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Intergenerational Intergroup Cooperation: "Future" ingroup favoritism and outgroup derogation in the minimal and natural group contexts

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Abstract

Issues related to sustainability (e.g., climate change and over-fishing) manifest themselves as intergenerational social dilemmas, and people are constantly faced with a choice between self-serving unsustainable behavior and sustainable, personally costly behavior. Extending the previous literature on intergroup (non-international) cooperation, we tested whether group membership of the future generations influences sustainable decision making. Two preregistered studies focusing on the minimal group (N = 1393) and the natural group (Japan vs. China, N = 1781), we revealed future ingroup favoritism and outgroup derogation; individuals are more and less likely to make a sustainable decision when they believe that their current behavior benefits future ingroup and outgroup members, respectively. Future ingroup favoritism and outgroup derogation were primarily driven by the increased felt responsibility for future generations and the reduced sense of reputational concern.

Keywords: intergenerational decision-making, intergenerational cooperation, future generation, sustainability; ingroup favoritism

Intergenerational Intergroup Cooperation: "Future" ingroup favoritism and outgroup derogation in the minimal and natural group contexts.

Many societal issues manifest themselves as social dilemmas, situations in which personal and collective interests conflict with each other (Dawes, 1980; Van Lange et al., 2013). Sustainability issues are no exceptions, and individuals are constantly faced with a choice between self-benefit maximizing unsustainable behavior and sustainable behavior that benefits future generations (i.e., intergenerational social dilemmas: Wade-Benzoni, 2008). Some issues are global (e.g., climate change), but others are local (e.g., overfishing), which makes the marked psychological difference; in local intergenerational social dilemmas, sustainable behavior is targeted only at future generations of one's own local community. Is it easier for individuals to sacrifice personal gains to exclusively benefit future ingroup members compared to future generations regardless of group membership? How willing are they to cooperate when their cooperation predominantly influences the future of an outgroup? Addressing this question helps us understand whether and how we should differently approach global and local sustainability issues. We thus empirically investigated whether intergenerational cooperation is greater when it solely benefits future generations of one's own group as compared to when it benefits those of an outgroup or unclassified future strangers.

In non-intergenerational social dilemmas, previous studies have robustly documented ingroup favoritism, the tendency to cooperate more for ingroup members than outgroup members (e.g., Balliet et al., 2014). In addition, experimental and meta-analytic evidence suggests that bounded indirect reciprocity plays a crucial role in shaping ingroup favoritism (Balliet et al., 2014; Imada et al., 2023, 2024; Yamagishi et al., 1999). Namely, Yamagishi and colleagues argued that intergroup contexts activate the heuristic that indirect reciprocity, a system in which individuals reward one another with cooperation based on their

reputations, is bounded by group membership (Imada et al., 2023, 2024; Yamagishi et al., 1999; Yamagishi & Mifune, 2008). This heuristic leads people to believe that when they face social dilemmas with ingroup members, but not with outgroup members, their cooperation brings long-term reputational benefits and other ingroup members are willing to cooperate with them (Mifune et al., 2010; Yamagishi et al., 1999; Yamagishi & Mifune, 2008).

Intergenerational social dilemmas are distinct from non-intergenerational ones in that because individuals from different generations do not live in the same time frame, (1) decision makers (i.e., those in the present generation) cannot assume their reputation in future generations benefits them and (2) they cannot expect their sustainable behavior to be directly reciprocated by future generations (i.e., they do not gain from reciprocation by future generations; Wade-Benzoni, 2008). Thus, the key psychological mechanisms behind ingroup favoritism are structurally absent in intergenerational social dilemmas, implying that intergenerational cooperation would not be influenced by whether or not beneficiaries (i.e., future generations) are ingroup members.

However, recent studies have suggested that present ingroup favoritism would be positively correlated with future ingroup favoritism. Specifically, Aaldering et al. (2024) demonstrated that the tendency to universally and parochially cooperate with others in the same generation predicts that with others in the future generation. As such, ingroup favoritism that has been robustly observed in the non-intergenerational contexts would emerge in the intergenerational contexts too, albeit to a lesser degree (Aaldering et al., 2024). In addition, previous studies on psychological underpinnings for sustainable, future-oriented behaviour suggest that shared group membership between the current and future generations promotes intergenerational cooperation via a set of psychological mechanisms that is unique to intergenerational decision-making (McAdams & de St. Aubin, 1992; Wade-Benzoni & Tost, 2009): affinity (Wade-Benzoni, 2008, 2019; Wade-Benzoni & Tost, 2009; Wickersham

et al., 2020) and generativity (Afridi et al., 2021; Barnett et al., 2019; Erikson, 1964; McAdams & de St. Aubin, 1992).

