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Accountability and righteousness

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Accountability and righteousness

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Abstract

Winners behaviors toward losers are important determinants for evolution of fairness and inequality in societies. However, little is known about how inequality arises from the status quo of equality and winners righteously act to losers. This research considers the accountability, investigating the question “how asking people to be accountable for decisions influence their behaviors toward losers as they are winners by chance?” and the hypothesis “being accountable induces winners to behave righteously to losers.” We institute the control winner’s righteousness game (WRG) in a group of three subjects with equal endowments and conduct a laboratory experiment with 297 subjects, consisting of three steps. First, each subject decides how much to take endowments from losers as she is a winner. Second, a lottery determines whether she becomes a winner or a loser. Third, she takes the endowment from each loser following her decisions in the 1st step if she is a winner. Otherwise, her endowment shall be taken by each winner. Two additional treatments are prepared: (i) intragenerational accountability (IAA) and (ii) intergenerational accountability (IRA). Every subject is asked to be accountable for her “take” decisions, providing the reasons and advice to unknown others that will play WRG later as the same generation in IAA and as the subsequent generations with a generational lineup in IRA. Results indicate that IAA and IRA affect subjects not to take endowments from losers as compared to the control, and the “take” reduction in IRA is twice as much as that in IAA. Overall, when people are held accountable for their decisions across generations they righteously behave to enhance both intragenerational and intergenerational fairness.

Keywords: Righteousness; Intragenerational accountability; Intergenerational accountability

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Nomenclature

ESG	Environmental, social and governance
ETs1	Endowment takes in the case of one winner
ETs2	Endowment takes in the case of two winners
IAA	Intragenerational accountability
IRA	Intergenerational accountability
IS	Intergenerational sustainability
JPY	Japanese yen
OLS	Ordinary least squares
SVO	Social value orientation
USD	US dollar
WRG	Winners righteousness game

1 Introduction

Nearly all men can stand adversity but if you want to test a man’s character, give him power, this is the supreme test (Ingersholl, 1895). The assertion suggests that individuals possess an incentive to abuse their power and this can have far-reaching effects on societies (Vredenburg and Brender, 1998). Often, the exercise of power leads to a few entities misusing various resources, resulting in inefficient and/or unfair situations (Fearon, 2004, Powell, 2004, Lancet, 2006). Such misuse of power can also be considered the causes of many social problems, such as corruption, inequality and conflicts, and there are many real-world examples of how those who have power to prodigiously make decisions affect powerless people and a whole economy (Sidanius and Pratto, 2012, Jetten et al., 2017). Such powerful or powerless people can be interpreted to get determined as “winners” or “losers” by chance from the status quo of equality due to the capitalist narrative that has been posed by societies (Gupta et al., 2002, De Nardi and Fella, 2017, Frank, 2016, Alvaredo et al., 2017). As a consequence, how winners behave towards losers can be a reflection of candor in a society, being important determinants for evolution of fairness and inequality (Williamson, 2008, Hossain and Ali, 2014, Burns, 2017). It is for this reason that this paper experimentally examines how inequality arises from an original situation of equality and winners behave “righteously” towards losers.

Decision making of winners towards losers is influenced by their valuation of what is considered just or fair (Konow, 1996, Nowak et al., 2000, Butler et al., 2011). The concept of fairness or righteousness in winner-loser settings is studied in economic literature, and there are some examples that emulate winners’ regards and behaviors for losers in experimental economics, such as dictator and solidarity games (Schotter et al., 1996, Bolton et al., 1998, Selten and Ockenfels, 1998, Camerer, 2003, Schurter and Wilson, 2009, Engel, 2011, Forgas and Tan, 2013, Konow et al., 2020, Grech et al., 2022, Cartwright and Thompson, 2023, Goerres and Eicheler, 2025). A laboratory experiment conducted by Servátka (2010) investigates the influence of information regarding a paired subject’s prior actions on individual behaviors within a non-strategic context of a dictator game, revealing that, on average, dictators allocate more funds to recipients known for their

generosity compared to those lacking a reputation. Ouyard et al. (2025) examines the preferences of Indian farmers concerning surface water allocation by employing a dictator game in lab-in-the-field experimental contexts. Their findings indicate that participants prefer to provide less water to downstream farmers than to upstream ones, and that effective water allocation behaviors can be elicited by altering the choice architecture, namely through loss framing.

In solidarity games, Selten and Ockenfels (1998) investigates how “probabilistic winners” give their money to “probabilistic losers” in a three-person laboratory setting.¹ This game incorporates a motivational aspect of confidence in reciprocity, distinguishing it from the dictator game. The majority of individuals are inclined to offer significant conditional donations to losers if they are winners by chance, taking into account educational, gender, and false consensus effects. A study by Oliveira et al. (2014) examines voluntary informal risk sharing through a graphic representation of the solidarity game designed for low-literacy people in field experiments including low-income participants in Texas. Their findings reveal much greater instances of “fixed gift to loser” behavior and less “egotistical” behavior compared to earlier studies. While the dictator and solidarity games demonstrate “giving behaviors” by winners to losers, limited number of papers study the “taking behaviors” that can mirror the winner-take-all societies (Frank and Cook, 1995, List, 2007, Bardsley, 2008, Dreber et al., 2013, Korenok et al., 2014, Flage, 2024).

Accountability, which entails providing justifications for one’s acts, can affect both the content and manner of individuals’ thinking, potentially diminishing decision makers’ vulnerability to many prevalent judgment and choice errors (Simonson and Nye, 1992, Konow, 2000, Salisbury et al., 2022, Scobie et al., 2025). The accountability principle asserts that the extent of equitable distributions is contingent upon the relevant variables subject to individual influence (e.g., action-work effort) while those beyond individual control (e.g., congenital physical disabilities) are often excluded from consideration (Konow, 2000). As part of public and social communication for self-governance, “reasons” and “advice” are two crucial components of accountability (Mullan, 2000, Wagner, 2005). A lab-in-the-field experiment of intergenerational sustainability (IS)

¹In a group of three subjects, a lottery decides who becomes winners or losers, and then the probabilistic winners are allowed to give their endowments to losers.

dilemma games by Timilsina et al. (2023) investigates the efficacy of intergenerational accountability (IRA) in preserving IS, revealing that IRA encourages generations to select the sustainable option through positive reasons and advice. Gan et al. (2025) examines the influence of environmental auditing on the environmental, social and governance (ESG) performance of A-share listed Chinese businesses from 2009 to 2021, employing a multi-period double-difference model to elucidate its underlying mechanisms. Their findings indicate that post-event accountability through environmental audits can enhance corporate ESG performance for firms. Nonetheless, accountability serves as a unidirectional communication mechanism between groups for intragenerational situations and from the current generation to subsequent generations for intergenerational contexts (Timilsima et al., 2019).

