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Proxy Voting for Future Generations: A Laboratory Experiment Using the General Public

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Abstract: To realize policies that benefit the youth and future generations, discussions are being held on how to give the votes of children who are currently ineligible to vote, and even future unborn generations, to their parents or voters of the present generation to vote as their proxies. To examine the effect of proxy voting on future-friendly choices, we conducted a laboratory experiment with the general public, including parents. Participants were assigned the roles of present and future generations, and the present-generation participants voted on allocating payoffs between generations. Proxy votes for future-generation participants were granted to some present-generation participants. We found that proxy voting did not increase the proportion of votes for future-friendly choices compared to the case without proxy votes, which is consistent with previous studies involving university students. We also observed that the older the participants, the more likely they were to vote for future-friendly choices. Once age was controlled for, parents were less likely than non-parents to vote for future-friendly choices. From a consequentialist perspective, these results suggest that we should add a twist to proxy voting, examine non-proxy voting methods, or explore other measures.

Keywords: proxy vote; future generation; laboratory experiment; general public

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1. Introduction

We understand that we are causing climate change as a result of our actions [1]. We also understand that we have destroyed biodiversity and the nitrogen and phosphorus cycles, which have already exceeded the tipping points [2–7]. However, current representative democracy is not a solution to these problems; the system itself is part of them [8,9]. Those elected rarely address issues with long-term consequences beyond the next or future election. What about the voters? Although they may recognize long-term problems and desire to solve them, they are often caught up with immediate interests and concerns. When faced with a choice, they cannot sacrifice immediate gain for the potential benefits of future generations.

Another critical issue is the changing population pyramid. According to World Bank Open Data [10] for 2021, Asia and Europe are home to the oldest people, over 65 years old. Japan tops the list with its share of the total elderly population at 29%, followed by Italy at 24%, and Portugal, Finland, and Greece at 23%. The smallest percentage of juveniles aged 0–14 years was 12% in Japan and 13% in Italy, Portugal, and Greece.

Under these trends, if a conventional electoral system is used, the elderly generation, which occupies a large proportion of the population, will vote for policies that provide immediate benefits. Younger generations have fewer chances to promote policies that consider their future. Therefore, in their common agenda, the Secretary General of the United

Nations [11] (p. 39) proposed "lowering the voting age and the eligibility age for standing as a candidate for elected office, as well as strengthening youth participatory bodies."

More radical electoral reforms have also been proposed to address these trends along with global issues, introducing proxy votes for the younger generation, who currently do not have voting rights. According to Van Parijs [12], between the two World Wars of the 20th century, the voting systems in the French protectorates of Tunisia and Morocco gave second votes to fathers with four or more children. Demeny [13] (p. 354) suggested "let(ting) custodial parents exercise the children's voting rights until they come of age". In recent years, parental proxy voting has been discussed in the German Parliament and envisaged in Hungary's new draft constitution; however, it has not yet been adopted. Will these electoral reforms work for future generations?

Several experimental studies have addressed this issue by gathering human participants in laboratories and asking them to vote in hypothetical voting opportunities. Kamijo et al. [14,15] divided the participants into three-person groups. Two of the three played the role of the present generation, with one vote each to determine the division of monetary rewards among the three. The remaining participant was assigned the role of a future-generation person who currently could not vote. Under proxy voting, one of the two present-generation participants was given a proxy vote on behalf of the future generation. They observed a change in voting decisions among present-generation participants without proxy votes. Some voted for an equal division among the three when each present-generation participant was given one vote. However, they switched to a division that gave more monetary rewards to the present-generation participants at the expense of the future-generation person under proxy voting.

Katsuki and Hizen [16] used the Intergenerational Sustainability Dilemma Game proposed by Kamijo et al. [17], in which three-person groups (i.e., generations) sequentially choose between options A and B. If the first generation chooses A (B, respectively), they obtain \$36 (\$27) as a participation reward, and the second generation's gains from A and B decrease to \$27 and \$18 (remain \$36 and \$27). The difference in rewards between A and B (\$9) is considered an investment to maintain sustainability. Katsuki and Hizen [16] prepared six generations and compared the case in which three persons of each generation had one vote each with the case in which one of the three had two votes, while the remaining two had one vote each. The two votes were explained to the participants that "(y)ou are asked to cast one vote as "your vote" and another vote as a "proxy vote on behalf of the subsequent groups" who cannot participate in your group's vote" (p. 13). They found that introducing a second vote only slightly increased the frequency of sustainable choice B.

In these experiments, the participants were university students, almost none of whom had children. Therefore, Kamijo et al. [18] conducted an Internet experiment with 1000 parents of children under the voting age and 1000 parents of children who had already obtained voting rights. Parents voted on the donation amount to nonprofit organizations that aimed for a better future society. They filled in their preferred donation amount, and the median amount was determined as the amount donated by every parent. Under proxy voting, parents of children under the voting age were allowed to fill in two donation amounts: One was their proposal and the other was on behalf of their children. In contrast to expectations, the donation amount realized under proxy voting was smaller than that realized with one vote for every parent. This result suggests that the proxy-vote approach may be ineffective in increasing donations towards a better society.