Affinity refers to the extent to which individuals feel empathetic towards, can visualize, and understand the consequences of their behavior for future generations (Wade-Benzoni, 2008). Previous studies demonstrated that increased affinity with future generations promoted intergenerational cooperation (Wade-Benzoni, 2008) and intergenerational solidarity (de Paula Sieverding et al., 2023). Wade-Benzoni and Tost (2009), in their theoretical review, held that intergenerational identification (i.e., the extent to which individuals feel share a common group identity with people in other generations: Wade-Benzoni, 2003) is positively associated with affinity, suggesting that shared group membership with others in future generations increases sustainable behavior via increased affinity. In other words, when individuals are aware that future generations whom their behaviors affect belong to the same group (i.e., the same entity spanning from the current generation to the future generations), they may feel increased identification and affinity and, thus, display increased intergenerational cooperation.

Generativity was first introduced by Erikson (1964) in his stages of development theory and originally defined as the concern about nurturing future generations (e.g., bearing and raising children). McAdams and St. Aubin (1992) further expanded the concept and defined it as the configuration of psychological features constellated around the individual and societal goals of providing for the next generations. According their theory of generativity, it includes the motives, concerns, and actions towards future generations. Previous studies showed that generativity is related to high pro-environmental and sustainable attitudes and behaviors (e.g., Afridi et al., 2021; Barnett et al., 2019).

As McAdams and St. Aubin (1992) proposed, generativity is a multi-faceted concept and we focus on the two major motives under generativity: legacy motivation (Syropoulos et

al., 2023; Wade-Benzoni et al., 2012; Zaval et al., 2015) and responsibility (Morselli & Passini, 2015; Syropoulos & Markowitz, 2023, 2021a). Legacies offer individuals an enduring meaning to their identity. Correspondingly, legacy motivation is defined as the personal motive to be remembered, to leave an enduring meaning to their identity, and to leave something for future generations in order to achieve a feeling of symbolic immortality and is considered as a component of generativity (Fox et al., 2010; McAdams & de St. Aubin, 1992; Wang et al., 2022). Previous studies found that legacy motivation is positively associated with sustainable future-oriented behavior (Bang et al., 2017; Hurlstone et al., 2020; Shrum, 2021; Wade-Benzoni & Tost, 2009; Wickersham et al., 2020). Importantly, legacies have the function of extending self into the future and gearing self-interests towards future others' interests. Fox et al. (2010) pointed out that people often perceive future others to be those who belong to the same group and this suggests that legacy motivations may promote intergenerational cooperation towards future ingroup members, but not necessarily for future outgroup members. As such, the positive effect of legacy motivations may be bounded by group membership and contribute to shaping future ingroup favoritism.

We note that there are two distinct types of legacy motivations: the reputation legacy and the impact legacy (Syropoulos et al., 2023; Syropoulos & Markowitz, 2021b). The former refers to the desire to be remembered as a good person (henceforth "reputational concern") and the latter refers to the desire to leave a positive impact on future generations (henceforth "legacy motivation"). Since the relative impact of the two legacy motivations on intergenerational cooperation is unclear in particular in intergroup contexts, we measured them separately and explored how they each contributed to intergenerational ingroup favoritism in the present research.

Responsibility is another important facet of generativity (Morselli & Passini, 2015) and refers to the sense of moral obligation towards future generations (Syropoulos &

Markowitz, 2021a). Previous studies revealed that the perception of responsibility promoted proenvironmental, future-oriented attitudes (Syropoulos et al., 2020; Syropoulos & Markowitz, 2023, 2021a; Watkins & Goodwin, 2020). Perceived responsibility corresponds with the perceived demand from one's society (McAdams & de St. Aubin, 1992) and it is conceivable that individuals feel responsible to be generative for their society, i.e., future members of the society. If so, similar to legacy motivation, responsibility promotes intergenerational cooperation especially towards future ingroup members, contributing to the emergence of ingroup favoritism in intergenerational social dilemmas.

Regarding intergenerational cooperation with future outgroup members, recent studies have suggested that individuals have less moral concerns for the welfare of outgroup members in the present generation than those in far future generations (Syropoulos et al., 2024). This suggests that individuals may be less willing to cooperate for future outgroup members than strangers in the future (i.e., future outgroup derogation). We note that previous studies also suggest that individuals prefer benefitting both future ingroup and outgroup members over exclusively benefitting future ingroup members (Schubert et al., 2024). However, those studies did not directly test whether outgroup membership per se discouraged intergenerational cooperation and thus we preregistered to test the prediction that we would observe future outgroup derogation.

