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Incorporating Imaginary Future Generations into Negotiations

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Abstract

People to be born in the future have no direct influence on current affairs. Given the disconnect between people who are currently living and those that will inherit the planet left for them, individuals who are currently alive tend to be more oriented toward the present, posing a fundamental problem related to sustainability. In this study, we propose a new framework for reconciling the disconnect between the present and the future whereby some individuals in the current generation serve as an imaginary future generation that negotiates with individuals in the real-world present. Through a laboratory-controlled intergenerational sustainability dilemma game (ISDG), we show how the presence of negotiators for a future generation increases the benefits of future generations. More specifically, we found that when faced with members of an imaginary future generation, 60% of participants selected an option that promoted sustainability. In contrast, when the imaginary future generation was not salient, only 28% of participants chose the sustainable option.

Keywords: Intergenerational Sustainability Dilemma Game, Imaginary Future Generation, Negotiation.

1. Introduction

One obvious, but important fact is that people to be born in the future are not present today. Although this fact is clear to the point of being redundant, it is of critical importance when considering its implications for the sustainability of communities, nations, and the world as a whole. When individuals discuss important social issues, including pension reform, energy policy, or environmental protection—all of which affect future generations—individuals in those generations are (by nature) excluded from those discussions. This is problematic when agreements struck by individuals in the present are biased to present circumstances; this represents one of the fundamental problems facing issues related to sustainability (Saijo 2015).

To make a path towards sustainability, it is important to understand the global, social, and human systems that support it, as well as the linkages between them (Komiyama and Takeuchi 2006). Experimental studies are useful for gathering data on issues that influence the three systems across generations, as collection of reliable data over a long period is difficult due to changes in the social, political, and economic environments. For instance, Fisher et al. (2004) performed an experiment in which a common-pool resource was managed across generations. Fisher and colleagues argued that certain mechanisms, such as communication (Carpenter 2000, Hackett et al. 1994), sanctions (Ostrom et al. 1992, Fehr and Gachter 2000, Yamagishi 1986), and voting (Walker et al. 2000), known to promote the sustainability of the common-pool

resource in a single generation game, are difficult to implement across different generations. Sherstyuk et al. (2016) observed that sustainability across generations poses a unique challenge because it is difficult for one generation to care about subsequent generations, and decisions made for future generations are laden with uncertainty about the future.

Hauser et al. (2014) also explored the problem of intergenerational resource allocation. The authors highlighted that reciprocity tends not to occur across generations. They also explored whether democratically produced decisions improve the sustainability of resources that are used intergenerationally. They found that when group members vote for the extraction level of resources and the median vote is extracted by all members, democratic decisions greatly reduce the probability of source depletion. Hauser et al. (2014) noted, however, that this relationship only holds if all members within a given generation join this institution. That is, if some members of a generation are not required to adhere to a decision that was democratically selected, the democratic rule's effectiveness in preventing resource depletion is mitigated.

Independent of Hauser et al.'s (2014) work, there exists another limitation of democratically selected choices that exclude future generations from the political process. When there are conflicts of interest between individuals in the present and individuals in the future, the decisions made by the former (and the degree to which they benefit the latter) are strongly contingent on the degree to which they are altruistic. Although Hauser et al. (2014) argued that

65 “voting can allow a majority of pro-social individuals to override a purely selfish minority” (p.
66 222), some studies have shown that the likelihood of this occurrence is situationally specific
67 (Croson and Gneezy 2009, Gintis 2014, Kamijo et al. 2015, Paxton and Glanville 2015). The
68 possibility of an individual to make prosocial decisions that benefit future generations is
69 uncertain at best. This uncertainty highlights the need for an instrument that prevents the
70 traditional democratic process from passing the debts (financial and otherwise) of current
71 generations to future generations.