In the current study, we conducted a proxy voting experiment with the general public, including parents, using the format of Kamijo et al. [14,15] instead of a donation. Young participants under the voting age were preferentially assigned the role of future-generation persons. In contrast, parents with children under the voting age received proxy votes for future-generation persons. We observed that some participants cast proxy votes to benefit themselves. Furthermore, some participants without proxy votes made choices that counteracted the effects of proxy votes. Consequently, the share of votes considering future-generation persons increased only slightly, which is consistent with the results of

previous studies with university students. A new finding was that older participants were more likely to vote for alternatives that benefited future-generation persons. Once age was controlled for, parents tended to make more self-advantageous choices than non-parents. From a consequentialist perspective, these results suggest that we should add a twist to proxy voting, examine non-proxy voting methods, or explore other measures.

The remainder of this paper is organized as follows. Sections 2 and 3 describe the experimental design and procedures. Section 4 presents the results, which are summarized in Section 5. Section 6 provides concluding remarks. Appendix A contains the instructions used in our experiments.

2. Experimental Design

We followed the experimental design constructed by Kamijo et al. [14] to compare our results with the general public and their results with university students, keeping the other elements as similar as possible. It employs the standard methods of experimental economics, which create a decision-making environment in the laboratory where participants' decisions have an actual impact in the form of different rewards depending on the experimental outcomes.

2.1. General Setup

The participants were divided into groups of three. Two of the three were assigned the roles of the present generation, while the remaining was assigned to the future generation. Present-generation members vote to determine the money allocation among the three members. In contrast, the future-generation member is not allowed to join the vote but merely waits for money allocation to be determined by the present generation.

Voters select one of three alternatives, A, B, or C, as described in Table 1. Alternative A (C) is regarded as present-oriented (future-oriented) and allocates 1400 (600) yen to the two present-generation members and 600 (1400) yen to the future-generation member. Alternative B is equality-oriented and allocates 1000 yen to all three members. We regard alternatives B and C as future-friendly. Note that the sum of money allocated to the three members is the largest for alternative A (3400 yen), the second largest for alternative B (3000 yen), and the smallest for alternative C (2600 yen). Kamijo et al. [15] provided two alternatives, present- and equality-oriented, with the same total size (1500 yen). Hence, it is more costly for present-generation members in our experiment to realize equality-oriented choices than in Kamijo et al. [15].

Table 1. Three allocation alternatives between present and future generations.

	Present Generation 1	**Present Generation 2**	**Future Generation**
Alternative A (present-oriented)	1400 JPY	1400 JPY	600 JPY
Alternative B (equality-oriented)	1000 JPY	1000 JPY	1000 JPY
Alternative C (future-oriented)	600 JPY	600 JPY	1400 JPY

2.2. Two Voting Rules

We compared the decisions of the present-generation members between two voting rules. Under both rules, the winner is determined by the majority rule. The ties are broken randomly. Abstention is not permitted.

The two rules differ only in the number of votes given to present-generation members, as described in Table 2. Under *ordinary voting*, present-generation members are given one vote each and cast for one of three alternatives. Under *proxy voting*, one of the two present-generation members was given a second vote. In this study, this type of member is denoted as *present generation 2*, whereas present-generation members with one vote are denoted as *present generation 1*. The instructions provided in Appendix A ask present generation 2

to use one vote for themselves and another vote as a proxy for the future generation that cannot join the vote. However, they are free to determine how to cast their votes; they cannot receive any revenue from future generations, even if they vote as a proxy.

Table 2. Number of votes given to each member under each voting rule.

	Present Generation 1	Present Generation 2	Future Generation
Ordinary voting	1	1	0
Proxy voting	1	2	0

3. Experimental Procedures

We conducted four sessions, gathering 54 participants from the general public who visited Kochi University of Technology's annual festival, where students showcased their research results and club performances.

3.1. Role Assignment

In each session, the experimenters assigned participants three roles (i.e., present generations 1 and 2, and the future generation) of equal magnitude. First, participants with children under the voting age played the role of present generation 2. Among the remaining participants, younger participants were assigned to the future generation until their capacity was reached. The others were randomly assigned to the remaining slots in present generations 1 and 2. Each group of three was randomly formed, with one participant selected from each of the three roles. The instructions merely informed them that relatively young participants would be assigned to the future generation. These roles and the three-member groups were fixed between the two voting rules, although the participants were not informed of their group members' identities.

3.2. Procedures

The experiment was conducted using z-Tree software 3.4 (Fischbacher [19]). The participants were seated individually in partitioned PC booths. The experiment consisted of the first instruction, decisions under ordinary voting; the second instruction, decisions under proxy voting; and a questionnaire. The first instruction explained the entire structure of the session and the rules of ordinary voting. After making decisions under ordinary voting, the second instruction explained the proxy voting rules. The results under the two voting rules were revealed after proxy voting so that the results under ordinary voting did not affect decision-making under proxy voting. One of the two results was randomly selected to determine the participants' earnings. Additionally, 500 yen was provided as a participation reward. Instead of cash, participants under the age of 15 received book cards and sweet treats of equal value to the experimental participation reward to ensure as much as possible that their parents would not embezzle them and to consider the regulations of the educational institutions the young participants attended and the educational policies of their parents.

3.3. Participants

Table 3 summarizes the participants' attributes according to their roles in the experiment. As a result of the role assignment described in Section 3.1, the average age and percentage of parents were the lowest for the future generation (i.e., 18.39 and 0.0%, respectively), the second lowest for present generation 1 (28.83 and 11.1%), and the highest for present generation 2 (43.28 and 61.1%).

Table 3. Attributes of the participants.