To recapitulate, previous studies suggest that the positive effect of affinity, reputational concern, legacy motivation, and responsibility may be bounded by group membership, and we examined how group membership of the future generations shapes intergenerational cooperation. In the present research, we conducted two studies to elucidate intergroup intergenerational cooperation in minimal and natural group contexts. We used the intergenerational sustainability dilemma game (ISDG: Kamijo et al., 2017; Shahen et al., 2021) which allowed us to directly observe participants making a choice between self-serving

unsustainable behavior and sustainable behavior (i.e., intergenerational cooperation). We also aimed to explore the psychological mechanisms behind the hypothesized future ingroup favoritism by measuring affinity and generativity (reputational concern, legacy motivation, and responsibility). All data, code, and study material associated with the present research can be found at https://osf.io/zt3k4/?view_only=99bf85f9bce04869a77f9acc7f70ba42. All studies were approved by the institutional ethics committee prior to data collection.

Study 1

In Study 1, in order to examine the effect of group membership per se, we used the minimal group paradigm (Rabbie & Horwitz, 1969; Tajfel et al., 1971) in which participants were divided into two arbitrary created experimental groups. Given the discussions above, we hypothesized that individuals are more and less likely to make a sustainable choice when members of the future generations belong to the same group (H1) and an outgroup (H2), respectively. In addition, we explored the influence of affinity and generativity (legacy motivation, reputational concern, and responsibility) as potential psychological underpinnings of intergroup intergenerational cooperation. We preregistered the study procedure, study material, the hypothesis and hypothesis testing, data exclusion, and target sample size and justification at https://osf.io/qjwa4/?view_only=f18eb52b19bf4194817fd7c1ad92bb23 and we have study material, analysis code, and supplementary results available at https://osf.io/6mnuw/?view_only=dad84776b1ce4f57adbc4ec3e849e63e.

Method

Pilot Study and Participants and Design

The study followed a between-subjects design with three conditions (group: ingroup vs. outgroup vs. control). We preregistered to test the two hypotheses with a logistic regression with the following dummy coding: Dummy 1: ingroup condition vs. control condition (H1); Dummy 2: outgroup condition vs. control condition (H2). We conducted a

priori power analysis using data from a pilot study. We first conducted a pilot study (N = 599, M_{age} = 35.89, *SD* = 12.77, 294 men, 304 women). The study procedure was identical to Study 1, but the content of the post-experimental questionnaire slightly differed (visit https://osf.io/p2wn9/?view_only=8f86aeade7d14e4aaeb54aa67e6f1e9f for more detail). It revealed that 1317 participants would be sufficient to detect the smallest effect size of our interest (5% difference between two conditions) with 95% statistical power and α = 5%. Since we preregistered to exclude incomplete responses and those who failed to correctly answer an attention check question, we recruited 1400 participants from Prolific and had 1397 complete response (M_{age} = 29.90, *SD* = 9.73, 702 men, 695 women). Preregistered data exclusion left us with 1393 participants for data analyses.

Procedure

After giving consent, participants completed two tasks: an artistic preference task (i.e., the minimal group induction) and an economic decision-making task. In the artistic preference task, they were presented with 21 pairs of paintings, one written by Klee and the other written by Kandinsky and asked to indicate one they preferred over the other for the 21 pairs. After the task, participants were informed that they belonged either to Group A (Klee) or Group B (Kandinsky) based on their actual artistic preferences. We then asked participants to answer six questions measuring social identification, using a scale from *1 = strongly disagree* to *6 = strongly agree* (e.g., "Belonging to Group A is an important part of my self-image", α = .75, Leonardelli & Brewer, 2001).

After the minimal group induction, participants read instructions about the ISDG (Shahen et al., 2021). In the ISDG, participants were asked to choose between Option X and Option Y, which earned them 3600 and 2700 points, rspectively. Participants were further told that there would be other people participating in future studies and they would complete the same game. Importantly, they were instructed that their decision would influence how

much future participants could earn in the game. More specifically, if they choose Option X (i.e., self-payoff maximizing option), a future participant could only earn 2700 and 1800 points by selecting Option X and Option Y respectively. Contrastingly, if they choose Option Y (sustainable option), a future participant could earn as much as participants could (see Table 1). The ISDG thus represented an intergenerational social dilemma, and the selection of Option Y was our measurement of intergenerational cooperation. Participants answered three comprehension check questions and could not proceed until they correctly answered the questions.

We instructed participants that 10% of participants would receive a bonus payment based on their decision with the conversion rate of £1 = 2000 points and, thus, their decision would influence future participants. To avoid deception, we recruited 60 additional participants (10% of the participants we recruited for the present study), and they completed the ISDG as the second generation of the game and their choices were based on the decisions of the randomly selected 60 participants in the present study.

