew of depersonalized individuals). More specifically, in East Asian cultures, the in-group is perceived to be a complex web where group members are connected with one another via personal ties, and often hold distinct roles within the group (for a succinct review, see Kavanagh and Yuki, 2017). Thus, in stark contrast with the conceptualization of the in-group by the conventional social identity perspective, East Asian individuals are not depersonalized in intergroup contexts but perceive themselves as a unique part of a complex social network. In other words, in East Asian societies, it is a presence of a personal connection with group members, rather than categorically represented group boundaries (i.e., the conceptualization of the in-group in Western cultures) that holds a crucial role in informing intergroup processes.

Yuki (2003) examined the relationship among the perceived homogeneity of the in-group, knowledge about intragroup social structure (i.e., subjective sociometric knowledge), social identification, and in-group loyalty in the United States and Japan. He found that among Japanese, in-group homogeneity did not predict loyalty towards a national in-group and social identification with a small-scale group affiliation (e.g., social clubs) that participants identified as most important to themselves. Rather, identification with these groups was predicted by sociometric knowledge of the relations among group members. This finding supported the proposition that East Asians tend to perceive the in-group as a social network rather than a collection of homogenous and depersonalized individuals. Among Americans, both homogeneity and sociometric knowledge were positively associated with in-group loyalty and social identification. Thus, this correlational evidence buttressed Yuki's theory (Kavanagh and Yuki, 2017; Yuki, 2003) on cultural differences in the conceptualization of the in-group.

Given that interpersonal connection and categorical group boundaries act as a basis for social categorization in East Asian and Western cultures, respectively (Kavanagh and Yuki, 2017; Yuki, 2003), Yuki et al. (2005) hypothesized that an acquaintance in an out-group would create a potential personal connection with members of the out-group and that Japanese would trust members of the out-group who shared a potential connection in the same manner as they would in-group members. By contrast, among Americans, they predicted that the presence of an acquaintance in the out-group would not influence trust towards out-group members, reflecting the categorical cut-off between in-group and out-group members. In their first study, they employed three experimental scenarios where participants were asked to imagine whether they would trust an in-group member, a member of an out-group in which they had an acquaintance (i.e., an out-group member with a potential relation: henceforth referred to as an Out-R member), and an out-group member whose group did not include anybody whom participants were familiar with. Consistent with their hypotheses, they found that Japanese trusted both in-group members and Out-R more than the members of an out-group that did not have any

members whom they were potentially connected to. This result suggests that Japanese indeed based their trust decisions on the presence of personal connections, rather than group category. Contrastingly, they found that Americans trusted an in-group member more than an out-group member regardless of whether they had an acquaintance in the out-group.

In their second study, they used an economic game paradigm, referred to as a faith game. The game consisted of two players: an allocator and a receiver. The allocator first received \$11 from an experimenter and decided how much they would like to send to the receiver, knowing that the remaining money would be theirs. The receiver had to decide whether they would like to take a guaranteed payment of \$3 or the money the allocator decided to give them before knowing how much the allocator sent to them. In the faith game, the allocator was not informed that the receiver would have such choices but believed that the receiver's final payoff was completely dependent on their money allocation. The allocator's payoff was also independent of the receiver's behavior. As such, the receiver's decision to take the endowment from the allocator reflects behavioral trust (i.e., making oneself vulnerable to exploitation of others: Mifune and Li, 2018), and trust in the faith game indicates that the receiver expects the allocator to be altruistic (i.e., to provide at least a fair amount of money to the receiver).

Participants played the game as a receiver with one of the three allocators: an in-group member, an Out-R member, and an out-group member. Yuki et al. (2005) replicated their finding using a vignette study with the economic game paradigm. In other words, East Asians trusted the Out-R member as much as they did the in-group member. While they did not directly measure how altruistic and cooperative participants expected the allocator to be, their results suggested that East Asians expected the Out-R member to be as cooperative as an in-group member. Overall, Yuki et al. (2005) provided empirical evidence for Yuki's proposition (Kavanagh and Yuki, 2017; Yuki, 2003) that East Asians define group boundaries in reference to a social network, rather than a categorical group distinction, which leads to the different expectations about the cooperativeness of out-group members with a potential relation.