72 To this end, we institute a new mechanism that allows members of the current generation to
73 virtually communicate and negotiate with members of future generations. In this communicative
74 mechanism, an individual from the present generation interacts and negotiates with others as if
75 he/she were doing so on behalf of a future generation. This approach has some practical
76 grounding; it has gained traction for local policy-making processes in Japan (Hara 2016). In this
77 paper, we examine this framework through a laboratory setting to determine how well it
78 reconciles the conflict of interest between present and future generations. More specifically, we
79 examine how the forced salience of an imaginary future generation during negotiations
80 improves benefits for that generation through an intergenerational sustainability dilemma game
81 (ISDG) that describes a tension between one generation and those that follow it. In the ISDG,
82 players adopt one of two sides. On one side, participants advocate positions that are beneficial

to the present generation, exclusively maximizing the benefits of the current generation. On the other side, players advocate positions that are beneficial to future generations, supporting the principle of utilitarianism (providing the greatest happiness of the greatest number of people), the maximin principle (providing the greatest benefit of the least-advantaged members of society), and the notion of sustainable development (World Commission on Environment and Development, 1987). Each generation faces the tension between outcomes that maximize profits versus those that adhere to sound ethical standards.

For the purposes of our analysis, we created two conditions for the ISDG. In the first condition, negotiations take place without the "presence" of individuals who act on behalf of future generations. This condition serves as a control condition that produces a baseline estimate of how often negotiators consider future generations in their decision-making. The second condition includes a negotiator who speaks for future generations.

Our analyses produced several notable findings. First, comparison of the two conditions shows that players choose a sustainable option in the treatment condition (60% of the time) to a significantly higher degree than the control condition (28% of the time). Results further show that this significant effect persists even after controlling for a period effect and stake size. Second, our analyses demonstrate that the number of prosocial players in a negotiation significantly increases the likelihood that the players will choose a sustainable option in the

control condition, though not in the treatment condition. This result suggests that the presence of an imaginary future generation influences decisions related to sustainability, independent of the prosocial preferences of decision makers. Third, a content analysis of the negotiation shows if a negotiator in the treatment condition supports a course of action that promotes sustainability with a high degree of frequency. In addition, participants demonstrated a greater tendency to support sustainable courses of action in sequences of generations that included a negotiator who acts for a future (relative to sequences of generations that did not include an negotiator for a future).

We discuss these results, and other issues surrounding them, in greater detail in the subsequent sections. In Section 2, we explain the nature of the ISDG and describe the experimental design and procedures we followed. We report the results of our experiment in Section 3 and offer some concluding remarks in Section 4.

2. Experimental design and procedure

2.1 Intergenerational Sustainability Dilemma Game (ISDG)

Before describing the nature of our experiment and its results, we first describe in detail the intergenerational sustainability dilemma game we used to derive our results. Each generation was assigned three participants and was required to follow two steps. First, each set of

119 generation representatives was required to choose between two options (A or B). These options
120 entail the pie (money) for that generation and the size of the pie for Option A is larger than that
121 for Option B. Second, participants were required to redistribute the pie to the three individuals.
122 An essential feature of the ISDG is that the choice of some generation affects the size of the pies
123 the next generations obtain from the same two options. Option A brings a larger benefit to the
124 current generation, to the detriment of the next generations, and this is interpreted as exploiting
125 the future or refraining from investing in the future. In contrast, Option B involves such
126 investment, lowering the benefits of the current generation, and preserving the size of the pies in
127 the future.

128 In our experiment, Generation 1 obtains 3600 JPY by choosing Option A and 2700 JPY with
129 Option B. After Generation 1 has decided, Generation 2 faces the same decision problem, but
130 the stake size may be different, depending on the choice of Generation 1. When Generation 1
131 choses Option A, the size of the pies decreases by 900 and Generation 2 obtains 2700 from
132 Option A and 1800 from Option B. In contrast, when Generation 1 chooses Option B, the stake
133 sizes of Generation 2 are the same that Generation 1 faces. The choice of Generation 2 affects
134 the stake sizes of next generations in the same manner and the next generations also face the
135 same decision problems (see Table 1). While Option A reduces the maximum possible payoffs
136 to future generations, Option B does not, making Option B a sustainable choice.