Table 1. Summary of payoffs in the ISDG

<table>
<tr><th>1st Generation</th><th>2nd Generation</th><th>3rd Generation</th><th>・・・・</th></tr>
<tr><td rowspan="4">X 3600p</td><td rowspan="2">X 2700p</td><td>X 1800p</td><td rowspan="4"></td></tr>
<tr><td>Y 900p</td></tr>
<tr><td rowspan="2">Y 1800p</td><td>X 2700p</td></tr>
<tr><td>Y 1800p</td></tr>
<tr><td rowspan="4">Y 2700p</td><td rowspan="2">X 3600p</td><td>X 2700p</td><td rowspan="4"></td></tr>
<tr><td>Y 1800p</td></tr>
<tr><td rowspan="2">Y 2700p</td><td>X 3600p</td></tr>
<tr><td>Y 2700p</td></tr>
</table>

Figures 1a-c. Graphical Summary of Experimental Conditions

Figure 1a

Ingroup Condition

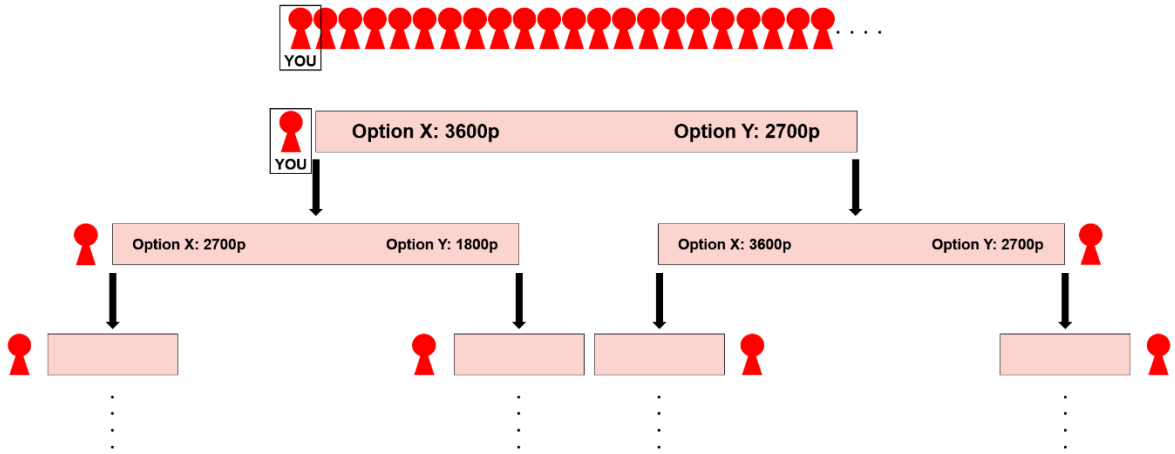


Figure 1b

Outgroup Condition

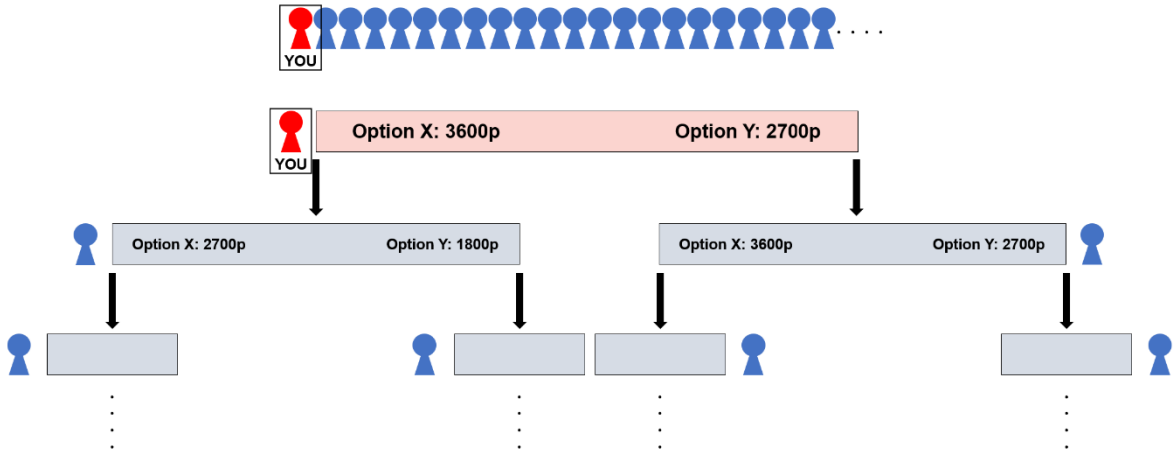
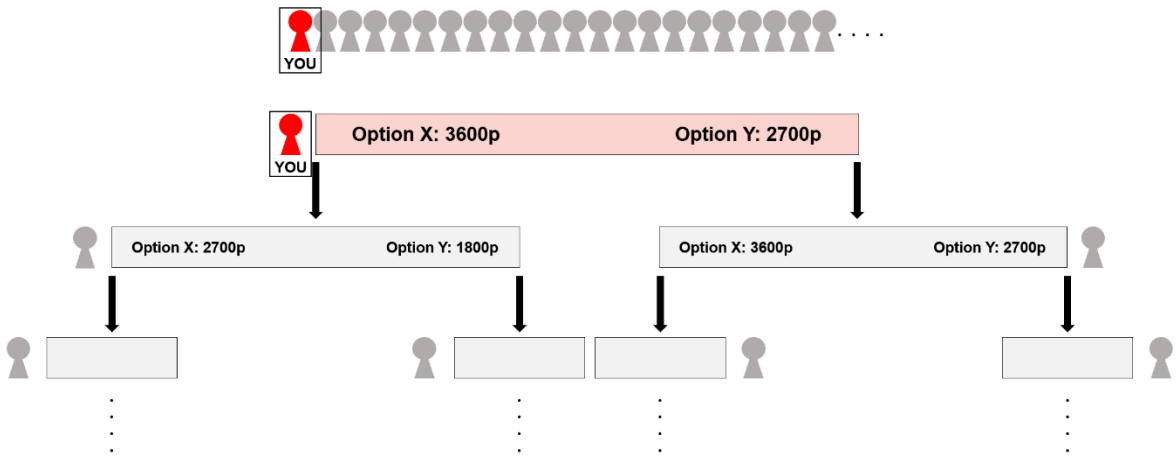