While Yuki and colleagues have provided a novel framework to understand cultural differences between Western and East Asian countries in intergroup processes, the existing empirical evidence speaks mainly to the context of intergroup trust (Ye and Ng, 2017; Yuki et al., 2005) and there has not been further experimental evidence for the theory. Thus, it remains unclear whether this framework is robust and generalizable to other domains of intergroup behavior, such as cooperation, i.e., behavior that serves to maximize the collective benefit in social dilemmas (Van Lange et al., 2013).

Cooperation and behavioral trust (i.e., an act of making oneself vulnerable to exploitations and selfishness by others in exchange for potential higher benefits; Mifune and Li, 2019) share underlying psychological mechanisms, such as the expectation about others' benevolent behavior and trustworthiness (DeSteno et al., 2012). However, there is one fundamental difference between cooperation and trusting behavior; trusting behavior is an action that exposes oneself to the risks of exploitation and betrayal (Bohnet and Zeckhauser, 2004) while also offering oneself the potential for higher payoffs. Consequently, assuming that others are cooperative and non-exploitative, trusting behavior becomes an optimal and rational strategy for individuals seeking to maximize their benefit. In contrast, noncooperation maximizes one's payoff in a prisoner's dilemma, assuming that others are cooperative. Therefore, the expectation that others are cooperative and trustworthy may be sufficient for people to trust others but not to cooperate, as the latter requires additional incentives or motivations (Pruitt and Kimmel, 1977).

From Yuki et al.'s (2005) Study 2, it remains unclear whether Japanese and Americans display network- and category-based cooperation. Namely, there is no direct evidence suggesting that Japanese are indeed

willing to prioritize collective benefits over personal benefits for Out-R members who are assumed to be as cooperative as in-group members. This being said, Yamagishi et al. (2013) revealed that individuals perceive situations requiring cooperation and trust in a similar manner, and their behaviors in these scenarios are correlated. Therefore, it can be reasonably assumed that Yuki's findings in the faith game would extend to cooperation contexts. Indeed, previous studies have robustly shown that people generally expect more cooperation from in-group members than from out-group members and this expectation translates into in-group favoritism in cooperation (Imada et al., 2023, 2024; Yamagishi et al., 1999). Therefore, it can be assumed that Yuki's findings in the faith game would be replicated in cooperation contexts.

Relatedly, however, Balliet and Van Lange (2013) conducted a large-scale meta-analysis on the relationship between behavioral trust and cooperation with more than 200 effect sizes and identified several moderators of the relationship, including culture: the association between depersonalized trust and cooperation was stronger among Americans than Japanese. Therefore, the examination of Yuki's theory in cooperation contexts deserves empirical elucidation. In addition, given that intergroup cooperation has close bearings on several societal issues such as environmental problems (Van Vugt, 2009), it is vitally important to conduct an independent experimental study to directly examine whether Yuki's theory can explain intergroup cooperation.

The present preregistered study aimed to test Yuki's theory within the context of intergroup cooperation. Given the number of existing social groups and the complexity of each individual's personal network, it is likely that individuals have acquaintances in a wide range of different out-groups. Thus, clarifying whether the presence of a potential connection to out-group members impacts intergroup cooperation, and examining whether this effect is culturally dependent, would provide valuable insight into understanding intergroup cooperation in real life. Indeed, providing additional evidence for this tendency could potentially be used to address major social problems that may be solved by mobilizing cooperation (e.g., Van Vugt, 2009). To this end, we employ a prisoner's dilemma in our study, and we would like to note that using the prisoner's dilemma allows us to directly measure expected cooperation from a partner and, correspondingly, test the mediating role of expected cooperation in the relationship between group membership and cooperation. In other words, we seek to extend Yuki's theory by offering quantitative evidence as to whether the cultural difference in the conceptualization of the in-group influences cooperation via expected cooperation.