Previous research has focused primarily on examining decision making of winners towards losers in various game settings through demonstrating giving behaviors of winners. Few studies have documented winners taking behaviors and studied how some interventions, such as accountability, affect people to act righteously to losers as they are winners by chance. Some present research have extended a grate potential of accountability to boost adherence and people thinking through reducing decision errors (Salisbury et al., 2022, Timilsina et al., 2023). In this study, we focus on examining the possible impacts on winners behaviors towards losers by accountability interventions as an laboratory experiment because the winner's righteousness will characterize how good the society or organizations are. Therefore, we pose a question "how asking people to be accountable for decisions influence their behaviors toward losers as they are winners by chance?", hypothesizing that being accountable induces winners to behave righteously to losers. We design and institute the control winner's righteousness game (WRG) in a group of three subjects with equal endowment and conduct a laboratory experiment with 297 subjects in Japan, examining the impact of two treatments on subjects endowment taking behaviors: (i) intragenerational accountability (IAA) and (ii) intergenerational accountability (IRA). Addressing this question and hypothesis will be beneficial for inducing winners to act righteously to losers for both intragenerational and intergenerational fairness in winner-take-all societies.

2 Methods

2.1 Experimental design and procedures

The experiments were conducted in the computerized experimental laboratories of Kochi University of Technology, Kochi Prefectural University and Kochi University. The experiments consisted of 12 sessions, each comprising 20 to 30 subjects, totaling 297 subjects. The subjects were volunteer undergraduate students from different disciplines, including economics, engineering and management. Each subject engaged in a single session lasting roughly 1.5 hours, receiving an average cumulative payoff of 2000 JPY. The subjects exhibit adequate homogeneity throughout the three treatments, characterized by comparable age ranges and a balanced male-to-female ratio, hence providing consistency among the experimental groups. Each session is split into three parts. The 1st part entails participating in a social value orientation (SVO) game. The 2nd part is a winner's righteousness game (WRG). The 3rd part comprises a questionnaire survey that gathers sociodemographic data. The 1st and 3rd parts are identical across all sessions. The 2nd part differs by sessions, each randomly allocated to one of the three treatments: control WRG, intragenerational accountability (IAA) and intergenerational accountability (IRA). Each treatment comprises four sessions, with the fundamental techniques in each session adhering to prior literature, including Selten and Ockenfels (1998) and Timilsina et al. (2023).

An SVO game classifies each subject's social viewpoint as altruistic, prosocial, individualistic or competitive types (Van Lange et al., 1997, 2007, Brosig et al., 2011, Carlsson et al., 2014, Sutters et al., 2018). A "slider method" is utilized to evaluate how subjects prioritize their advantages relative to others (Borghans et al., 2008, Murphy et al., 2011). Figure 1 indicates that subjects reply to six aspects, each providing nine alternatives for allocating points between themselves and an anonymous partner. Each subject selects one alternative for each item by marking a line at the spot that signifies her desired allocation. The average distributions for the subject $\bar{A}_s$ and the partner $\bar{A}_p$ are calculated from all six aspects. Then, 50 is deducted from $\bar{A}_s$ and $\bar{A}_p$ to reposition the origin of the resultant angle to the center of the circle (50, 50). The SVO index of a subject

Figure 1: Instructions to measure social value orientation (SVO) by the slider method

Instructions

In this task you have been randomly paired with another person, whom we will refer to as the **other**. This other person is someone you do not know and will remain mutually anonymous. All of your choices are completely confidential. You will be making a series of decisions about allocating resources between you and this other person. For each of the following questions, please indicate the distribution you prefer most by **marking the respective position along the midline**. You can only make one mark for each question.

Your decisions will yield money for both yourself and the other person. In the example below, a person has chosen to distribute money so that he/she receives 50 dollars, while the anonymous other person receives 40 dollars.

There are no right or wrong answers, this is all about personal preferences. After you have made your decision, **write the resulting distribution of money on the spaces on the right**. As you can see, your choices will influence both the amount of money you receive as well as the amount of money the other receives.

Example:

You receive	30	35	40	45	50	55	60	65	70	
	----- ----- ----- ----- ----- ----- ----- ----- -----									
Other receives	80	70	60	50	40	30	20	10	0	

You 50

Other 40

1

You receive	85	85	85	85	85	85	85	85	85	
	----- ----- ----- ----- ----- ----- ----- ----- -----									
Other receives	85	76	68	59	50	41	33	24	15	

You

Other

2

You receive	85	87	89	91	93	94	96	98	100	
	----- ----- ----- ----- ----- ----- ----- ----- -----									
Other receives	15	19	24	28	33	37	41	46	50	

You

Other

3

You receive	50	54	59	63	68	72	76	81	85	
	----- ----- ----- ----- ----- ----- ----- ----- -----									
Other receives	100	98	96	94	93	91	89	87	85	

You

Other

4

You receive	50	54	59	63	68	72	76	81	85	
	----- ----- ----- ----- ----- ----- ----- ----- -----									
Other receives	100	89	79	68	58	47	36	26	15	

You

Other

5

You receive	100	94	88	81	75	69	63	56	50	
	----- ----- ----- ----- ----- ----- ----- ----- -----									
Other receives	50	56	63	69	75	81	88	94	100	

You

Other

6

You receive	100	98	96	94	93	91	89	87	85	
	----- ----- ----- ----- ----- ----- ----- ----- -----									
Other receives	50	54	59	63	68	72	76	81	85	

You

Other

7

is calculated as $SVO = \arctan \frac{(\bar{A}_p) - 50}{(\bar{A}_s) - 50}$. According to the SVO indices, social preferences are classified as altruistic ($SVO > 57.15^\circ$), prosocial ($22.45^\circ < SVO < 57.15^\circ$), individualistic ($-12.04^\circ < SVO < 22.45^\circ$), and competitive ($SVO < -12.04^\circ$). This study classifies “altruistic” and “prosocial” kinds as “prosocial” subjects, whereas “individualistic” and “competitive” types are labeled as “proself” (see Murphy et al., 2011).