Figure 1c

Control Condition



In the ISDG, we manipulated the group membership of future participants whom participants' decisions would impact. In the ingroup and outgroup conditions, we told participants that future participants would belong to the same and the other artistic preference group (Figures 1a and 1b). In the control condition, we did not give any information about the group membership of future participants (Figure 1c). Participants were randomly assigned to one of the three conditions and then chose between Option X and Option Y, as the first generation of the game.

After making the decision in the ISDG, participants answered questions measuring affinity (Wade-Benzoni, 2008), reputational concern (Syropoulos et al., 2023; Wu et al., 2015), legacy motivation (Zaval et al., 2015), and responsibility (Syropoulos et al., 2020; Watkins & Goodwin, 2020) in a randomized order. For affinity, we modified the four-item scale from Wade-Benzoni (2008, Study 2) used by replacing "generations" with "participants", $\alpha = .78$, e.g., "I felt empathetic towards future participants." For legacy motivation, we used two items from the legacy motivation scale (Zaval et al., 2015), $\alpha = .86$, e.g., "It is important to me to leave a positive legacy." For reputational concern, we modified four items from the reputational concern scale (Wu et al., 2015), $\alpha = .81$, e.g., "During the decision-making task, I thought about how future participants would think about me." For responsibility, we modified and used four items from the previous studies (Syropoulos et al., 2020; Watkins & Goodwin, 2020), $\alpha = .86$, e.g., "I had a responsibility to consider the impact of my decision on future participants." For an exploratory purpose, we included the impact legacy scale (Syropoulos et al., 2023). All items were measured with a 7-point Likert scale, from *1 = not at all* to *7 = very much so*. Lastly, participants provided demographic information (sex and age).

Results and Discussion

We first looked at the proportion of participants in each experimental condition who chose the sustainable option. In the control condition (N = 463), 226 participants (48.81%) chose the sustainable option. In the ingroup condition (N = 464), 271 participants (58.41%) chose the sustainable option. In the outgroup condition (N = 466), 192 participants (41.20%) chose the sustainable option. Following our preregistration, we first dummy-coded the conditions as follows: Dummy 1: ingroup vs. control; Dummy 2: outgroup vs. control. Using the coding and the decision in the ISDG as a binary dependent variable (unsustainable = 0, sustainable = 1), we conducted a logistic regression. Supporting H1, we found a significant effect of Dummy 1, $B = 0.39$, 95% CI [0.12, 0.65], $p < .001$. Moreover, supporting H2, we found a significant effect of Dummy 2, $B = -0.31$, 95% CI [-0.57, -0.05], $p = .02$. Thus, we found both ingroup favoritism and outgroup derogation. The results held after controlling for the effect of age and sex.

Following our preregistration, we examined the effect of group on affinity, reputational concern, legacy motivation, and responsibility (see Table 2 for descriptive statistics), using the dummy coding. Table 3 summarizes the results of the four regression analyses. Overall, we found that individuals scored higher on affinity, legacy motivation, and responsibility when the future generations belonged to their ingroup compared when they did not know about the group membership of the future generations. Contrastingly, we found a significant difference in reputational concern between the outgroup and control conditions, suggesting that the increased selfishness in the outgroup condition might be explained by the lowered reputational concern they felt.

Table 2

Descriptive Statistics of Affinity, Reputational Concern, Legacy Motivation, and Responsibility by Condition

	Ingroup	Outgroup	Control
Affinity	4.94 (1.25)	4.70 (1.31)	4.69 (1.31)
Reputational Concern	3.36 (1.53)	3.07 (1.43)	3.31 (1.50)
Legacy Motivation	5.34 (1.44)	5.06 (1.52)	5.09 (1.49)
Responsibility	4.50 (1.52)	4.08 (1.56)	4.08 (1.57)

Note: numbers in brackets indicate standard deviations.