137

138 << Insert Table 1 Here >>

139

140 While the equality, utilitarian, and maximin principles suggest that all generations should
141 choose Option B, the self-interested choice of each generation is Option A. Thus, there is a
142 conflict between the intergenerational rationality and the single-generational rationality, like in
143 the well-known prisoner dilemma, where the collective rationality conflicts with the individual
144 rationality. However, the ISDG game differs from the prisoner dilemma on a number of key
145 aspects. First, in the ISGD game, the payoff for people in a given generation is fixed as a
146 function of their own decision; the decisions of future generations do not influence the payoff
147 obtained by the original generation. Consequently, direct reciprocal behavior of between present
148 and future generations is impossible; choosing the sustainable choice cannot be explained by
149 reciprocal altruism (Trivers 1971). Second, each generation can only select Option A or B one
150 time, and are therefore unable to exert influence the decisions of future generations beyond their
151 one selection. Consider that even if the current generation chooses Option B, there is no
152 guarantee that the next generation will also choose Option B, nor is there any way for the
153 current generation to intervene in the next generation's decision-making process. Although
154 individuals in the current generation may hope that subsequent generations replicate their

decision (i.e., that the sequence will be: B, B, …, B), it may be difficult for them to do so if they believe future generations will fail to replicate their decision (Sherstyuck et al. 2016).

2.2 Introducing an imaginary future generation

The difficulty associated with a generation's selection of Option B derives from the inability of future generations to communicate and negotiate with the current generation. The absence of voices from future generations makes it impossible for the current generation to consider their hopes and preferences. The inclusion of an imaginary future generation in negotiations allows individuals in the present generation to communicate and negotiate with individuals who act on the future generation's behalf. However, the payoff of the imaginary future generation who acts on behalf of the future generation is decided upon by members of the current generation, including this person. Through this design, we can investigate how the presence of the imaginary future generation affects the way members of the current generation take decisions, in the context of an ISDG.

2.3 Experimental procedure

We performed this experiment in two waves, respectively occurring in February and June of 2014. We recruited subjects from a subject-pool based at Kochi University of Technology in

Japan. In total, we recruited 210 graduate and undergraduate students (90 in February and 120 in June) to participate in the study. Upon arriving at the reception desk, they drew a card that indicated which sequence and group to which they belonged, as well as their identification numbers. In each sequence, six groups correspond to six different (sequential) generations. Subjects in the same sequence played the ISDG across generations. Each group (with the exception of the sixth) consisted of three members. In the February wave, we assigned three sequences as treatment conditions (i.e., they contained future generation negotiators) and two sequences as control conditions. In June, we assigned four sequences as treatment conditions and three sequences as control conditions. Whereas the first through fifth groups (i.e., generations) had to choose Option A or B in the ISDG, the sixth group did not need to make a decision because they knew they were the final generation in the sequence. Given that the final group did not provide data, all data were from the first through fifth groups. In total, there were twelve groups from five generations (N = 180, 55 women, 125 men; mean age = 19.47).

Upon arriving to the experiment site, participants in the treatment and control conditions were shown to separate rooms. In each room, a member of the research team distributed instructions and explained the experimental procedures to participants. The instructions did not refer to the context of the intergenerational resource allocation problem and did not allude to salient research objectives. For instance, rather than use the word “generation” in the

191 instructions (which may have sensitized participants to our research objectives), we instead used
192 the word “group.” After receiving the experiment’s instructions, the first groups were led to
193 small rooms where they engaged in (recorded) discussions. After arriving at their decisions,
194 participants were moved out of the room and the next groups were invited in. The procedure
195 was repeated five times.

196 All groups’ decisions were written on a whiteboard in the experiment room, so subjects were
197 allowed to be aware of those decisions. After making their decisions related to resource
198 allocation, participants completed a final questionnaire that measured social value orientation
199 (Van Lange et al. 1997) and demographics (e.g., sex and age). Participants then received their
200 payouts and were dismissed.