In the laboratory WRG game, we adhere to the fundamental design and procedures established by Selten and Ockenfels (1998). We implement the control WRG in a group of randomly assigned three subjects, consisting of three steps. First, each member in a group have 1000 points as endowments and decides how much to take endowments from losers as she is a winner. In decision making, she considers two situations: (i) endowment takes in the case of one winner (ETs1) and (ii) endowment takes in the case of two winners (ETs2). Second, a lottery determines whether she becomes a winner (with an probability of $2/3$) or a loser (with an probability of $1/3$). In the lottery, each member must role a dice and research assistants record the outcome, i.e., winner or loser. The rule is that numbers one, two, three or four win, while five and six lose. Third, each member in the group takes the endowment from each loser following her take decision in the 1st step, provided she is a winner. Otherwise her endowment shall be taken by each winner. If the lottery results for everyone “winner” or “loser,” in a group, there will be no take decisions, taking into account simply the initial endowment as the total points. For each group, the payoffs resulting from winning or losing are calculated for all subjects. In the game, a dominant strategy or a Nash equilibrium strategy for each winner subject is to take endowment 1000 points from each loser, as it maximize her payoff, irrespective of other winner’s take decisions in a group. A Pareto optimal allocation includes any endowment takes by a winner from a loser such that increasing a winner’s take necessarily decreases the loser’s endowments. Typical Pareto optimal allocations are: (i) a winner takes all endowments from a loser (1000, 0), (ii) a winner takes nothing from a losers (0, 1000) and (iii) any endowment takes, i.e., x , by a winner from a loser, where x is an integer from 0 to 1000 ($x, 1000 - x$).

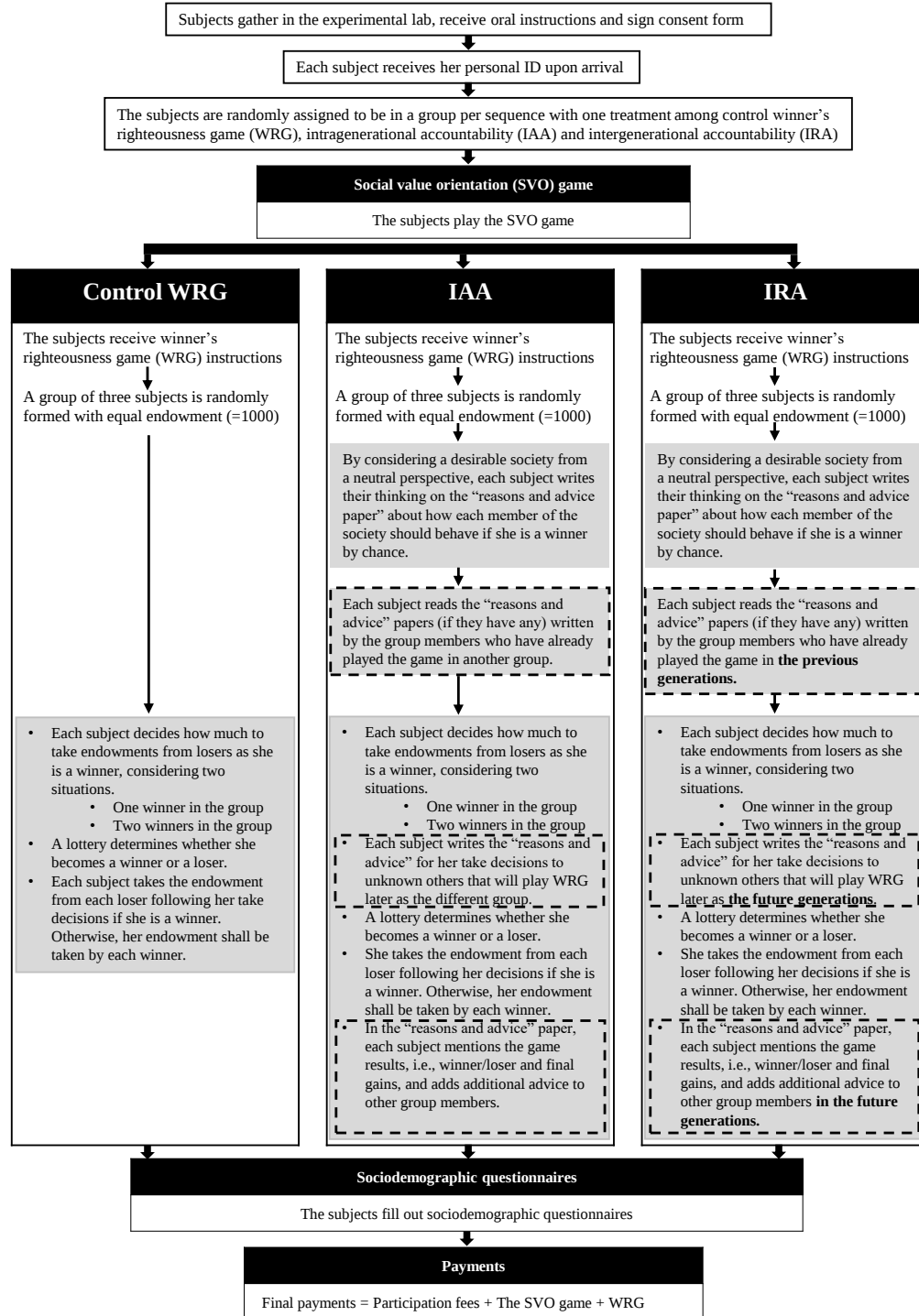
In the IAA, first, a group of three subjects in a generation is randomly formed with an equal

endowment for each (= 1000 points) after receiving WRG instructions. Second, subjects are asked to write their thinking on the “reasons and advice paper” about how each member of the society should behave if she is a winner by chance, considering a desirable society from a neutral perspective. Third, each subject read “reasons and advice papers” (if they have any) written by the group members who had previously played the game in another group. Fourth, each subject determines their two endowment take decisions: ETs1 and ETs2, and write the reasons and advice for her decision to unknown others who will subsequently engage in the game as the different group. After that each subject takes the endowment from each loser following her decisions if she is a winner from the lottery. Otherwise, her endowment shall be taken by each winner. Fifth, in the “reasons and advice paper,” each subject mention the game results, i.e., winner or loser, and final gains, while also providing additional advice to other group members.