In addition, whereas our main interest is to extend Yuki's theory on cultural differences in intergroup processes (Ye and Ng, 2017; Yuki et al., 2005) to intergroup cooperation, we also attempt to conceptually replicate the findings of Yuki et al. (2005) by measuring interpersonal trust. Yuki's theory has been a theoretical cornerstone that has guided a variety of subsequent research on cross-cultural work, and Yuki (2003) and Yuki et al. (2005) both have been cited more than 500 times as of September 2023. Yet, there have only been a few examples of experimental evidence supporting the theory itself (Ye and Ng, 2017; Yuki, 2003; Yuki et al., 2005). Moreover, recent preregistered studies by Nam and Chen (2021) failed to find support for Yuki's theory; they tested whether Americans and South Koreans categorize others with shared attributes and existing relationships as ingroup members, respectively, but they found that both Americans and South Koreans were more likely to categorize others based on existing relationships rather than shared attributes.

We also note that experimental evidence reported in the two studies in Yuki et al. (2005) was weak. They employed a 2 (culture: Japan and the United States) by 3 (target: in-group vs. out-group vs. Out-R) mixed design, but did not find a significant interaction effect in either study. Nevertheless, they followed up the nonsignificant interaction and conducted pairwise comparisons separately for data from Japan and the United States. These pairwise comparisons showed supported predictions for network- and category-based trust among Japanese and

Americans, respectively. Another potential concern with the original work is that significant pair-wise comparisons were not observed in each of the experimental scenarios (Yuki et al., 2005, Study 1). Of the three different experimental vignettes, only data from one vignette showed the predicted effect via pairwise comparisons, as well as when data from all three vignettes were aggregated. Although the lack of a significant interaction effect may have been due to low statistical power, given the results of Nam and Chen (2021), it is worthwhile revisiting Yuki's theory to seek more robust empirical evidence.

Hypotheses

H1: Intergroup Cooperation

Based on Yuki et al. (2005), we predicted the following; Japanese would cooperate more with In and Out-R compared to Out (H1a), and they would not discriminate between In and Out-R (H1b). Americans would cooperate more with In compared to Out and Out-R (H1c), and they would not discriminate between Out and Out-R (H1d).

H2: Intergroup Trust (Conceptual Replication of Yuki et al., 2005)

We aimed to conceptually replicate the main finding of Yuki et al. (2005) regarding trust and hypothesized the following; Japanese would trust In and Out-R more than they would Out (H2a), and they would not discriminate between In and OR (H2b). Americans would trust In more than Out and Out-R (H2c), and they would not discriminate between Out and Out-R (H2d).

H3: Expectation about the Partner's Cooperation

Yuki et al. (2005) examined intergroup trust in the faith game, where individuals would base their trusting behavior on the expectation about altruistic motives of a paired partner. Such an expectation also plays an important role in cooperation. Previous studies have found that intergroup discrimination in cooperation is explained by expectations about cooperation; more specifically, Yamagishi et al. (1999) showed that individuals cooperate more with in-group members than out-group members because they expect in-group members to cooperate more than out-group members. Thus, similarly to intergroup cooperation, we predicted the following; Japanese would expect more cooperation from In and Out-R compared to Out (H3a), and they would not discriminate between In and Out-R (H3b). Americans would expect more cooperation from In compared to Out and Out-R (H3c), and they would not discriminate between Out and Out-R (H3d). The analytic strategy follows that for H1.

Method

Open science

Materials associated with preregistration (analysis code, study materials, and the full Stage 1 manuscript) are available at <https://osf.io/tde5x/>. Data and analysis code can be found at <https://osf.io/8zm3e/>.

Participants and design

The study design followed a 2 (country: Japan vs. the United States) × 3 (group: In vs. O vs. OR) between-subject design. A priori power analysis revealed that a total of 967 participants should be sufficient to

detect a small effect of $f = 0.10^1$ (Yuki et al., 2005) with 80 % statistical power at $\alpha = 0.05$. Thus, we sought to collect 435 participants in each country. We obtained ethics approval from two institutional ethics boards and conducted the study in accordance with the British Psychological Society Code of Ethics and Conduct.

We advertised the study to 400–500 students taking a psychology module at a private university in Japan and solicited voluntary participation in exchange for partial course credit. We made the study available to participants for two weeks. Regardless of whether the number of data points reached 435 or not, we preregistered our intent to terminate data collection after two weeks in Japan due of resource constraints. In the United States, we recruited students at a public university in the United States in exchange for partial course credit. We expected that obtaining a large a number of participants using the participant pool would take a considerable amount of time, and we thus preregistered our intent to keep the study available for one semester in order to maximize the number of participants.