		Present Generation 1 (18 Participants)	Present Generation 2 (18 Participants)	Future Generation (18 Participants)
Average age (SD)		28.83 (12.37)	43.28 (11.82)	18.39 (2.50)
Female		6 (33.3%)	9 (50.0%)	10 (55.6%)
Parent		2 (11.1%)	11 (61.1%)	0 (0.0%)
Parent with children under the voting age		0 (0.0%)	8 (44.4%)	0 (0.0%)
SVO	Individualist	5 (27.8%)	2 (11.1%)	2 (11.1%)
	Competitor	0 (0.0%)	0 (0.0%)	1 (5.6%)
	Equalitarian	9 (50.0%)	12 (66.7%)	10 (55.6%)
	Utilitarian	1 (5.6%)	4 (22.2%)	3 (16.7%)
	Not classified	3 (16.7%)	0 (0.0%)	2 (11.1%)

Note: Except for age, the number in each cell represents the number of participants. Percentages in parentheses are calculated by dividing each number by 18 (i.e., the number of participants assigned to each column's role). SD: standard deviation. SVO: social value orientation.

We measured each participant's social value orientation (SVO) by asking them to answer 12 allocation questions based on Eek and Gärling [20]. The participants chose one of four allocation alternatives that they preferred most for each question. For example, (520, 260), (460, 460), (460, 60), and (460, 760) correspond to alternatives that individualists, equalitarians, competitors, and utilitarians prefer the most, respectively, where the former number in parentheses is the allocation to the respondent, whereas the latter number is to a hypothetical anonymous person paired with the respondent. If eight of the twelve answers were consistent with a particular type of SVO, the participants were classified as that type. In our experiment, equalitarians and utilitarians occupied a larger share of present generation 2 than present generation 1. Although this difference was not statistically significant according to Fisher's exact test (p-value 0.12), we conducted a regression analysis considering each participant's SVO.

4. Experimental Results

We first examined whether proxy voting increased the share of votes beneficial to future generations compared with ordinary voting. We then considered the participants' individual choices behind the aggregate outcomes.

4.1. Aggregate Outcomes

We compared the share of votes for future-friendly alternatives B and C between the two voting rules. Note that the participants could not identify their group members. There was no interaction between the two present-generation members in each vote, and each vote under each rule was held only once. Hence, the voting outcome in each group did not have a particular meaning but merely determined the rewards received by each participant. For this reason, we aggregated the votes cast by all groups in our data analysis.

Table 4 shows each alternative's number of votes and percentage under each voting rule. Since half of the present-generation members had a second vote, the total number of votes under proxy voting was 1.5 times that of ordinary voting. Proxy voting increased the number of votes for alternatives A, B, and C by 7 (=26 − 19), 5 (=15 − 10), and 6 (=13 − 7), respectively, compared with ordinary voting. Regarding vote share, 4.7 percentage points moved from present-oriented alternative A to future-oriented alternative C, while the vote share for equality-oriented alternative B remained the same. Although this change is in the future-friendly direction, the vote distributions are not significantly different between the two voting rules (chi-square test of independence: statistic 0.30, p-value 0.86).

Table 4. Each alternative's number of votes and percentage under each voting rule.

	Alternative A	Alternative B	Alternative C	Sum
Ordinary voting	19 (52.8%)	10 (27.8%)	7 (19.4%)	36 (100%)
Proxy voting	26 (48.1%)	15 (27.8%)	13 (24.1%)	54 (100%)
Own votes	21 (58.3%)	9 (25%)	6 (16.7%)	36 (100%)
Proxy votes	5 (27.8%)	6 (33.3%)	7 (38.9%)	18 (100%)

Proxy votes were intended to be cast for future-oriented alternative C or at least equality-oriented alternative B. However, 5 of the 18 proxy votes were cast for present-oriented alternative A. In addition, own votes moved from alternatives B and C to alternative A by one vote each (i.e., 10–9 and 7–6) when ordinary voting was replaced with proxy voting.

Proxy voting increases the vote share for future-friendly alternatives B and C only slightly. If we consider introducing proxy voting to real politics to reflect the interests of future generations, it should be noted that its effect might be limited. Instead, suppose that we introduce it for the reason that future generations should have inherent political rights. In this case, its introduction, together with several other policy measures, is supported in terms of consequentialism because it is not accompanied by worsening the benefits for future generations.

4.2. Individual Voting Behavior

We now turn our attention to the participants' voting behavior. We first investigated whether the participants changed the use of their own votes between the two voting rules (Tables 5 and 6). Proxy voting intends for present generation 1's vote and present generation 2's own vote to be cast in the same manner as ordinary voting or hopefully switched to future-friendly alternatives B or C. In other words, proxy voting requires large numbers to be placed on the diagonal line or in the upper-right cells of Tables 5 and 6. However, some participants of present generation 1 did not follow this intention (Table 5): Two of the six participants who voted for alternative B under ordinary voting switched to alternative A, and both participants who voted for alternative C under ordinary voting switched to alternatives A or B. In contrast, the own votes of present generation 2 were used in line with the proxy-voting intention (Table 6): 17 of the 18 participants continued voting for the same alternative as under ordinary voting, and one participant switched from alternative B to C.

Table 5. Voting behavior under the two voting rules (present generation 1).

		Proxy Voting		
		Alternative A	Alternative B	Alternative C
Ordinary Voting	**Alternative A**	9	1	0
	Alternative B	2	4	0
	Alternative C	1	1	0

Note: For example, the 9 in the upper-left cell means that 9 of 18 present-generation-1 participants voted for alternative A under both ordinary and proxy voting.