In the IRA, after receiving WRG instructions, three subjects with an equal endowment (= 1000 points) for each are randomly assigned to form a group, referred to as a generation in a sequence. Each subject write their thinking about winner’s behaviors to losers in a society as same as IAA. However, she read “reasons and advice papers” (if they have any) written by the group members who have already played the game in the previous generations. After that each subject sets her ETs1 and ETs2, and asked to be accountable for that, providing the reasons and advice to unknown others that will play WRG later as the future generations with a generational lineup. Finally, each subject go through the lottery, take the endowment from losers (or her endowment shall be taken), and in the “reasons and advice paper,” mentions the game results and adds additional advice to other group members in the future generation.

In experiments, a subject enrolls and engages in a single session. Subjects in a session are assigned to one treatment, therefore categorizing our experiments as a between-subject design. Upon arrival at the laboratory, they are sent to computers interconnected inside a network for the exchange of information regarding their decisions, advice and payoffs with the administrative PC through z-tree software (Fischbacher, 2007). Subjects are provided with written instructions and consent form detailing the experimental procedures involved in the treatment, and they are

Figure 2: A flow chart of experimental procedures for subjects in the intragenerational accountability (IAA) and intergenerational accountability (IRA) treatments as compared to control winner's righteousness game (WRG) in one sessions



requested to sign the forms upon agreeing to participate (see the appendix A for experimental instructions). After we observe each subject's agreement, the experimenter delivers oral instructions to all subjects in that session using neutral terminologies, ensuring comprehension of each procedure without any bias. First, the subjects engage in an SVO game for approximately 20 minutes, choosing selections that indicate their SVOs. Second, the WRG is conducted, requiring a duration of 30 to 45 minutes, contingent upon the treatments. Third, following the WRG, subjects fill out the sociodemographic questions in 10 minutes. The session concludes with the disbursement of an experimental reward to each subject in the session, lasting approximately 5 to 10 minutes. Each subject receives a fixed participation fee of 500 JPY. Depending on the performance, subjects earn 300 JPY from the SVO game and 1200 JPY from WRG on average. A flow chart summarizing the experimental procedures for a session is presented in figure 2.

2.2 Statistical analyses

The experimental cross sectional data from 297 subjects are systematically organized and employed for statistical analyses, comprising ETs1, ETs2, two treatment dummies: (i) IAA and (ii) IRA, gender dummy, SVO dummy, average points taken by previous group members in the case of one (AP1) and two winners (AP2) and three reasons and advice dummies: (i) one set (RA1), (ii) two sets (RA2) and (iii) three or more sets (RA3) of reason and advice papers (see table 1 for the definitions of all variables). The median regression is used to statistically analyze the treatment effects on ETs1 and ETs2 instead of parametric mean-based regressions, when observations of ETs1 and ETs2 in the sample are deemed non-normally distributed and/or skewed. The literature asserts that median regressions are superior to parametric mean-based methods, such as ordinary least squares (OLS) regression, as they provide robust estimations against boundary values and/or outliers, particularly when the dependent variable is constrained within a specific support range, non-normally distributed and skewed (Hao and Naiman, 2007, Hirose and Kotani, 2022). We have conducted Shapiro-Wilk tests on ETs1 and ETs2 to assess their normality with a null hypothesis positing that the variables are normally distributed. The findings reject the null hypothesis for

Table 1: Descriptions of variables

Variables	Descriptions
Dependent variables	
Endowment takes in the case of one winner (ETs1)	A variable that represents the endowment take decision by each subject from losers as she is the sole winner in a group.
Endowment takes in the case of two winners (ETs2)	A variable that represents the endowment take decision by each subject from a loser as she is the one winner out of two winners in a group.
Independent variables	
Treatments (Base group = Control WRG) ^a	
Intragenerational accountability (IAA)	A dummy variable that takes 1 when a subject is in IAA treatment, otherwise 0.
Intergenerational accountability (IRA)	A dummy variable that takes 1 when a subject is in IRA treatment, otherwise 0.
Gender (Base group = female)	A dummy variable that takes 1 when a subject is male, otherwise 0.
SVO (Base group = Prosocial) ^b	A dummy variable that takes 1 when a subject is identified as prosocial, otherwise 0.
AP1	Average points taken by previous group members in the case of one winner that is mentioned in the reason and advice papers
AP2	Average points taken by previous group members in the case of two winners that is mentioned in the reason and advice papers
Reasons and advice	
(Base group = No reasons and advice paper)	
One set of reasons and advice papers (RA1)	A dummy variable that takes 1 when a subject has one set of the reasons and advice papers from previous groups, otherwise 0.
Two sets of reasons and advice papers (RA2)	A dummy variable that takes 1 when a subject has two sets of the reasons and advice papers from previous groups, otherwise 0.
Three or more reasons and advice (RA3)	A dummy variable that takes 1 when a subject has three or more sets of the reasons and advice papers, otherwise 0.

^a Winner's righteousness game (WRG)

^b Social value orientation (SVO)

ETs1 ($z = 2.87, p < 0.01$) and ETs2 ($z = 4.32, p < 0.01$). Consequently, we employ the median regressions for ETs1 and ETs2 with the specifications of equation (1).

$$Y_i^K = \mathbf{X}_i \boldsymbol{\beta}^K + \epsilon_i \quad (1)$$

where Y_i^K s are dependent variables that indicate endowment take decisions of subjects indexed by $i = 1, \dots, 297$ for $K = \{\text{ETs1}, \text{ETs2}\}$. $\mathbf{X}_i = (1, X_{1i}, X_{2i}, \dots, X_{\ell i})$ represents a vectors of $\ell + 1$ independent variables consisting of intercept, IAA, IRA, gender, prosocial, AP1, AP2, RA1, RA2 and RA3, respectively. Finally $\boldsymbol{\beta}^K = (\beta_0^K, \beta_1^K, \dots, \beta_\ell^K)$ is a vector of the coefficients associated with $\mathbf{X}_i$ to be estimated through the least absolute distance estimation method and ϵ_i is an error term. Each coefficient represents the alteration in the median resulting from a one-unit increase in a continuous (or dummy) independent variable (or from zero to one), holding other variables constant.