201 The treatment and control treatments differ along several lines. In the treatment condition,
202 one of the three participants that comprised each generation was instructed to negotiate as if
203 he/she was a member of a later generation. Specifically, when drawing cards, one of the
204 participants drew a card marked with the α symbol.[2] The individual who drew this card was
205 instructed as follows: “If you are the subject with the α symbol on your card, please negotiate
206 with the other two subjects not according to your own benefits and preferences, but with an eye
207 towards maximizing the benefits of those that negotiate after your group. Keep in mind,

[2] α has no special meaning in Japan, and is considered neutral.

however, that you will receive a payout that is divided among members of your group, regardless of the ultimate decision your group makes." At the beginning of the discussion, subject α had to inform the other two members of the group that he/she drew the α card.

On average, each experiment took approximately 90 minutes. For their participation, all subjects received a flat rate of 900 JPY, plus the additional money they received as a function of their decision-making.

2.4 Coding

To explore whether and the degree to which the presence of a member of an imaginary future influenced the decision-making process, we transcribed all recordings of the negotiations. In total, participants produced 3034 statements.[3] We employed three coding types. The coding schema is shown in Table 2. Specifically, the coding took into account whether a statement was in support of or against Option A or Option B, neutral between the two, or about payout or not (Coding 1), whether each participant's final, pre-decision opinion was in support of Option A or Option B (Coding 2), and how the group decision was taken (Coding 3). For each statement (Coding 1), each individual (Coding 2), or each group (Coding 3), two trained assistants applied

[3] We defined a statement in terms of a speaking turn. We excluded conversations that took place between experimenters and subjects to clarify the procedures of the experiment.

224 a code. When these two coders disagreed on or missed the code to be assigned, one of authors
225 made the determination.
226
227 < Insert Table 2 Here >>
228
229 3. Results
230 3.1 The influence to examine the effects of the treatment on the types of statements of future
231 generations on sustainability decisions
232 We first explored the main research objective of this study. Specifically, we tested whether
233 the introduction of an α participant (i.e., representative for a future generation) into negotiations
234 affected a group's likelihood of selecting a more sustainable option (Option B). We regressed
235 the group's choice (Option A = 1, Option B = 0) on which condition the group was assigned to
236 (treatment condition = 1, control condition = 0; Table 3, Model 1). A Wald test revealed that the
237 95% confidence interval ($CI_{95\%}$) surrounding the mean did not contain zero (χ^2 [1] = 5.74, *p*
238 = .017). To explore the effects of contextual factors (like the position in the generational
239 sequence, or the size of rewards) on group decision-making, we added contextual factors to the
240 model, as controls (Table 3, Model 2). When contextual factors were introduced, the significant
241 $CI_{95\%}$ persisted (χ^2 [1] = 5.23, p = .022), suggesting that the effect of a future generation's

presence in negotiations on the decision outcome was not moderated by which generation game players belonged to, or by how large their potential payout was.

<< Insert Table 3 Here >>

3.2 The moderating effect of pro-sociality

We also explored whether and how pro-sociality, that is, the orientation "to maximize outcomes for both themselves and others (cooperation) and to minimize differences between outcomes for themselves and others (equality) (Van Lange et al. 1997, p. 733)", moderates the effect between the treatment condition and the groups' decision-making. It is possible that introducing a member of an imaginary future generation primes group members' general social concerns rather than concern for future generation specifically. If this is the case, pro-socials—who tend to have a general concern for the outcomes of others—would be more sensitive to the presence of members of the future generation than non-pro-socials. Results of our analyses did not support this. The makeups of the groups that selected Option B (in terms of pro-social members relative to other members) are outlined in Table 4. To test whether the proportion of groups choosing Option B increases with the number of pro-socials, especially in the treatment condition, we performed a Mantel-Haenszel test for trends (Agresti 2002), using

the IBM SPSS version 23.0 software. This test has been developed to examine differences in proportions across groups, given linear-by-linear trends for the groups. The results showed that, in the treatment condition, the number of pro-socials did not predict whether the group selected Option B (χ^2 [1] = 0.48, p = .49). However, in the control condition, groups comprised entirely of pro-socials selected Option B significantly more than Option A (χ^2 [1] = 3.89, p = .049). These results suggest that the inclusion of a member of an imaginary future influenced decision-making, independent of general pro-sociality.