Table 3

Results of Regression Analyses on Affinity, Reputational Concern, Legacy Motivation, and Responsibility

	Affinity	Reputational Concern	Legacy Motivation	Responsibility
Dummy 1	0.25* [0.08, 0.41]	0.05 [-0.14, 0.25]	0.25* [0.05, 0.44]	0.42* [0.22, 0.62]
Dummy 2	0.01 [-0.15, 0.18]	-0.23* [-0.43, -0.04]	-0.03 [-0.23, 0.16]	0.002 [-0.20, 0.20]

Note: numbers in square brackets indicate lower and upper bounds of the 95% confidence interval. * $p < .05$. Dummy 1: ingroup (1) vs. control (0). Dummy 2: outgroup (1) vs. control (0).

Finally, we examined the psychological processes underlying the observed ingroup favoritism and outgroup derogation. Specifically, we ran a mediation analysis where Dummy 1 predicted the sustainable decision-making via affinity, legacy motivation, and responsibility, the variables that were significantly predicted by Dummy 1. We bootstrap-tested the indirect effects (bootstrap = 1000) and found that the indirect effect via responsibility was significant, $B = 0.09$, 95% CI [0.04, 0.13], $p < .001$. The other mediation effects were not significant, $|B_s| < .007$, $p_s > .12$. The direct effect was not significant ($B = 0.01$, 95% CI [-0.05, 0.05], $p = .84$). Thus, the effect of shared group membership with future generations was fully mediated by increased responsibility for future generations.

Next, we tested the mediation model where Dummy 2 predicted the sustainable decision-making via reputational concern. The indirect effect was significant, $B = -0.06$, 95%

CI [-0.04, -0.003], p = .03. The direct effect was not significant (B = -0.02, 95% CI [-0.12, 0.004], p = .06), and the effect of outgroup membership was fully mediated by the lowered level of reputational concern that individuals felt.

Overall, we did found support for our hypotheses, revealing ingroup favoritism and outgroup derogation in the intergenerational context. Our finding thus extended the previous literature on intergroup cooperation to the intergenerational context. It is noteworthy that we observed outgroup derogation where individuals are less likely to choose the sustainable option when the future generation belongs to the outgroup. Furthermore, Study 1 provides novel insights into psychological underpinnings of intergenerational intergroup cooperation. Specifically, the mediation analyses suggest that it is responsibility and reputational concern that account for the effect of group membership in intergenerational intergroup cooperation; individuals are more likely to make a sustainable decision for future generations that share the group membership as they feel an increased level of responsibility for them. Contrastingly, they are less likely to make a sustainable decision when future generations that their action influences belong to an outgroup because they feel the reduced level of reputational concern when making the decision.

Study 2

In Study 1, we used minimal group membership in order to elucidate the effect of group membership per se. While studies with minimal group contexts offer valuable insights as to how group membership itself guides intergenerational cooperation, it nevertheless lacks ecological validity. To gain more practical insights as to how group membership influences intergenerational cooperation, we used national groups (Japan vs. China), instead of minimal groups, as a focal intergroup context, and aimed to replicate Study 1. We preregistered study procedure, study material, the hypothesis and hypothesis testing, data exclusion, and target sample size and justification at

https://osf.io/5wdte/?view_only=e971c655ab1347adb648b0aed869b589 and we have study material, analysis code, and supplementary results available at https://osf.io/sy8jk/?view_only=e120056ad5964344837903ce8aa1ab17.

Method

Participants, Design, and Procedure

The study followed a between-subjects design with three conditions (group: ingroup vs. outgroup vs. control). We preregistered to test the two hypotheses with a logistic regression with the following dummy coding: Dummy 1: ingroup condition vs. control condition (H1); Dummy 2: outgroup condition vs. control condition (H2). In Study 1, 58% of the participants in the in-group condition (N = 463) chose the sustainable option and 49% of the participants in the control condition (N = 464). In the out-group condition (N = 466), 41% chose the sustainable option. A priori power analyses revealed that 1707 participants would be sufficient to detect significant planned contrast terms (Dummy 1 and 2). We thus recruited 1750 Japanese participants from Lancers. We had 1805 completed and non-duplicated responses (M_{age} = 42.88, SD = 10.73, 702 men, 695 women). Preregistered data exclusion left us with 1781 participants for data analyses. The study was identical to Study 1 except that the study was written in Japanese, the focal intergroup context was Japan (ingroup) vs. China (outgroup), and the ISDG was not incentivized. We chose China as the outgroup as Japan and China share several environmental issues such as air pollution. In the ISDG, participants were asked to imagine they played the game and instructed that participants in the future generations were Japanese (ingroup), Chinese (outgroup), or those whose nationality is hidden (control). All scales except responsibility (α = .58) had satisfactory reliability: affinity: α = .74; reputational concern: α = .84; legacy motivation: α = .87; responsibility: α = .74.