3 Experimental results

Table 2 and table 3 report the summary statistics of the major variables for subjects in the control winner righteousness game (WRG), intragenerational accountability (IAA) and intergenerational accountability (IRA) and overall sample. In table 2, the averages of the independent variables, i.e., gender and social value orientation (SVO), conditional on specific treatments are almost similar to the overall (unconditional) averages of taking the same variables. Considering gender and SVO, 67 %, 67 %, and 56 % subjects are male, and 57 %, 43 %, and 56 % subjects are prosocial in the control WRG, IAA and IRA, respectively. These results imply that the random assignments of the treatments through sampling processes are effective enough as initially intended. However, subjects across the different treatments had different information on the average points of one (AP1) and two winners (AP2) that is taken by previous group members, including different number of reasons and advice papers. Table 3 presents the summary statistics for two dependent variables, such as endowment takes in the case of one winner (ETs1) and two winners (ETs2).

Table 2: Summary statistics of the independent variables

	Treatments			Overall
	Control WRG ^a	IAA ^b	IRA ^c	
Gender ^d				
Average (Median) ^e	0.67 (1.00)	0.67 (1.00)	0.56 (1.00)	0.63 (1.00)
SD ^f	0.47	0.47	0.49	0.48
Min	0.00	0.00	0.00	0.00
Max	1.00	1.00	1.00	1.00
Social value orientation (SVO) ^g				
Average (Median)	0.57 (1.00)	0.43 (0.00)	0.56 (1.00)	0.52 (1.00)
SD	0.49	0.49	0.49	0.50
Min	0.00	0.00	0.00	0.00
Max	1.00	1.00	1.00	1.00
AP1 ^h				
Average (Median)	0.00 (0.00)	245.19 (0.00)	344.92 (300.00)	194.23 (0.00)
SD	0.00	328.14	278.81	285.89
Min	0.00	0.00	0.00	0.00
Max	0.00	1000.00	1000.00	1000.00
AP2 ⁱ				
Average (Median)	0.00 (0.00)	243.36 (0.00)	280.92 (216.00)	172.30 (0.00)
SD	0.00	334.48	255.82	270.89
Min	0.00	0.00	0.00	0.00
Max	0.00	1000.00	1000.00	1000.00
One set of reasons and advice papers (RA1) ^j				
Average (Median)	0.00 (0.00)	0.25 (0.00)	0.24 (0.00)	0.16 (0.00)
SD	0.00	0.44	0.43	0.37
Min	0.00	0.00	0.00	0.00
Max	0.00	1.00	1.00	1.00
Two sets of reasons and advice papers (RA2) ^k				
Average (Median)	0.00 (0.00)	0.25 (0.00)	0.09 (0.00)	0.11 (0.00)
SD	0.00	0.44	0.29	0.31
Min	0.00	0.00	0.00	0.00
Max	0.00	1.00	1.00	1.00
Three or more sets of reasons and advice papers (RA3) ^l				
Average (Median)	0.00 (0.00)	0.00 (0.00)	0.42 (0.00)	0.14 (0.00)
SD	0.00	0.00	0.49	0.34
Min	0.00	0.00	0.00	0.00
Max	0.00	0.00	1.00	1.00
Sample size	102	96	99	297

^a WRG stands for winner righteousness game^b IAA stands for intragenerational accountability^c IRA stands for intergenerational accountability^d Gender = 1, when a subject is male, otherwise 0.^e Median in parentheses^f SD stands for standard deviation.^g SVO = 1, when a subject is prosself, otherwise 0.^h AP1 stands for average points taken by previous group members in the case of one winner that is mentioned in the reasons and advice papersⁱ AP2 stands for average points taken by previous group members in the case of two winners that is mentioned in the reasons and advice papers^j RA1 = 1, when a subject has one set of reasons and advice paper, otherwise 0.^k RA2 = 1, when a subject has two sets of reasons and advice papers, otherwise 0.^l RA3 = 1, when a subject has three sets of reasons and advice papers, otherwise 0.

Table 3: Summary statistics of the dependent variables

	Treatments			Overall
	Control WRG ^a	IAA ^b	IRA ^c	
Endowment takes in the case of one winner (ETs1)				
Average	752.45	605.00	459.61	607.18
Median	1000.00	500.00	400.00	600.00
SD ^d	309.93	332.93	329.77	344.84
Min	0.00	0.00	0.00	0.00
Max	1000.00	1000.00	1000.00	1000.00
Endowment takes in the case of two winners (ETs2)				
Average	745.39	616.88	394.08	586.75
Median	1000.00	550.00	300.00	500.00
SD	322.07	348.35	322.29	360.71
Min	0.00	0.00	0.00	0.00
Max	1000.00	1000.00	1000.00	1000.00
Sample size	102	96	99	297

^a WRG stands for winner righteousness game

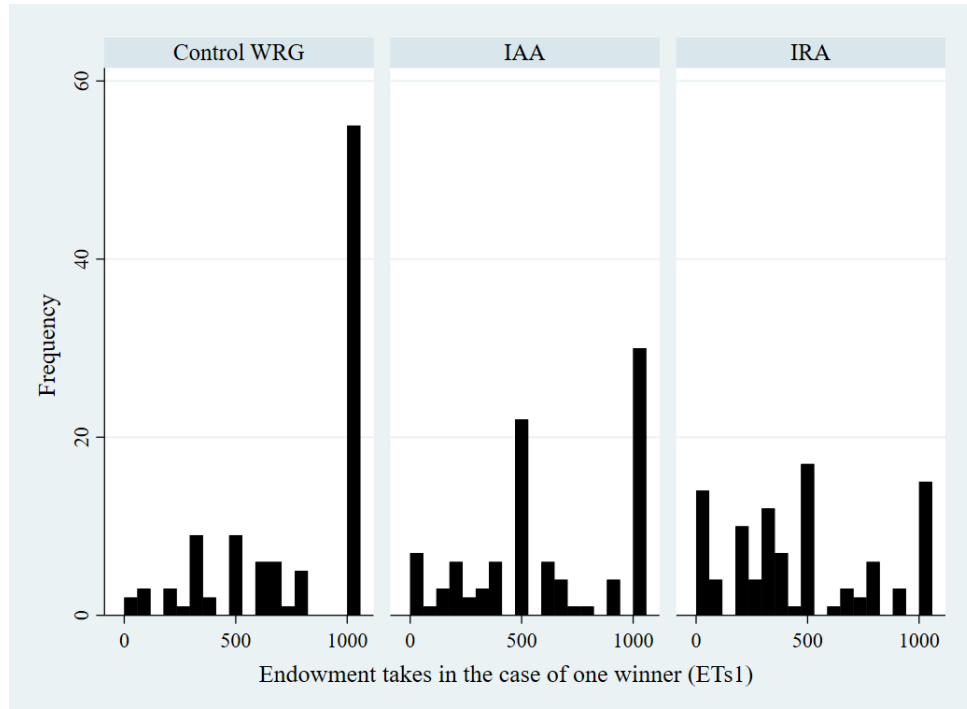
^b IAA stands for intragenerational accountability