Table 6. Voting behavior under the two voting rules (present generation 2; own votes).

		Own Votes under Proxy Voting		
		Alternative A	Alternative B	Alternative C
Ordinary Voting	**Alternative A**	9	0	0
	Alternative B	0	3	1
	Alternative C	0	0	5

Note: For example, the 9 in the upper-left cell means that 9 of 18 present-generation-2 participants cast their own votes for alternative A under both ordinary and proxy voting.

Proxy votes are intended to be cast for future-oriented alternative C or at least equality-oriented alternative B. In other words, proxy voting would expect large numbers to be placed in the middle column and on the right-hand side in Table 7. However, five of the nine present-generation-2 participants who voted for alternative A under ordinary voting also cast proxy votes for alternative A.

Table 7. Voting behavior under the two voting rules (present generation 2; proxy votes).

		Proxy Votes under Proxy Voting		
		Alternative A	**Alternative B**	**Alternative C**
Ordinary Voting	**Alternative A**	5	2	2
	Alternative B	0	3	1
	Alternative C	0	1	4

Note: For example, the 5 in the upper-left cell means that 5 of 18 present-generation-2 participants voted for alternative A under ordinary voting and also cast proxy votes for alternative A under proxy voting.

The above behavior related to present generation 1's votes and present generation 2's proxy votes suppressed the increase in votes for alternatives that would benefit future generations. This observation is consistent with Kamijo et al. [14,15] and Katsuki and Hizen [16] who used university students as participants.

From Tables 6 and 7, we can state that in present generation 2, five of the nine participants who voted for alternative A under ordinary voting cast two votes for alternative A under proxy voting. In contrast, none of the nine participants who voted for alternatives B or C under ordinary voting voted for alternative A under proxy voting. Such voting behavior implies that establishing recipients for proxy votes is crucial for realizing future-friendly outcomes.

4.3. Regression Analysis

We conducted probit regression analyses for ordinary and proxy voting to identify participants' attributes that correlated with their voting decisions. The dependent variable was whether each vote was cast for a future-friendly alternative B or C (1) or the present-oriented alternative A (0). Among the independent variables, "age" is the age of each participant, ranging between 17 and 64. The "parent (female) dummy" is designated as 1 if participants are parents (female) and 0 otherwise. The "prosocial dummy" is designated as 1 if participants are classified as equalitarians or utilitarians and 0 otherwise according to their answers to the 12 questions measuring SVO. For proxy voting, we also examined which type of vote—present generation 1's vote, present generation 2's own vote, or their proxy vote—tended to be cast for future-friendly alternatives.

The regression results are presented in Table 8. The marginal effect was calculated for each independent variable. The benchmark for the type of vote under proxy voting was present generation 2's own vote.

Under both rules, older participants are more likely to vote for future-friendly alternatives B or C than younger participants. Once age is controlled for, parents are less likely to vote for future-friendly alternatives than non-parents. This relationship between age, having children, and voting behavior is a new finding of this study, which could not be examined by the previous laboratory experiments using university students (Kamijo et al. [14,15]; Katsuki and Hizen [16]).

The regression result regarding having children, conditional on age, was also confirmed by comparing Tables 9 and 10. Because the parents were 36 years old or older in our experiment, we also focused on non-parents who were 36 years old or older. Table 9 summarizes non-parents' voting behavior. Two of the three non-parents who played the role of present generation 1 voted for future-friendly alternatives B or C under the two voting rules. All three non-parents in present generation 2 always cast votes for alternatives B or C, including their proxy votes. As described in Table 10, both parents in present generation 1 voted for future-friendly alternatives B or C under ordinary voting. However,

one parent switched to present-oriented alternative A under proxy voting. Among the 11 parents assigned to present generation 2, 5 voted for alternatives B or C under ordinary voting. Under proxy voting, five cast their own votes for alternatives B or C and eight cast their proxy votes for alternatives B or C. Although the data size was limited, we can see that the share of votes for alternatives B or C is smaller for parents than for non-parents over 36 years old. While it is natural to entrust the proxy votes of children to their parents in terms of legitimacy, our results suggest that to whom proxy votes of future generations should be entrusted is debatable in terms of consequentialism.

Table 8. Probit regression estimation results.

	Ordinary Voting		**Proxy Voting**	
Independent variable	Marginal effect	Robust standard error	Marginal effect	Robust standard error
Vote by present generation 1	-	-	0.045	0.194
Proxy vote	-	-	0.286 *	0.160
Age	0.025 ***	0.009	0.027 ***	0.008
Parent dummy	−0.452 **	0.188	−0.483 **	0.166
Female dummy	−0.100	0.206	−0.046	0.169
Prosocial dummy	0.317	0.208	0.366 *	0.188
Log pseudo likelihood	−19.672		−27.042	
Pseudo r-squared	0.210		0.277	
Sample size	36		54	

Note: The dependent variable is whether each vote was cast for a future-friendly alternative B or C (1) or the present-oriented alternative A (0). The benchmark for the independent variables "vote by present generation 1" and "proxy vote" under proxy voting is the own vote by present generation 2. Statistical significance levels: *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Table 9. Number of votes for future-friendly alternatives B or C (non-parents over 36 years old).

	Ordinary Voting	**Proxy Voting**
Present generation 1 (3 participants)	2	2
Present generation 2 (3 participants)	3	3 (own vote) 3 (proxy vote)

Note: For example, the 2 in the upper-left cell means that two of three non-parents over 36 years old who played the role of present generation 1 voted for alternatives B or C under ordinary voting.