Procedure

We first prepared our study material in English and conducted a back-translation. Namely, HI, GT, and NM were involved in creating the original material, and KM translated it into Japanese. Then, JS back-translated the materials into English. KM and JS were not familiar with the original study material before translation. HI and GT together moderated and finalized the study materials in the two languages.

Participants were invited to take part in an online survey consisting of three parts: a pre-experiment questionnaire, a prisoners' dilemma (PD: Verhoeff, 1993; Wahl and Nowak, 1999), and a post-experiment questionnaire. As a cover story, participants were first informed that the study aimed to investigate the relationship between interpersonal relationships and economic behavior across various universities. In the pre-experiment questionnaire, participants answered questions about demographic information (sex, age, nationality, language, and university affiliation). In addition, they were presented with a list of names of various universities, including one fictitious university, in their country and asked to select universities that their acquaintances attended (see study material for a full list). We included the fictitious university in the list to make sure that there is one university that participants do not attend and do not know of anybody attending (i.e., the out-group condition, see below).

Then they read instructions about the PD. The basic rules of the economic game were as follows; participants were paired with another participant, and they were both endowed with 500 cents (for Japanese participants, 500 yen). They could decide how much to keep for themselves and how much to transfer to the paired participant, knowing that each cent they send to the other participant would be doubled by the experimenter. If both actors decided to send 500 cents, it would maximize the final collective payoff (2000 cents). Contrastingly, if they both kept all the money for themselves, they would collectively end up with 1000 cents. Participants answered three comprehension check questions about the game, and they could proceed to the next page only after correctly answering the questions. To incentivize participants, we noted that one participant would be randomly selected to receive the actual payment of the money they earn in the PD.²

Participants played the game once with an in-group member (In), an out-group member (Out), or an out-group member with a potential relation (Out-R). They were randomly assigned to one of the three

conditions. In the out-group condition, they were told that they were paired with a person who attended a university that none of their acquaintances attended. In the Out-R condition, they were told that their partner attended a university that their acquaintance attended. It was made to be clear that the partner in the game would know the university affiliation of participants. The amount of money participants decided to transfer was a measurement of cooperation. After completing the PD, participants proceeded to the post-experiment questionnaire, which included measurements of expectation about the partner's cooperation, trust towards the partner, subjective sociometric knowledge, perceived homogeneity of the group, social identification, and reputational concern. As a measure of participants' expectations about their partner's cooperation, participants were asked to indicate how much they thought their partner had transferred to themselves. We measured willingness to trust towards their partner using six items from Bocian et al. (2018), and participants responded to the items (e.g., I would give my number to my partner) with a 5-point scale ranging from 1 = *Strongly disagree* to 5 = *Strongly agree*. Then, participants answered five questions measuring their subjective sociometric knowledge (Yuki et al., 2005: e.g., "I know the personality differences among students at [In-Group]"). The perceived homogeneity of the group was measured with two items (e.g., Yuki et al., 2005: e.g., "Most people in my university are similar to each other in their value and preferences"). We used Cameron's (2004) social identification scale, which consists of 12 items (e.g., Generally, I feel good when I think about myself as a student at [In-Group]). We used a 6-point Likert scale ranging from 1 = *Strongly disagree* to 6 = *Strongly agree* to measure subjective sociometric knowledge, perceived homogeneity of the group, and social identification. Finally, for reputational concern, we introduced four items from Wu et al. (2015), e.g., "When deciding how much to transfer, I did not consider what my partner would say about me", using a 5-point scale ranging from 1 = *Strongly disagree* to 5 = *Strongly agree*. We measured the reputational concern scale for exploratory purposes.

Results

We made minor changes and additions to the preregistered analysis code and we report these deviations in our analysis code: (<https://osf.io/cg6xh>). Otherwise, we strictly followed the preregistered participant recruitment and analytic procedure. After we finished data collection, we had 340 and 403 participants from Japan and the US, respectively. We then excluded those who took too short or long to complete the study according to our pre-registered criteria, and this left us 332 and 345 participants from Japan and the US for subsequent data analyses. While the final sample size did not reach our desired number, a sensitivity power analysis indicated that the data would be sufficient to detect a small interaction effect of $f = 0.12$ for a 2×3 between-subject ANOVA, with 80 % statistical power. Thus, our study was still sufficiently powered. For multi-item measures, we took an average of each item to create composite scores. Our key variable, trust, showed satisfactory reliability ($\alpha = 0.77$, $M = 2.62$, $SD = 0.87$). We summarize overall descriptive statistics and correlations between three key variables, cooperation, expected cooperation, and trust in Table 1. See online supplementary materials for details of other scales.