<< Insert Table 4 Here >>

3.3 The effect of the presence of a future generation on decision-making processes

For this part of the analysis, we identified some indicators that may provide some insight as to how the introduction of future generation representatives influenced discussions within groups. Specifically, focusing on what individuals talked about (the contents of their statements), what individuals chose (individual choices), and how the group decision was taken (discussion rules and times), we showed the direct and indirect influence of a future generation on the process of discussion.

Statements. The proportions of each type of statements over all statements are given in Table 2. To examine the effects of the treatment on the different types of statements made by groups, we performed Chi-square tests on the proportions of statements in favor of Option A or Option B, as a function of each condition. The results of this analysis suggested that subjects in the treatment condition were less likely to voice positive attitudes towards Option A than subjects in the control condition. Specifically, in the treatment condition, 15.34% of all statements voiced positive attitudes towards Option A, versus 27.55% in the control condition (χ^2 [1] = 63.61, p < .001). Moreover, participants in the treatment condition produced more positive statements towards Option B (19.33% of all statements) relative to the control condition (14.49% of all statements). This difference is statistically significant (χ^2 [1] = 10.63, p = .001). In addition, when comparing attitudes voiced by the different types of participants (participants in the control condition, non-α participants in the treatment condition, and α participants in the treatment condition), the latter produced the largest number of statements in favor of Option B, followed by non-α participants in the treatment condition, and by subjects in the control condition (see Table 5). This rank order was reversed in terms of the proportion of statements in favor of Option A. These results suggest that the presence of an individual talking on behalf of an imaginary future exerted a positive influence on individuals, pushing them to take a decision that benefits the future generations.

295

296 << Insert Table 5 Here >>

297

298 *Individual choices.* Across all conditions, roughly half of participants expressed a preference
299 for Option A (54.3%), and the other half seemed to prefer Option B (45.7%, Table 2). This
300 difference was not significant (z = 1.134, p = .257). This non-significant difference disappears
301 when the statements are evaluated by condition. Whereas 59.0% of subjects in the treatment
302 condition expressed positions supportive of Option B, 72.0% of subjects in the control condition
303 supported Option A. A Chi-square test revealed this difference to be significant (χ^2 [1] = 16.60, p
304 < .001). When comparing the final statements made by the different types of subjects in the
305 study (i.e., participants in the control condition, non-α participants in the treatment condition,
306 and α in the treatment condition) preferences for Option A differed significantly (χ^2 [2] = 18.87,
307 p < .001). Whereas majority (72.0%) of the subjects in the control condition preferred Option A
308 to Option B (z = 3.811, p < .001), most of the α participants (69.7%) selected Option B rather
309 than Option A (z = -2.263, p = .024). Non-α participants in the treatment condition were
310 relatively split; 46.3% voiced a final opinion in preference for Option A, and 53.7% were in
311 support of Option B. This difference was not significant (z = -0.611, p = .54).

Individual positions varied based on group membership. Most groups (87.7%) arrived at unanimous decisions. Particularly striking is that none of the groups in the control condition experienced conflict prior to making their final decision (see Table 6). In the treatment condition, however, 21.9% of groups experienced some form of disagreement (i.e., some members chose Option A while others chose Option B). This result suggests that even at the last stage of the discussion, conflict can emerge.[4]

<< Insert Table 6 Here >>

Decision rules. Reflecting the high level of agreement among most participants, about half of the groups were coded as having reached a unanimous agreement without the emergence of an opposing position. About a quarter of groups reached a consensus through discussion, and 13.3% used some form of decision rule to choose an option (Table 2).

Introducing a representative for a future did not significantly influence the *type* of decision rule the groups adopted, but a slightly greater number of treatment groups used a decision rule

[4] Three groups were excluded from this analysis due to missing values. Of the three, two groups had members that did not express their opinions during the final phase of the discussion. For the other group, we were unable to decipher the group members' decisional preferences during these last discussions.

than control groups (Table 7). This result was consistent with our findings related to individual choice, which showed greater disagreement among treatment groups relative to control groups.