Table 10. Number of votes for future-friendly alternatives B or C (parents).

	Ordinary Voting	**Proxy Voting**
Present generation 1 (2 participants)	2	1
Present generation 2 (11 participants)	5	5 (own vote) 8 (proxy vote)

Note: For example, the 2 in the upper-left cell means that two of two parents who played the role of present generation 1 voted for alternatives B or C under ordinary voting.

Although this is weak evidence in terms of the statistical significance level (i.e., *p*-value 0.098), present generation 2's proxy votes are more likely to be cast for future-friendly alternatives than their own votes under proxy voting (Table 8), which is in accordance with the intention of proxy voting. No statistically significant differences were observed between present generation 1's votes and present generation 2's own votes. These observations are consistent with those reported by Kamijo et al. [14,15] and Katsuki and Hizen [16].

We did not find gender differences in voting choices. However, Kamijo et al. [14] found that female participants were more likely to cast proxy votes for future-friendly alternatives than male participants. The prosocial dummy has positive signs but is statistically significant at the 10% level for proxy voting only. In Katsuki and Hizen's [16] experiment with six generations of sequential voting, the positive effect of the prosocial dummy was more apparent for all types of votes.

5. Summary of Main Observations

Our main observations are summarized as follows.

Observation 1. *Proxy voting only slightly increased the vote share for future-friendly alternatives.*

Observation 2. *When ordinary voting was replaced with proxy voting,*

(i) *Some present-generation participants with one vote switched from future-friendly to present-oriented alternatives.*
(ii) *Present-generation participants with two votes tended to cast their own votes for the same alternative that they chose under ordinary voting.*
(iii) *Some present-generation participants with two votes who voted for the present-oriented alternative under ordinary voting also cast proxy votes for it. In contrast, those who voted for future-friendly alternatives under ordinary voting never cast proxy votes for the present-oriented alternative.*

Observation 3. *Under both rules, older participants were more likely to vote for future-friendly alternatives than younger participants. Once age was controlled for, parents were less likely than non-parents to vote for future-friendly alternatives.*

6. Concluding Remarks

Previous experiments using university students observed little effect of proxy voting on future-friendly choices. The current study tested its effect on participants of different ages and life stages and obtained similar results. Proxy votes were not necessarily cast for future-friendly alternatives. Some participants without proxy votes switched from being future-friendly to self-serving when ordinary voting was replaced with proxy voting, counteracting the effect of proxy votes. Using participants from the general public also revealed that older voters were more likely to make future-friendly choices. Once age was controlled for, parents were more likely to make self-serving choices than non-parents. Future research should also test the robustness of the results of laboratory experiments using other techniques, such as field experiments conducted during actual elections in real political contexts.

The introduction of proxy votes can be justified as granting innate rights to people, as long as they are alive. For example, Wall [21] (p. 171) proposed a proxy-claim vote, in which he argued, "every person in a democracy is provided a proxy vote from birth to death that they can also claim to exercise for themselves at any point they desire." However, from a consequentialist perspective, the observations from our experiment and previous studies do not support proxy voting. The expected lower birth rates in the future in many developed countries would also weaken the effect of proxy voting on realizing sustainable collective decisions.

Hauser et al. [22] showed through a laboratory experiment that median voting, in which group members propose a resource consumption amount and every member is assigned to consume the median of the proposed amount, effectively prevents the collapse of the commons owing to overconsumption by a few group members. However, as Katsuki and Hizen [16] pointed out, if the median voter prefers overconsumption, median voting will not realize the sustainability of the commons.

Another possible method for sustainable decision-making is to change people's ways of thinking, rather than focusing on voting under the assumption that people's ways of thinking never change. For example, a Future Design approach has been proposed to design a mechanism to activate people's futurability: People are regarded as exhibiting *futurability* when they experience an increase in happiness as a result of deciding and acting toward foregoing current benefits to enrich future generations [23]. Its practical applications to citizen deliberation are underway in Japanese municipalities. Recently, this approach was also used by the United Nations and is essential for future research [24].

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Data Availability Statement: The data used in our analysis are available upon request from the corresponding author.

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Appendix A

This Appendix provides English translations of the Japanese instructions used in the experiments. It is a modified version of the instructions of Kamijo et al. [14] with the general public as participants.

Instructions

Write notes if necessary.

To participants

Thank you for participating in today's experiment. Please do not look at other seats or around in the laboratory. Refrain from private conversations. Do not engage in eye contact, hand gestures, or other forms of communication. Do not touch the computer until instructed to do so. Do not eat or drink. Please raise your hands quietly if you have any questions. Our staff will come to your seat to answer your questions.

General information

Each participant is asked to behave as a person of the future or present generation. Whether you belong to the future or present generation is written on your seat. Based on the information we received from you at reception, we designated those who were relatively old as the present generation and those who were relatively young as the future generation.

Participants are divided by a computer lottery so that there are groups of three participants: one from the future generation and two from the present generation. The computer lottery takes place regardless of the actual parent-child relationship. Each group is independent and does not influence the others. Participants are asked to make decisions regarding resource allocation within their groups. It is not revealed who is in the same group during or after the experiment. Furthermore, the other participants will not be informed of the decisions you made.

The experiment is divided into two halves (Experiments 1 and 2). Experiments 1 and 2 are independent, and the decision-making outcome in Experiment 1 will not affect the content of Experiment 2. Please consider them separately and make decisions accordingly.