Intergroup cooperation

We conducted a 2 (country: Japan vs. the United States) x 3 (group:

Table 1
Overall descriptive statistics and correlations of the key dependent variables.

	<i>M(SD)</i>	1	2	3
1. Cooperation	301.67 (149.28)	–		
2. Trust	2.62 (0.87)	.12*	–	
3. Expected cooperation	286.99 (129.73)	.72*	.14*	–

¹ In Study 2 of Yuki et al. (2005), they conducted a 2 (culture: US vs. Japan) x 3 (condition: In vs. Out vs. Out-R) mixed ANOVA to test their main hypotheses. The size of the reported interaction effect was $\eta^2 = 0.01$, which is equivalent to $f = 0.10$.

² We paid one participant in the In condition based on their decision and another participant's decision.

In vs. Out vs. Out-R) between-subject ANOVA on cooperation (see Table 2 for descriptive statistics). We found a significant main effect of country, suggesting that Americans were overall more cooperative than Japanese, $F(1, 671) = 9.27, p = .002, \eta_p^2 = 0.01$. However, the main effect of group and the interaction effect were not significant, $F_s(0.67, p_s) .51, \eta_p^2 = 0.002$ (group), $\eta_p^2 = 0.001$ (interaction).

Despite that the interaction was not significant, we conducted pairwise comparisons using estimated marginal means. Among Japanese, cooperation level did not significantly differ depending on the group membership of the partner, $|t_s| < 0.86, p_s) 0.39$. Overall, Yuki et al.'s (2005) finding on trust was not replicated in cooperation. Among Americans, the level of cooperation did not significantly differ depending on the group membership of the partner in the prisoners' dilemma, $|t_s| < 1.09, p_s) 0.27$. Similarly, to Japanese, we did not observe in-group favoritism among Americans. Overall, in our study, cooperation was not influenced by whether a partner belonged to the same university, a different university, or a different university that an acquaintance attended. Overall, the observed effect sizes were small, mirroring small effect sizes reported in similar and highly powered recent studies (e.g., Imada et al., 2023). We did not find support for H1.

Hypothesis 2. Intergroup Trust (Conceptual Replication of Yuki et al., 2005)

We then conducted a 2 (country: Japan vs. the United States) \times 3 (group: In vs. Out vs. Out-R) between-subject ANOVA on trust (see Table 2 for descriptive statistics). While the interaction effect was not significant $F(2, 671) = 1.46, p = .23, \eta_p^2 = 0.004$, we found that the main effects of group and country were significant, group: $F(1, 671) = 10.06, p < .001, \eta_p^2 = 0.03$; country: $F(1, 671) = 40.96, p < .001, \eta_p^2 = 0.06$. The significant main effect of country suggests that Americans were more trusting than Japanese, consistently with previous studies (e.g., Yamagishi, 2011). We followed up on the significant main effect of group with pairwise comparisons, and we found that participants overall trusted In and Out-R significantly more than Out, regardless of their nationality. Thus, we failed to conceptually replicate Yuki et al. (2005) with the preregistered analyses.

As a nonregistered exploratory analysis, we investigated the simple main effect of group in each country. The simple main effect of group was significant among Japanese ($F(2, 329) = 9.31, p < .001, \eta_p^2 = 0.05$), but not among Americans ($F(2, 342) = 2.77, p = .06, \eta_p^2 = 0.02$). Furthermore, consistent with Yuki et al. (2005) and H2a/H2b, pairwise comparisons revealed that Japanese trusted In and Out-R significantly more than Out, $|t_s| > 3.26, p_s < 0.003$. We note two things; first the interaction effect in our study was not significant and the results should be carefully interpreted. Second, Yuki et al. (2005) conducted two studies and neither of the two in fact yielded a significant interaction effect. Yuki et al. (2005) drew conclusions from simple main effect analyses (i.e., pairwise comparisons of group conditions by each country).