<< Insert Table 7 Here >>

Discussion time. Across all conditions and groups, subjects spent nearly five minutes engaging in discussion (M = 292.71 seconds, SD = 171.68 seconds). As with the other moderators, however, discussion time was largely dependent on the condition to which the group was assigned. Treatment groups (M =351.23 seconds, SD = 158.60 seconds) tended to discuss longer than control groups (M_{ctl} = 210.80 seconds, SD_{ctl} = 157.60). This difference was significant (t[58] = 3.39, p = .001, d = 0.88). This result was unsurprising given the high level of disagreement among individuals in the treatment groups. That level of disagreement takes a longer amount of time to sort through.

Relationships across indicators. Finally, we calculated correlation coefficients relating the group's choice (A = 1, B = 0) to (1) the number of members who supported A and (2) the ratios of statements which were supportive of Option A to Option B (see Table 9). These correlations were significant, suggesting that the indicators outlined above were the driving factors behind the group's decisions.

<< Insert Table 8 Here >>

In sum, the analysis of the contents of the discussions showed that the presence of an negotiator for a future promoted direct and indirect support for Option B, both in terms of statements and decisions, and increased the likelihood that the group would choose Option B.

4. Discussion

Without accounting for the voices of individuals from distant future generations, it is impossible to move towards a sustainable society. To address this difficulty, we propose a new approach through which some individuals from the current generation serve as representatives for imaginary future generations during negotiations that lead to decisions that impact the future. In this study, we have empirically explored how this approach works in the laboratory with respect to resource allocation. Our analyses revealed that when members of an imaginary future generation are present during negotiations, groups tend to select more sustainable options.

One explanation for this phenomenon is that participants who were assigned to be representatives of future generations served as effective proxies for these imagined generations. Relative to those from the current generation in the treatment condition, as well as those in the control condition, future generation representatives tended to (1) be more supportive of

363 sustainable options, and (2) maintain their preferences for sustainable options at the end of the
364 discussion. Relative to the control condition, the treatment condition involved longer discussion
365 times and less unanimity among participants. Taken together, these results suggest that the
366 presence of an imaginary future generation in negotiations affected those negotiations.

367 These findings have several practical implications and are marked by some limitations. First,
368 we believe that the pursuit of a sustainable society cannot be exclusively reliant on the
369 pro-sociality of a generation's members. Pro-sociality and altruism have long-been known to
370 contribute to cooperation in prisoners' dilemmas (McClintock & Liebrand 1988, Van Lange
371 1992). In the control condition in this study, only groups comprised of three pro-social people
372 selected the sustainable option. In contrast, in the treatment condition, participants tended to
373 choose the sustainable option regardless of the number of pro-social members in the group.

374 Second, results suggest that individuals can effectively serve as proxies for other generations,
375 even without monetary incentive. We found that when people were designated representatives
376 of future generations, many actively supported the sustainable option. This result was consistent
377 with findings related to citizen participation in local districts in Japan. In these districts, some
378 people are asked to communicate and negotiate with others as a spokesman from the distant
379 future (Hara 2016). Future research in this domain would benefit from exploring characteristics
380 of future proxies that make them effective.

Finally, although we did not establish causality, we found that the inclusion of a future generation representative positively influenced individuals from the current generation to choose sustainable options. There are several possible explanations for this finding. For example, if these current generation participants are aware that subsequent generations include future generation representatives, they may be motivated to select the sustainable option because the subsequence generations also receive the pressure to choose the sustainable option from further future generations. It is also possible that participants from the current generation simply conformed to the preferences of the participants who act for the future generation. Future work with a more sophisticated methodological approach, including qualitative interpretation of the transcriptions, would be useful to provide clarity in this domain.