Results and Discussion

In the control condition (N = 590), 250 participants (42.37%) chose the sustainable option. In the ingroup condition (N = 600), 326 participants (54.33%) chose the sustainable option. In the outgroup condition (N = 591), 158 participants (26.73%) chose the sustainable option. Supporting H1, we found a significant effect of Dummy 1, $B = 0.48$ 95% CI [0.25, 0.71], $p < .001$. Supporting H2, we found a significant effect of Dummy 2, $B = -0.70$, 95% CI [-0.95, -0.46], $p < .001$. Replicating Study 1, we found both ingroup favoritism and outgroup derogation. We note that the effect size of outgroup derogation was substantially bigger than that in Study 1, the minimal group context. The results held after controlling for the effect of age and sex.

Table 4 summarizes descriptive statistics of the key psychological variables by condition. We found that Dummy 2 significantly influenced affinity, reputational concern, legacy motivation, and responsibility (Table 5) such that outgroup membership reduces the extent to which participants felt affinity, reputational concern, legacy motivation, and responsibility. Contrastingly, Dummy 1 (i.e., shared ingroup membership with future generations) significantly influenced only responsibility.

Table 4

Descriptive Statistics of Affinity, Reputational Concern, Legacy Motivation, and Responsibility by Condition (Study 2)

	In-group	Out-group	Control
Affinity	4.04 (1.17)	3.63 (0.99)	3.94 (1.16)
Reputational Concern	3.39 (1.33)	3.01 (1.24)	3.25 (1.41)
Legacy Motivation	4.14 (1.41)	3.75 (1.42)	4.01 (1.51)
Responsibility	3.74 (1.27)	3.27 (1.12)	3.44 (1.22)

Note: numbers in brackets indicate standard deviations.

Table 5

Results of Regression Analyses on Affinity, Reputational Concern, Legacy Motivation, and Responsibility (Study 2)

	Affinity	Reputational Concern	Legacy Motivation	Responsibility
Dummy 1	0.10 [-0.02, 0.23]	0.14 [-0.01, 0.29]	0.13 [-0.03, 0.30]	0.30* [0.16, 0.44]
Dummy 2	-0.30* [-0.43, -0.18]	-0.24* [-0.39, -0.08]	-0.26* [-0.43, -0.10]	-0.17* [-0.31, -0.04]

Note: numbers in square brackets indicate lower and upper bounds of the 95% confidence interval. * $p < .05$. Dummy 1: ingroup (1) vs. control (0). Dummy 2: outgroup (1) vs. control (0).

To elucidate the psychological processes underlying the observed ingroup favoritism and outgroup derogation, we conducted mediation analyses. We first built a model in which Dummy 1 predicted the sustainable decision via responsibility. Following Study 1, we bootstrapped-tested the indirect effect. Consistently with Study 1, we found that responsibility significantly mediated the relationship between shared group membership and sustainable decision-making, $B = 0.07$, 95% CI [0.04, 0.11], $p < .001$. The direct effect was also significant, $B = 0.05$, 95% CI [0.01, 0.09], $p = .04$. Regarding outgroup derogation, we found that affinity ($B = -0.01$, 95% CI [-0.03, -0.01], $p = .009$), legacy motivation ($B = -0.01$, 95% CI [-0.02, -0.002], $p = .02$), and responsibility ($B = -0.03$, 95% CI [-0.06, -0.01], $p = .01$), but not reputational concern ($B = 0.002$, 95% CI [-0.002, 0.01], $p = .40$) mediated the relationship between outgroup membership and sustainable decision-making. Outgroup membership was negatively associated with felt affinity, legacy motivation, and responsibility, in turn reducing intergenerational cooperation.

Overall, we replicated Study 1 in the actual group context with stronger outgroup derogation. It thus suggests that ingroup favoritism and outgroup derogation in the intergenerational sustainable decision making are the robust phenomenon and the negative impact of outgroup membership can be exacerbated in actual intergroup contexts. Regarding

the psychological mechanisms, consistently with Study 1, we found that responsibility played a critical role in bridging the relationship between shared ingroup membership with future generations and sustainable decision-making. In the present study, we found that in addition to reputational concern, affinity and responsibility also accounted for outgroup derogation in the Japan vs. China context. This suggests that psychological underpinnings of future outgroup derogation in natural intergroup contexts can be complex and context-dependent.