^c IRA stands for intergenerational accountability

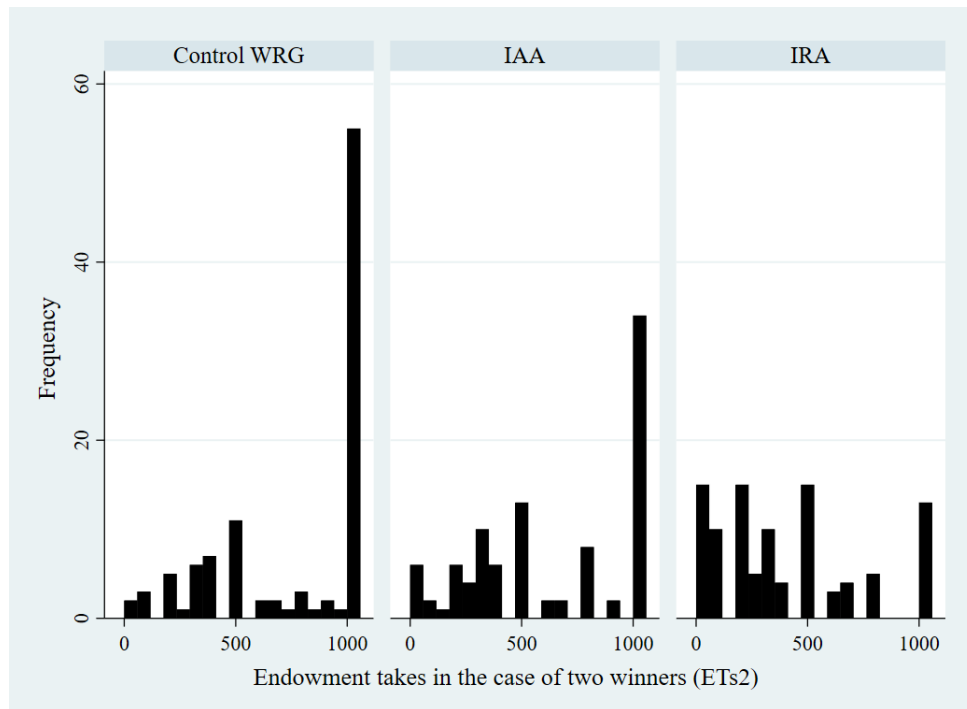
^d SD stands for standard deviation.

Subjects in the control WRG decide to take endowments 752.45 and 745.39 points from losers as she is a winner in the case of one winner and two winners in a group, respectively. However, subjects in IAA and IRA decide to take endowments 605.00 (616.88) and 459.61 (394.08) points from losers as she is winner in the case of one winner (two winners) in a group, respectively. Overall, table 3 reveals that subjects in different treatments exhibit different ETs1 and ETs2.

Figure 3 shows the frequency distributions of the ETs1 and ETs2 under the three treatments: control WRG, IAA and IRA. Figure 3a (figure 3b) demonstrates that the distribution under the control WRG is skewed to the right, as the peak of the distribution is 1000 points, indicating that a considerable portion of subjects take all endowments from losers as she is a winner in the case of one winner (two winners) in a group. On the other hand, the distribution under the IAA and IRA are close to flattened, with concentration of around 0 to 500 points. We also draw the corresponding boxplots in figure 4 for the same distributions under the control WRG, IAA and IRA, corroborating that the location parameters, such as medians and quantiles, for the ETs1 and ETs2 per subjects in the IAA and IRA treatments are generally lower than those in the control WRG. We also run a Mann-Whitney test with the null hypothesis that the distributions of the ETs1 and ETs2 per subject