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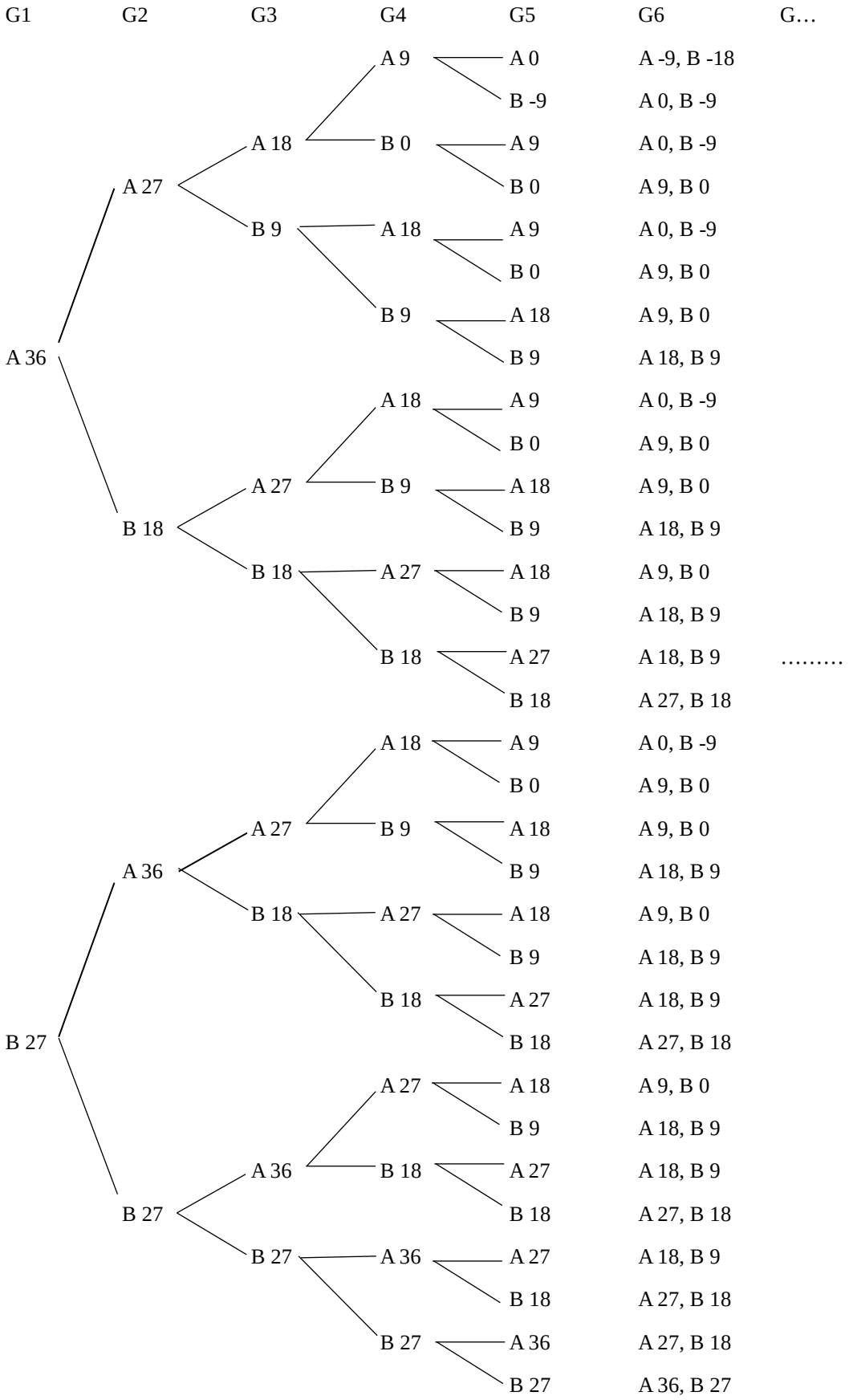