Hypothesis 3. Expectation about Cooperation

We conducted a 2 (country: Japan vs. the United States) \times 3 (group: In vs. Out vs. Out-R) between-subjects ANOVA on expected cooperation (see Table 2 for descriptive statistics). We did not find any significant effects ($F_s < 1.55, p_s > 0.21$) and pairwise comparisons revealed that expected cooperation was not influenced by the group membership of the partner ($|t_s| < 1.59, p_s) 0.60$). As such, we did not find support for H3.

Discussion

Yuki and colleagues' influential theory on cultural differences in group conceptualization has significantly impacted subsequent cross-cultural research on intergroup processes (Kavanagh and Yuki, 2017). As of September of 2023, the cornerstone papers introducing the theory have each amassed over 500 citations (Yuki, 2003; Yuki et al., 2005). In this study, we aimed to examine the theory through intergroup cooperation while also conceptually replicating the original findings from Yuki et al., 2005 using alternative measurements and contexts. Specifically, we assessed whether Japanese and Americans would display discriminatory behavior in cooperation and trust based on network-based and category-based group boundaries, respectively.

First, we did not find evidence that Japanese cooperate more with an in-group member and a member of an out-group connected to their acquaintance compared to an out-group member (i.e., Out-R member). In addition, we did not find that Americans displayed category-based intergroup trust. As such, Yuki et al.'s (2005) finding was not replicated in the cooperation context. In fact, we did not replicate the well-established phenomenon of in-group favoritism in cooperation. One possible explanation for these null findings is that we used university affiliation as a salient intergroup context, which might have induced a superordinate group category (i.e., university student) rather than in-group vs out-groups based on university affiliations. It may be thus sensible to rely on non-university contexts where superordinate group categories are less likely to be salient.

Second, we failed to conceptually replicate Yuki et al.'s (2005) findings with the self-reported trust, as we did not find a significant interaction between culture and group membership. As we briefly noted earlier, Yuki et al. (2005) similarity did not find the interaction effect in either of their two studies, but rather found that Americans and Japanese displayed category-based and network-based trust, referring to the results of simple main effect analyses. In this sense, our results were partly consistent with the original findings; consistent with Yuki et al. (2005), the simple main effect analyses did reveal network-based interpersonal trust among the Japanese, who reported increased trust towards both an in-group member and a member of an out-group connected to their acquaintance. That being said, a significant culture \times membership manipulation has never been found in our study and the original studies, demonstrating that Yuki's theory overall lacks experimental evidence and warrants further reliance on the theory.

We acknowledge several methodological differences between our study and the original study. Firstly, while participants in the original study were fully incentivized, we instructed participants that one randomly selected participant would receive the actual payment of the money earned in the study. Although Romano et al. (2021) found that incentives did not influence intergroup cooperation in prisoner's dilemma, our incentivization approach might have reduced participant engagement.

In addition, the original study (Yuki et al., 2005, study 2) was conducted in a laboratory setting. For their study, participants were surveyed about the universities in which they had an acquaintance prior to taking part in the study, and participated in the study via a program on a computer terminal that simulated the experience of a networked study. This method likely enhanced participant engagement by reinforcing the belief that they were actually playing economic games with others. In contrast, our study was conducted entirely online, making it

Table 2
Descriptive statistics of cooperation, trust, and expected cooperation by conditions.

	Cooperation			Trust			Expected Cooperation		
	In	Out	Out-R	In	Out	Out-R	In	Out	Out-R
Japan	290.99 (14.30)	273.82 (13.85)	287.39 (14.23)	2.50 (0.08)	2.15 (0.08)	2.56 (0.08)	305.62 (12.67)	277.48 (12.32)	291.13 (12.55)
USA	330.38 (13.80)	317.01 (14.17)	309.19 (13.62)	2.79 (0.08)	2.71 (0.08)	2.96 (0.08)	293.70 (12.15)	281.05 (12.61)	274.25 (12.05)

methodologically distinct from the original study. Our failure to fully replicate Yuki et al. (2015) suggests that these findings may be sensitive to experimental procedures, particularly those affecting participant engagement. However, the potential impact of the methodological difference would be minimal as Arai et al. (2023) recently reported that intergroup cooperation in prisoners' dilemmas was not substantially affected by the experimental setting, lab vs. online.