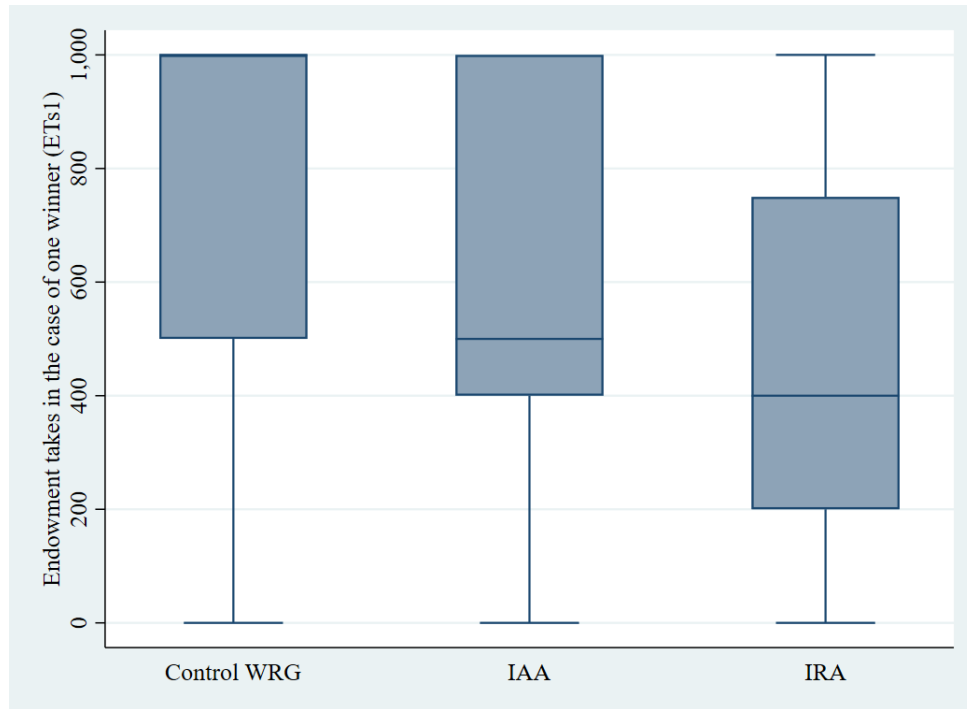


(a) Frequency distribution of the ETs1 in the treatments

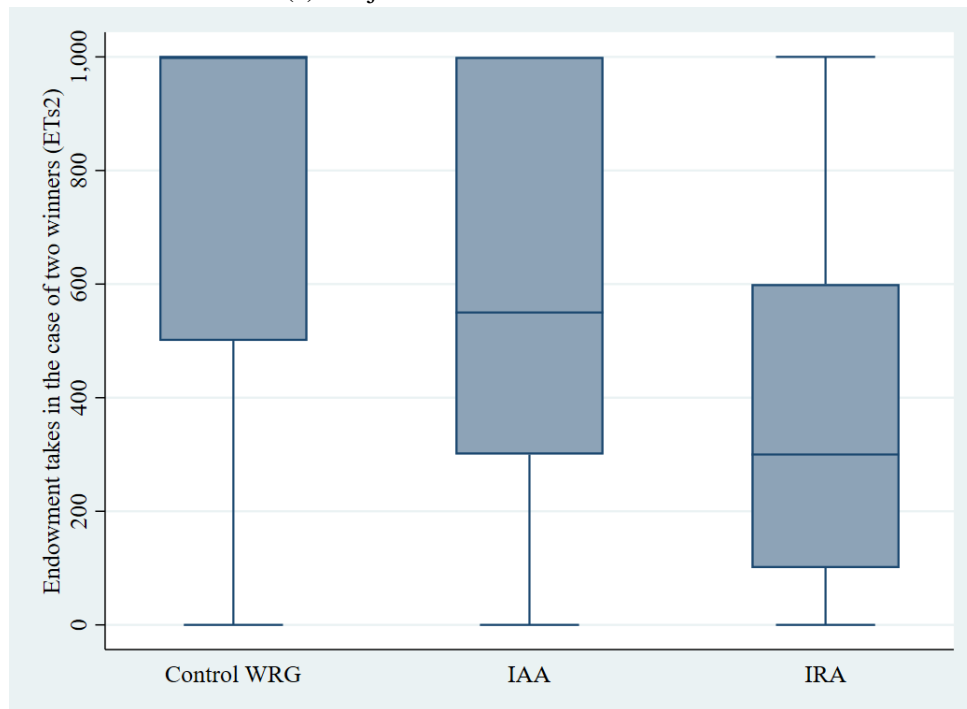


(b) Frequency distribution of ETs2 in the treatments

Figure 3: Frequency distribution of ETs1 and ETs2 in the control WRG, intragenerational accountability (IAA) and intergenerational accountability (IRA) treatments



(a) Subject ETs1 in three treatments



(b) Subject ETs2 in three treatments

Figure 4: Boxplots of endowment takes (ETs1 and ETs2) by subjects from losers as they are winners in three treatments, i.e., control WRG (winner's righteousness game), intragenerational accountability (IAA) and intergenerational accountability (IRA).

Table 4: Estimation results of median regression on endowment takes

Variables	Endowment takes in the case of one winner (ETs1)			Endowment takes in the case of two winners (ETs2)		
	Model-1	Model-2	Model-3	Model-4	Model-5	Model-6
<i>Treatment dummies</i>						
(Base group = Control WRG) ^a						
Intragenerational accountability (IAA)	-500.00*** (73.24)	-150.00*** (47.83)	-150.00** (68.62)	-400.00*** (110.90)	-100.00 (92.00)	-100.00 (64.25)
Intergenerational accountability (IRA)	-600.00*** (61.58)	-300.00*** (47.35)	-300.00*** (54.59)	-700.00*** (85.46)	-400.00*** (99.98)	-391.18*** (63.59)
<i>Control factors</i>						
Gender (Base group = Female)		200.00*** (40.57)	200.00*** (23.96)		300.00*** (50.45)	258.82*** (48.63)
SVO†(Base group = Prosocial)		300.00*** (32.87)	300.00*** (35.46)		200.00** (93.66)	250.00*** (47.01)
AP1 ^c			0.30*** (0.11)			—
AP2 ^d			—			0.47*** (0.13)
Reasons and advice (Base group = No reasons and advice paper)						
One set of reasons and advice papers (RA1)			-200.00*** (76.81)			-235.29*** (75.36)
Two sets of reasons and advice papers (RA2)			-137.50 (94.22)			-252.94*** (63.56)
Three or more sets of reasons and advice papers (RA3)			-120.00 (104.12)			-97.06 (88.34)
Sample size	297	296	296	297	296	296

Standard errors are in parentheses

***significant at the 1 percent level, **at the 5 percent level and *at the 10 percent level

^a WRG stands for winner righteousness game

^b SVO stands for social value orientation

^c AP1 stands for average points taken by previous group members in the case of one winner that is mentioned in the reason and advice papers

^d AP2 stands for average points taken by previous group members in the case of two winners that is mentioned in the reason and advice papers

between the control WRG and other treatments (IAA and IRA) are the same. The null hypothesis is rejected at the 1 % significance level, implying the significant differences in the distributions between control WRG and other treatments.

To quantitatively characterize the research question, we perform median regressions in which ETs1 and ETs2 are taken as dependent variables, and IAA and IRA are taken as an independent one along with other control factors, as described in equation (1). Table 4 reports the estimated coefficients, their corresponding standard errors and the statistical significance level of the independent variables on ETs1 and ETs2 in median regression models. Model-1 (Model-4) in table 4 contains two treatment dummies, such as IAA and IRA, as independent variables. Next, we gradually add gender dummy, SVO and other control factors as independent variables in models 2 to 3 (models 5 to 6), building upon model-1 (model-4). We mainly center on reporting the estimated coefficients of treatment dummies and some control variables, such as gender, SVO, AP1, AP2 and RA1, because they are identified to remain significant at 1 to 5 % in all models. The results reveal that male subjects tend to take more ETs1 and ETs2 by 200.00 ~ 300.00 points as compared to females. Regarding SVO, subjects who are identified as a proself take more ETs1 and ETs2 by 200.00 ~ 300.00 points as compared to prosocial. Subjects are found to increase ETs1 (ETs2) by 0.30 (0.47) points as the average points taken by previous group members increased by one point in the case of one winner (two winners) that is mentioned in the reasons and advice papers. Subjects having one set of reasons and advice papers take 200.00 ~ 235.29 points less ETs1 and ETs2 as compared to having no reasons and advice papers. Regarding treatment dummies, the estimated coefficients of IAA on ETs1 are statistically significant with a negative sign in models 1, 2 and 3. However, the estimated coefficients of IRA on both ETs1 and ETs2 are statistically significant with negative sign across all models. The results indicate that subjects under IAA tend to decrease endowment takes by 150.00 ~ 500.00 points on the median ETs1 as compared to control WRG, holding other variable constant. In IRA, subjects tend to decrease endowment takes by 300.00 ~ 600.00 and 391.81 ~ 700.00 points on the median ETs1 and ETs2, respectively, as compared to control WRG, holding other variables constant. Overall, the finding suggest that both