General Discussion

In the present research, we investigated whether shared group membership between current and future generations would foster intergenerational cooperation (i.e., sustainable behavior) using the minimal and natural intergroup context and the ISDG. We hypothesized that people would be more and less cooperative with future ingroup members and outgroup members, respectively. Supporting the hypotheses, we found ingroup favoritism and outgroup derogation in both minimal and natural intergroup contexts; shared ingroup membership and outgroup membership promotes and lowers intergenerational cooperation, respectively. In addition, we revealed that increased responsibility and reputational concern respectively played a key role in shaping ingroup favoritism and outgroup derogation in the intergenerational context.

Our finding extends the extensive literature on ingroup favoritism (Balliet et al., 2014; Everett et al., 2015) by demonstrating it in the intergenerational contexts and by revealing the unique contributor to “future” ingroup favoritism, perceived responsibility. The result suggests that ingroup framing can be an effective strategy to promote intergenerational cooperation. Previous studies on proenvironmental behavior suggested that proenvironmental identity plays a pivotal role in shaping proenvironmental behavior (Gatersleben et al., 2014; Sparks & Shepherd, 1992; Vesely et al., 2021). Fostering a new identity, especially when it conflicts with existing ones, can be challenging. Highlighting the consequences of present

behavior on future ingroup members does not require identity change and can be an efficient way to promote sustainable behavior.

We consistently found outgroup derogation in the intergenerational dilemma, while outgroup derogation is rarely observed in non-intergenerational social dilemmas cooperation (Aaldering et al., 2018; Balliet et al., 2014; Imada et al., 2021) . In non-intergenerational dilemmas, previous studies have robustly shown that people prefer not doing anything over harming outgroup members (Imada & Mifune, 2024) and they thus do not discriminate between outgroup members and strangers when making cooperative decisions. We found that in the minimal intergenerational context, individuals experience a lower level of reputational concern, and this leads to the reduced willingness to be sustainable. This finding contribute to the previous literature on reputation and sustainable behavior what has collated mixed evidence (e.g., Griskevicius et al., 2010; Lange et al., 2020). Our result suggests that the role of reputational concern in shaping sustainable behavior is conditional to whom sustainable behavior is believed to influence. Contrastingly, however, in the natural group context, reputational concern did not mediate the relationship between outgroup membership and intergenerational cooperation. Our result suggests that the role of reputational concern in shaping sustainable behavior is conditional to whom sustainable behavior is believed to influence. Thus, we suggest that the psychological mechanisms underlying the unwillingness to make sustainable decisions for future outgroup members may be context-dependent when it comes to natural group contexts.

Nevertheless, we conjecture that there are alternative explanations for the discrepancy between non-intergenerational and intergenerational contexts. One possible explanation is that temporal distance between participants and future outgroup members might reduce the sense of moral harm caused by outgroup derogation. The second possibility is that people's sense of power (i.e., being able to unilaterally influence future generations) uniquely

decreased cooperation with future outgroup members. Previous studies suggested that having complete power over others induces a sense of responsibility and promotes generosity (Handgraaf et al., 2008) in general. On the other hand, having power leads to outgroup dehumanization and, correspondingly, justify harm against outgroup members (Lammers & Stapel, 2011; Rai et al., 2017). Thus, in intergenerational social dilemmas, power over future outgroup members may reduce intergenerational outgroup cooperation via increased dehumanizing tendencies towards outgroup members. We argue that psychological processes underlying outgroup derogation in intergenerational social dilemmas deserve further research.

Our findings offer important practical implications for existing interventions approaches that highlights the immediate impacts of climate change on specific regions of the world. While it is important to acknowledge that climate change impartially impacts different countries (Lenton et al., 2023), highlighting those countries and encouraging individuals to act for them can rather be counterproductive. For instance, climate change causes sea level rise and the flood and land subsidence risks are particularly high for some cities and areas. As such, there have been campaigns and media coverage highlighting such high-risk areas to increase the awareness of climate change (e.g., Tuvalu). Our finding suggests that these attempts may backfire; when people believe that their immediate sustainable behavior mainly benefits the future of an outgroup and its members, they may be less likely to engage in sustainable behavior. In sum, despite that climate change is indeed a global issue, it would be more effective to frame it as a local issue, encouraging individuals to think about the future of their own group.

Lastly, we would like to discuss the limitations of the research. While the ISDG offers a clear measurement of sustainable vs. unsustainable self-serving choices, the intergenerational social dilemma that it represents does not fit all forms of actual intergenerational dilemmas we face. In the ISDG, for instance, it is an individual decision

rather than a collective decision that impacts future generations. Thus, our findings may not be generalized to explain decision-making in intergenerational dilemmas in which individuals' decision making cumulatively impacts future generations (Hauser et al., 2014). While economic games abstract and stylize complex social environments, they are indeed different from actual proenvironmental and sustainable decision making. As such, it is sensible to examine whether our findings are generalizable to a diverse set of actual sustainable decisions.

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