Experimental rewards

Your experimental rewards will be determined according to the decision-making results in Experiments 1 and 2. Specifically, the reward amounts in Experiments 1 and 2

are determined, respectively, based on each decision-making result. After Experiment 2 is completed, a computer lottery selects one of the two amounts as your reward for today's experiment. The final reward will be the amount selected plus 500 yen as a participation fee. Participants under 15 years of age receive a book card or a set of book cards and sweets as a reward, equivalent to the final monetary reward.

Experiment 1

Decision-making in Experiment 1

In Experiment 1, the distribution of 2000 yen between the present and future generations is determined. One of the following is determined by the vote of the present generation:

Proposal 1 (present generation 1400 yen; future generation 600 yen);
Proposal 2 (present generation 1000 yen; future generation 1000 yen);
Proposal 3 (present generation 600 yen; future generation 1400 yen).

Two thousand yen will be distributed according to the proposal with the most votes.

Notes on voting

Each person of the present generation has one vote. They may only vote for a single distribution proposal. In the case of a tie for first place, a computer lottery determines the outcome.

Notes on the distribution proposals

The monetary amount of each distribution proposal represents the amount of each person's rewards for each generation. For example, if distribution proposal 1 is selected by voting, each participant of the present generation will receive a reward of 1400 yen, and the future-generation participant will receive a reward of 600 yen. The same applies to the other distribution proposals.

Role of the future generation

People from the future generation do not make decisions. Please wait for the present generation's decision-making.

Disclosure of voting results

The voting results of Experiment 1 are not disclosed when Experiment 1 is completed. This will be disclosed when Experiment 2 is completed and the rewards are determined.

The following pages explain the computer screens and their operations.

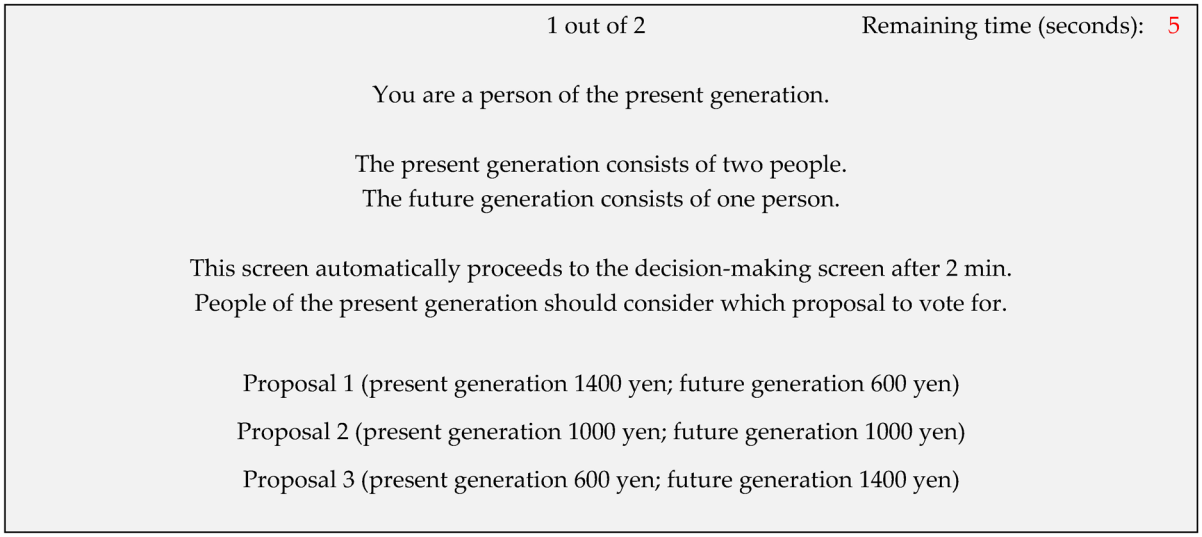

Figure A1. Start screen for Experiment 1.

To begin, you will see the above screen. Here, you will be informed of whether you belong to the present or future generation. It also displays the number of people in the present and future generations. In this example, you are a person of the present generation.

The remaining time (s) is displayed in the upper right of the screen. The screen proceeds automatically after 2 min. People of the present generation should consider which proposal they should vote for.

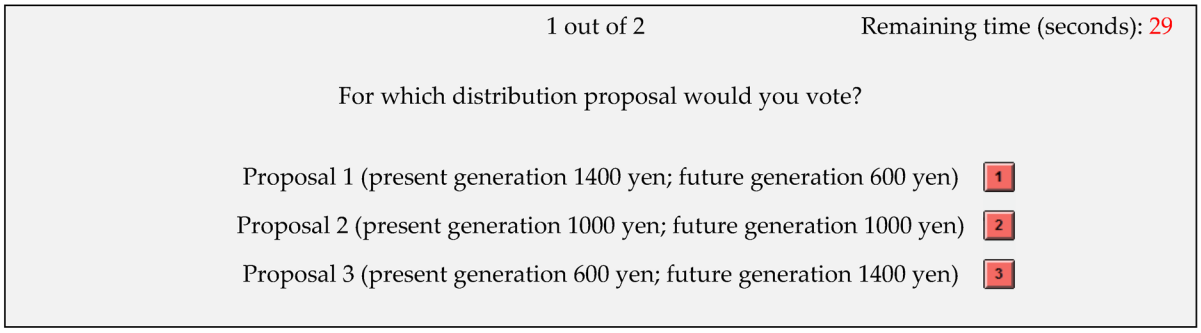

Figure A2. Decision-making screen for the present generation.