IAA and IRA affect subjects not to take endowments from losers as compared to the control WRG, and the take reduction in IRA is twice as much as that in IAA.

Overall, it is evident from the summary statistics that the random assignments of the treatments are effective enough (table 2) and subjects endowment takes from losers as she is a winner in the case of one and two winners in a group get different in three treatments (table 3). It also appears to be true qualitatively in figure 4. We quantify the difference across the treatments through median regressions. The estimated coefficients indicate that subjects in IRA (IAA) tend to decrease endowment takes by 300.00 ~ 600.00 (150.00 ~ 500.00) and 391.81 ~ 700.00 points on the median ETs1 and ETs2, respectively, as compared to the control WRG, holding other variables constant. These findings are robust and consistent with the results obtained from different models in table 4. The estimation results associated with ETs1 and ETs2 provide answers to our research questions (how asking people to be accountable for decisions influence their behaviors toward losers as they are winners by chance?) and support the alternative hypothesis (being accountable induces winners to behave righteously to losers) by rejecting the null. Finally, our research establishes that when people are held accountable for their decisions across generations, they righteously behave to enhance both intragenerational and intergenerational fairness.

As we progress into the twenty-first century, it becomes increasingly apparent that economic, environmental and technological transformations are transpiring globally, resulting in winners and losers (O'Brien and Leichenko, 2003, UN, 2020, Rodríguez-Pose et al., 2023). Although the potential exists for universal benefit, numerous regions, sectors or social groups are marginalized from the globalization process or experience predominantly adverse effects, such as heightened economic vulnerability and/or a diminution of political or cultural identity (Conroy and Glasmeier, 1992, Mittelman, 1996, 2000). Kapstein (2000) analyses in his review essay that globalization and trade liberalization have influenced the evolving patterns of income distribution in industrial economies. He asserts that whereas free trade produces overall economic efficiency benefits, it simultaneously reallocates the rewards to factors of production, such as labor, resulting in identifiable groupings of benefactors and disadvantaged persons, or, in other terms, winners and losers.

Furthermore, climate impact assessments consistently highlight disparities in the regional and sectoral effects of climate change, and there is an increasing acknowledgement that the execution of climate change mitigation policies generates both winners and losers (McCarthy et al., 2001, O'Brien and Leichenko, 2003, Parry et al., 2007). Frank and Cook (1995) argues that winner-take-all markets, influenced by globalization and technology, attract excessive resources and lead to wasteful spending patterns, based on the standard economic premise that the social value of a product or service is effectively measured by market willingness to pay. In this sense, our WRG represents the current environment of winner-take-all societies where each subject in a group decides how much to take endowments from losers as she is a winner by chance (i.e, lottery) and how inequality arises from the status quo of equality. The understanding of how winner-take-all markets lead to income inequality may influence societal efforts to modify market distributions for the sake of fairness (Frank and Cook, 1995). Research by social psychologists and anthropologists indicates that social learning via observation and communication fosters empathy and reduces social distance towards people from other groups (Behrens et al., 2008, Smith, 2010, Heyes, 2012). In alignment with existing literature, the one-sided communication of reasons and advice from one group to another for IAA, as well as from the current generation to subsequent generations for IRA, serves as a social mechanism that reduces social disparity and conveys shared perceptions of righteousness (Timilsina et al., 2023). Therefore, it shall be possible to argue that subjects in our experiments have righteously behaved to enhance both intragenerational and intergenerational fairness, raising sympathy and solidarity beyond self-interests by IAA and IRA.

4 Conclusion

This paper has examined the effect of the accountability on winners behaviors to losers, investigating the question “how asking people to be accountable for decisions influence their behaviors toward losers as they are winners by chance?” and the hypothesis “being accountable induces winners to behave righteously to losers.” To this end, we have implemented a laboratory exper-

iment with three treatments of “control winner’s righteousness game (WRG),” “intragenerational accountability (IAA)” and “intergenerational accountability (IRA),” for collecting data on endowment takes in the case of one winners (ETs1) and two winners (ETs2) and control factors of 297 student-subjects in three Japanese universities. The results show that both IAA and IRA induce subjects not to take endowments from losers as compared to the control, and the effect under IRA is approximately twice as much as that under IAA in magnitude. Overall, when people are held accountable for their decisions across generations, they righteously behave to enhance both intragenerational and intergenerational fairness. The novel aspects of this study are (i) to consider the accountability for analyzing winner’s righteousness to losers by conducting a laboratory experiment and (ii) to empirically identify real decisions and behaviors toward losers by winners in a game settings instead of declared intentions.

We recognize certain limitations in our research and suggest possible directions for future work. First, our study does not investigate the inner functioning of how and why IAA and IRA influences subjects motivations, decisions and behaviors on righteousness to losers. Future studies should incorporate an alternative experimental design or additional tests utilizing the psychological method and qualitative interviews to elucidate how and why IAA and IRA subjects modify their behaviors. Second, the gender effect is a compelling phenomena; nevertheless, the underlying reasons remain ambiguous. Third, in order to extend the applicability of our research findings, future studies should employ both IAA and IRA in social experiments to address several economic and social inequality issues. While we understand that our research may have other limitations, we sincerely feel that it represents an advancement in promoting winners righteousness to losers, and further studies on this topic will assist consolidate these findings.

5 Appendix

We provide (A) the experimental instructions for the winner’s righteousness game (WRG).

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