445 Table 1. Payoffs for each generation.

446

Coding	Coding schema	Proportions of all	Inter-coder reliability: Agreement ratio (%)	Inter-coder reliability: Cohen's kappa (k)
Coding 1[a]	In support of Option A	19.3%	90.9%	.71
	In support of Option B	17.8%	91.3%	.71
"The statement was…"	Against of Option A	4.7%	94.6%	.42
	Against of Option B	2.0%	97.9%	.45
	Neutral	45.0%	78.5%	.57
	Discussion about how to share	13.4%	93.1%	.71
Coding 2[b]	Participant's pre-decision opinion was in support of Option A	54.3%	98.3%	.97
Coding 3	A unanimous agreement without an opposing opinion	56.7%	66.7%	.42
"The group decision was made by…"	Using a decision-making device (e.g., majority voting, or a random-outcome mechanism like paper-rock-scissors)	13.3%		
	Reaching a consensus through discussion, though there is a conflict of opinion	26.7%		
	Miscellaneous/other methods[c]	3.3%		

447 Note. [a] A statement was defined by a speaking turn. This indicates that a statement can be
448 classified into more than one category. Therefore, we treated types of statement as six
449 independent categories, rather than mutually exclusive options of a single category. The
450 percentages of types of statements did not sum up to 100%.
451 [b] Five subjects' final opinions could not be coded, as they did not express their opinion before
452 the group's decision was made final.
453 [c] Two groups (3.3%) were rather unorthodox; they used a game of rock-paper-scissors to take
454 their decisions, despite the absence of conflict among the group's members.
455 Table 2. Coding schema.

456

457

Explanatory Variables	Model 1				Model 2			
	Coef. (SE)	z	*p*	$CI_{95\%}$	Coef. (SE)	z	p	$CI_{95\%}$
Intercept	0.94 (0.45)	2.12	.034	[0.07, 1.82]	-0.20 (1.66)	0.12	.904	[-3.45, 3.05]
Condition (0 = control, 1 = treatment)	-1.35 (0.56)	-2.40	**.017**	[-2.45,-0.25]	-1.59 (0.69)	-2.30	**.022**	[-2.95, -0.23]
Generation no.	-	-	-		0.20 (0.28)	0.70	.481	[-0.35, 0.74]
Payoff for A	-	-	-		0.0003 (0.0004)	0.62	.538	[-0.001,0.001]
Pseudo R^2	.0742				.0806			
AIC	80.76				84.23			
LR chi^2	6.15				6.68			
Prob > chi^2	.013				.083			
Log-likelihood value	-38.38				-38.11			

458 Table 3. Log-linear regression models of group decisions.

459

460

	Number of pro-socials			
Condition	0	1	2	3
Treatment (n=35)	-	80.0	56.3	57.1
Control (n=25)	0.0	0.0	0.0	43.8

Table 4. Ratio of groups choosing Option B.

Statements	Control	Treatment		$\chi^2(2)$	p
		non-α	α		
Supportive statements for Option A	27.55%	18.04%	9.94%	82.78	< .001
Supportive statements for Option B	14.49%	17.08%	23.83%	24.86	< .001

463 Table 5. Proportion of statements in support of Option A or Option B, by condition.

464

	Members who took the position of Option A				$\chi^2(3)$	p
Condition	None	1 person	2 people	3 people (all)		
Control	28.00%	0.00%	0.00%	72.00%	12.86	.005
Treatment	50.00%	6.25%	15.63%	28.13%		

Table 6. Proportion of groups that chose Option A, based on the final position of their members.

	Decision rule					
Condition	Unanimity	Decision device	Consensus	Other	$\chi^2(3)$	p
Control	72.00%	4.00%	24.00%	0.00%	6.12	.011
Treatment	45.71%	20.00%	28.57%	5.71%		

Table 7. Proportion of groups that adopted decision rules of various types.

	Statements for B	No. members for A	Chose Option A
Ratio of statements for A in each group	-.682**	.775**	.779**
Ratio of statements for B in each group	-	-.782**	-.725**
Number of members who ultimately endorsed A	-	-	.949**
Chose Option A (A = 1, B = 0)	-	-	-

** p <.001

Table 8. Correlation matrix (N = 57).