The present generation's decision-making takes place on a screen, as shown above. Please click on the button marked "1" to vote for proposal 1, the button marked "2" to vote for proposal 2, or the button marked "3" to vote for proposal 3. Once a decision is made, it cannot be reversed.

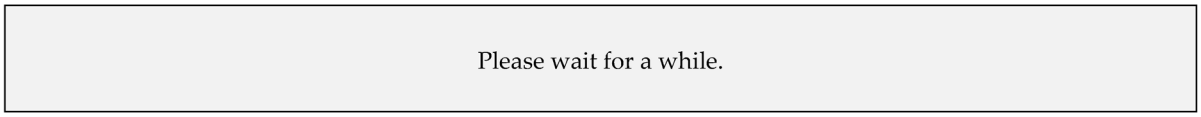

Figure A3. Wait screen.

The above screen appears while waiting for other participants' decision-making or experimenters' operations. We apologize for the delay; it is only a few minutes long at most, so please be patient. After all the people of the present generation complete their decision-making, the explanation of Experiment 2 begins promptly.

Experiment 2

Decision-making in Experiment 2

The decision-making content in Experiment 2 is almost identical to that in Experiment 1. The distribution of 2000 yen between present and future generations will be determined. One of the following is determined by the vote of the present generation:

Proposal 1 (present generation 1400 yen; future generation 600 yen);
Proposal 2 (present generation 1000 yen; future generation 1000 yen);
Proposal 3 (present generation 600 yen; future generation 1400 yen).

Two thousand yen will be distributed according to the proposal with the most votes.

Differences from Experiment 1

Unlike Experiment 1, one of the two people in the present generation can cast two votes in Experiment 2. If you have two votes, please cast one vote for yourself and the other on behalf of the future generation that cannot participate in the vote. You are free to decide how to cast these two votes. You may not receive compensation from future generations even if you vote as a proxy.

The following pages explain the computer screens and their operations.

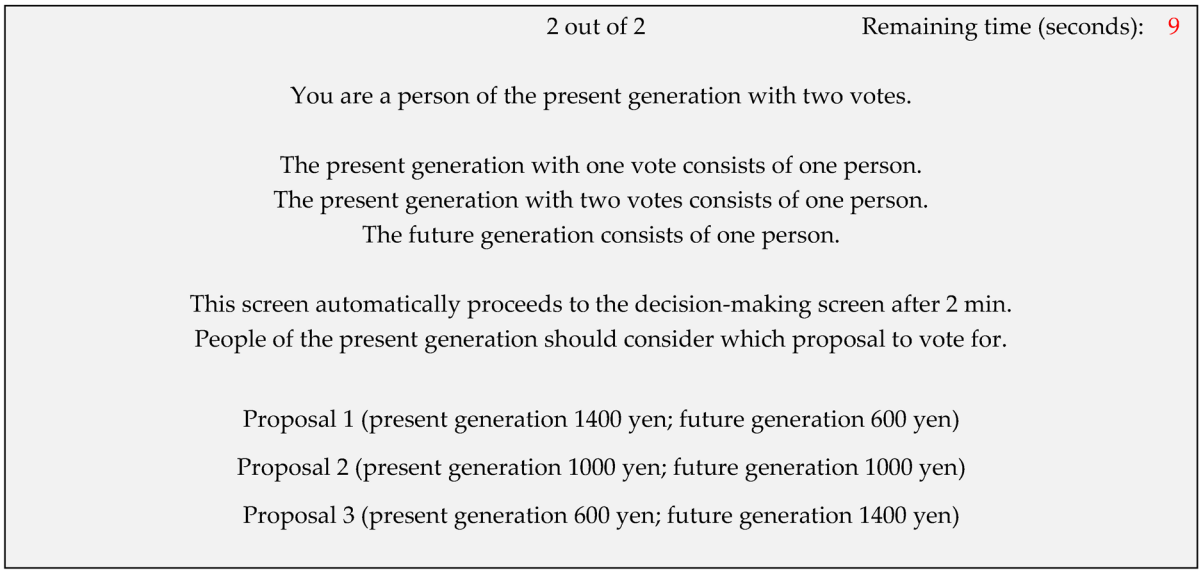

Figure A4. Start screen for Experiment 2.

To begin, you will see the above screen. Here, you will be informed of whether you belong to the present or future generation. It also displays the number of people in the present and future generations. It also displays whether one or two votes were received. In this example, you are a person of the present generation who has two votes.

The remaining time (s) is displayed in the upper right of the screen. The screen proceeds automatically after 2 min. People of the present generation should consider which proposal they should vote for.

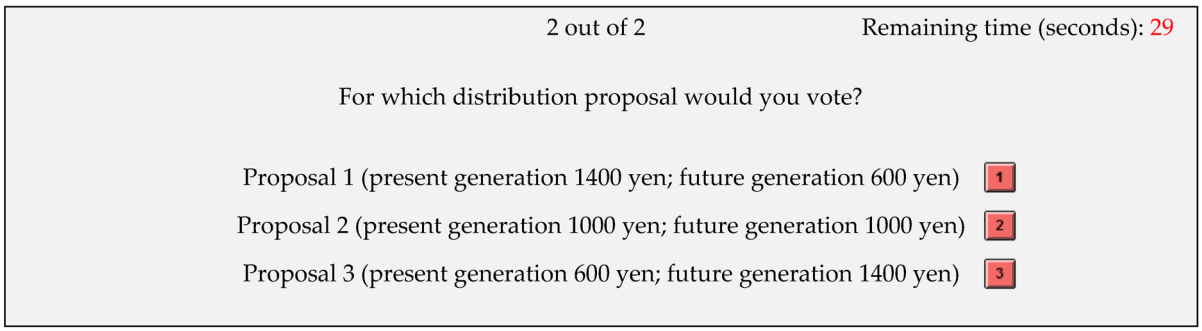

Figure A5. Decision-making screen 1 for the present generation.