Another possible explanation for weaker effects in our study may be the time period in which our study took place. As our data were conducted following the COVID-19 pandemic, it is possible that participants' identifications with their ingroups may have changed, given that students may have been engaged in social distancing or participating in courses remotely. It is possible that the COVID-19 pandemic may have reduced opportunities for participants (both in Japan and the United States) to attend to sociometric information within their groups. Future research should examine whether these patterns change as social interactions gradually return to pre-pandemic norms.

There are also important issues to consider when considering replications of cross-cultural studies. First of all, cultures are not static and are in a constant state of flux. Thus, differences observed in cross-cultural research may grow larger or disappear over time. For instance, Yamagishi and colleagues (e.g., Yamagishi and Yamagishi, 1994; Yamagishi, 2011) have presented results spanning several decades demonstrating differences in generalized trust between Japan and the United States. However, newer evidence suggests that the gap in generalized trust found in large scale surveys such as the World Values Survey has disappeared (see discussion in afterward in Yamagishi, 2011). Thus, failures to replicate classic research may simply reflect cultural change over time.

Furthermore, research on cultural differences has suggested that many cultural differences are not fixed but, in many cases, can reflect momentary activation of different strategies in response to differing situations and ecological conditions (see for instance work on culture as situated cognition, Oyserman, 2016). For instance, Yamagishi et al. (2008) showed that cultural differences in preferences for conformity or uniqueness in Japan and the United States could be understood as differences in default strategies tailored to commonly encountered situations in each country. Japanese preferences for conformity and American preferences for uniqueness manifested when the nature of the situation was unclear, but disappeared when the nature of the situation was clarified. Importantly, when the situation was one in which reputation was important (vs. unimportant) American participants tended to make choices approximating the default pattern of Japanese, and *vice versa*. Thus, cultural differences observed in psychological research may reflect the activation of different psychological tendencies but may not necessarily provide evidence for the presence or absence of a psychological tendency in a given culture.

In the case of this study, failure to replicate previous cross-cultural work on intergroup trust does not necessarily invalidate the theoretical framework upon which the predictions were originally generated. In the case of group-based trust, it is likely that psychological mechanisms supporting trust in those who we share a common category with or a personal or indirect contention (such as common-identity and common-bond groups, e.g., Prentice, Miller, and Lightdale, 1994) can be observed in both Japan and the United States, but there may be cultural differences in the frequency at which these psychological mechanisms are used, or changes in their relative use over time.

Lastly, we argue that a test of the theory with more diverse samples would be sensible to further examine the replicability and generalizability of the original findings. In the original papers (Yuki, 2003; Yuki et al., 2005), Yuki and colleagues predominantly focused on the West vs. East Asia dichotomy. However, recent work suggests that the dichotomy fails to capture the full spectrum of culture differences among typically underrepresented world regions (Uskul et al., 2023). As such, further research on social identity processes among non-Western and non-East Asians would help us revisit Yuki's theory and find a new and

overarching theoretical framework to explain how individuals in different cultures process and act on social categorizations.

Ethics

We obtained ethics approval from the institutional ethics boards. We obtained informed consent from participants and conducted the study in accordance with the Declaration of Helsinki.

CRediT authorship contribution statement

Hiroataka Imada: Conceptualization, Methodology, Formal analysis, Data curation, Writing – original draft, Visualization, Project administration. **Gen Tsudaka:** Conceptualization, Methodology, Writing – review & editing, Project administration. **Nobuhiro Mifune:** Conceptualization, Methodology, Resources, Writing – review & editing. **Keiko Mizuno:** Validation, Investigation, Resources, Writing – review & editing. **Joanna Schug:** Validation, Writing – review & editing. **Kodai Kusano:** Validation, Investigation, Resources, Writing – review & editing.

Declaration of competing interest

Given their role as an Editorial Board member, Schug J. had no involvement in the peer-review of this article and had no access to information regarding its peer-review. All other authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

Data is available at <https://osf.io/8zm3e/>.

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Supplementary materials

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