The present generation's decision-making takes place on a screen, as shown above. This screen is the same as that used in Experiment 1.

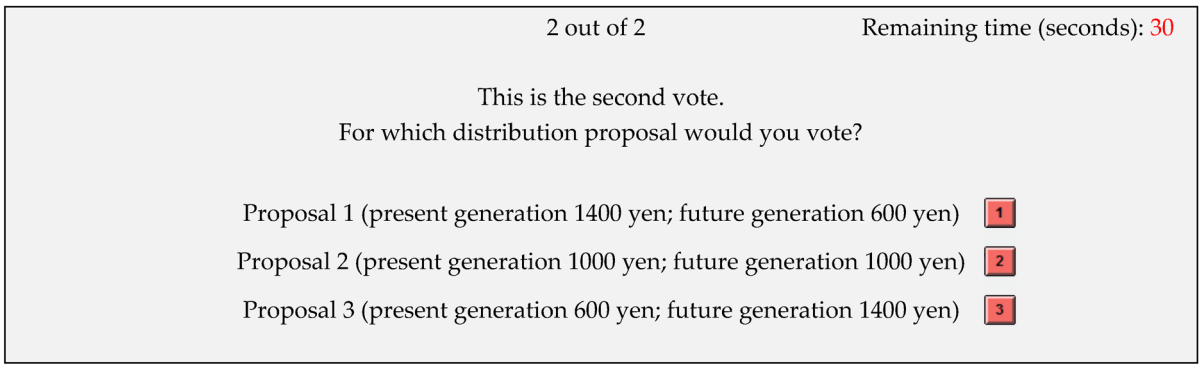

Figure A6. Decision-making screen 2 for the present generation.

The present generation with two votes casts a second vote on behalf of the future generation on a screen, as shown above. The decision-making process is the same as before.

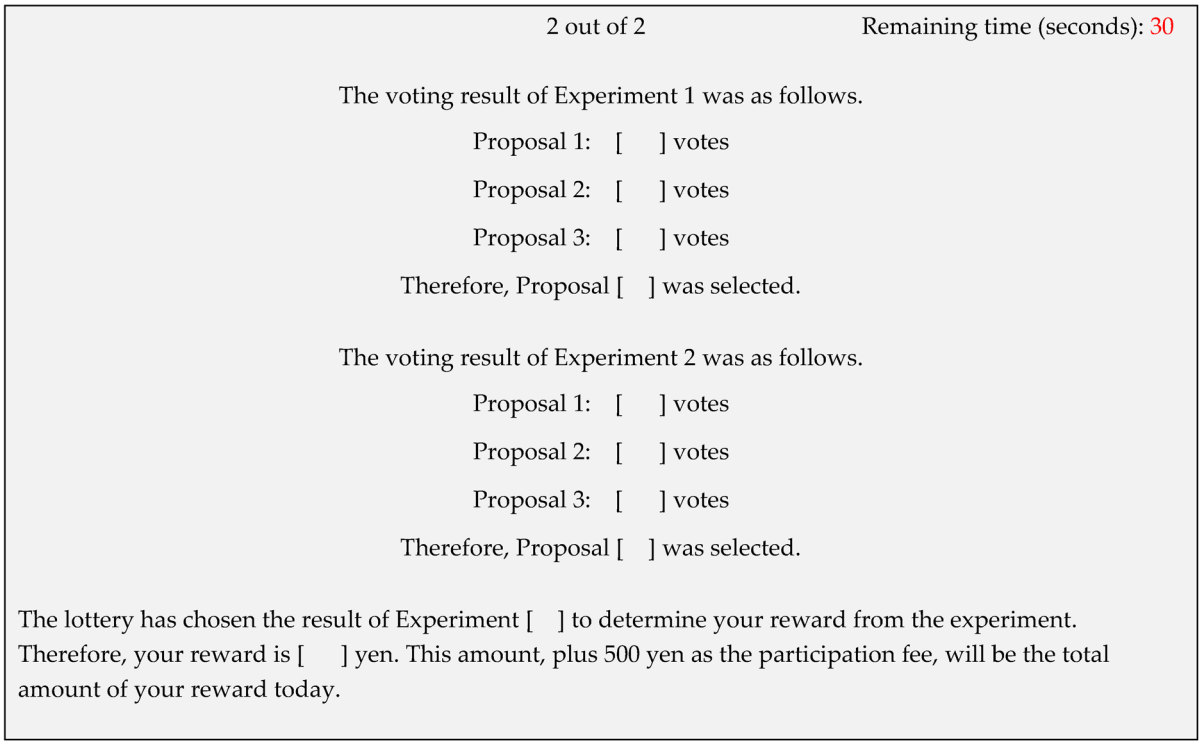

Figure A7. Result screen.

After all the selections in Experiment 2 have been made, the voting results for Experiments 1 and 2 are displayed as shown above. It also shows the result a computer lottery has selected to determine your reward. The final reward for the experiment, including the 500-yen participation fee, will also be displayed.

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