Essays on behavioural foundations of representation and leadership: Evidence from Borneo and the laboratory

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ABSTRACT

This thesis uses laboratory experiments to explore representation in social organizations. In our experimental design, we argue that the effectiveness of the representative's decision on group payoffs depends on the extent to which agency is provided by the group. In this thesis, we report three studies on representation from a behavioural perspective.

In the second chapter, we introduce a modified public good game that have the representative complementing the outcome of a collective action. The game is played sequentially, and groups members may contribute to the collective action, knowing there is a representative adjusting the benefits (multiplier) for contributions. The experiment involved participation of Sarawak's Kayan villagers and incorporated the subjects' pre-existing social status and social relationship closeness to examine the role of social status in representation. We found that social status acts as an amplifier to representative's efforts and group members' contributions.

In the third chapter, we introduced a modified sender-receiver game to examine another function of representative; that is to channel benefits to the group. An agency relationship is established between representative (sender) and group members (receivers) when a recommendation (message) from the representative is accepted by group members. As in the second chapter, we explore whether social status and relationship play any role in predicting representative's willingness to recommend public-spirited outcomes and group members' willingness to accept the representative's recommendation. We found that social status plays no role in representative's public-spiritedness, but the closeness of relationship between representative and group members legitimized the representative's recommendations.

The final chapter uses the modified public good game developed in Chapter 2 to examine representation relationship in the long run and determine whether the order of a representative's decisions have an impact on social welfare. We found higher incidences of efficiency in the simultaneous decision treatment in a pattern which is stable across time. We also found that there are reciprocal tendencies between representative and group members, resulting in the groups' decisions bifurcating towards socially efficient or no representation relationship.

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GIA	Group investment account
GM	Group members
GP	Group project
GP_O	Group project with the outside option
GP_S	Group project recommended by the Sender
GS	Session-level group status
IA	Individual account
ID	identification
IOS	Scale Inclusion of Other in the Self Scale
IP	Individual project
K-S	Kolmogorov - Smirnov
K-W	Kruskal - Wallis
M_H	High valued multiplier
M_L	Low valued multiplier
MPCR	Marginal per capita return
MPR	Marginal private return
MSR	Marginal social return
M-W	Mann-Whitney test
MYR	Malaysian Ringgit
NGOs	Non-governmental organisations
OLS	Ordinary least squares
PG	Public Good
PGG	Public Good Game
R	Receiver
S	Sender
SD	Standard deviation
TS	Traditional status

Chapter 1

Introduction

The presence of a representative within groups is ubiquitous in many social organizations. The main role of a representative is to act on behalf of the group members by advocating for the group's interest. However, most work on representation have been concentrated in the fields of political economy and political science. Buchanan & Tullock (1962) initiated the formalisation representation in terms of economic and political exchange by introducing the basis of representation and the bargaining process by a representative on behalf of voters in constitutional democracies. Their line of inquiries started with a group of individuals performing collective actions aligned with their interests, and this would then be extended to how political institutions can be shaped to maximise voters' interest or curtailed representative's public office abuses. On the other hand, studies on representation by Besley (2005, 2006) and Besley & Coate (1997) stress the importance of political selection and the qualities of representation. This strand of work on representation examined: i) the role of representative's quality, and especially her/his honesty and competencies and characteristics; ii) representative's method of selection, whether it happens at random, by heredity or through voting; and iii) the incentive structure for a citizen to propel her/himself to stand for election and become a representative.

This thesis has proposed an exploratory framework on representation using economic games. Examining representation in economic experimental games allowed the act of representation to be analysed in multiple social organizations, from grassroots and corporate organizations to labour unions. The actors in this framework consisted of: i) a representative, whose decisions affected the payoffs of the group as well as her/his payoff; and ii) the group members that provided agency or legitimacy for the representative's decision. These games would then be implemented as lab-in-the-field experiments and a laboratory experiment with student subjects. The field setting enabled this framework to examine the effects of representation (in a community with pre-existing rules and traditions) on representative's selection.

In this framework, we argue that the effectiveness of the representative depends on the extent of the agency provided by the group. Typically, the relationship between representative and group members involves conflict of interest and mutual trust. A relationship shaped by mutual trust will produce efficient group outcomes when a representative's effectiveness is matched by the group members' collective actions. On the other hand, a shirking representative will harm the cooperative group outcome for personal gain, while uncooperative group members will cause a disservice to a responsible representative. Using two new experimental games, this thesis investigates: i) representatives' trustworthiness in advocating group interests; ii) the degree to which group members trust representatives to do this; and iii) the effects of underlying social norms and social hierarchies on shaping representation and its outcomes.

This thesis reports three experiments on representation and leadership. Two experiments involved lab-in-the-field settings in which subjects were recruited from the tight-knit Kayan tribe villages in Sarawak (Borneo), Malaysia.

In Chapter 2, we explore the role of social status in representative leadership. Within a three-person group, one person was selected at random to act as the representative leader. The group played a modified public good game. In this game, the effort of the leader is complementary with the total contributions of the others. The two group members decide on contribution levels towards a public good. Before the representative decides, he/she receives information on total contribution. The representative's effort complements group members' contributions by affecting the value of the public good multiplier. This experiment involved participation of Kayan villages, and before the game was executed, villagers reported their judgements on one another's relative status dimensions and social relationship closeness. We found that villagers assigned as the group's representative behave prosocially, often at personal cost, to improve group outcomes. Although representatives were informed about group members' contributions before deciding on their effort level, we found that there was no correlation between the members' contributions and the representative's effort. Social status acts as an amplifier to the representative's effort and group members' contributions, as the most effective representation is carried out by those with high social status, while the most efficient collective action originates from higher status group members. The findings for this chapter indicate that there is a representation norm linked to social status in the Kayan tribe.

The experiment in Chapter 3 explores representatives' agency in deciding on behalf of group members. We introduced a sender-receiver agency game in which an agency relationship is established between representative and group members when the recommendation of the representative is accepted by group members. At the start of the game, every player is informed of each other's potential payoffs. Group members (receivers) are aware of the possible conflict of interest faced by the randomly appointed representative (sender), i.e. the recommendation made might be skewed in favour of the representative, and concurrently a representative knows the risk that his/her public-spirited recommendation might be rejected by suspicious group members. Similar to the experiment in Chapter 2, we incorporate Kayan villagers' judgements on each other's social status and explore whether social status differences play any role in predicting representatives' willingness to recommend public-spirited outcomes and group members' willingness to accept the representative's recommendation. We found there are more representatives were willing to engage in public-spirited representation than behaved self-interestedly. Belonging to an aristocrat family is the only social status characteristics that could explained public-spirited representations. On the other hand, closeness of relationship with the representative predicts the likelihood of group members to accept a representative's agency. The findings from this experiment contrast with the earlier experiment's findings. We argue that in the sender-receiver game, the role of the representative is similar to that of a modern representative (e.g. a village leader who negotiates with outsiders and then reports back). In the modified public good game, this role is similar to traditional forms of leadership (e.g. noblesse oblige improves collective action).

Chapter 4 examines the role of representative leader using the framework that has been set in the field in Chapter 2 but using the standard laboratory experimental methods. Using the modified public good game above, we varied the order of the representative's decision with respect to group members' contribution in three different treatments. Subjects decided for 20 rounds and feedback was provided after the conclusion of each round. The objective of this experiment was to examine whether the order of the representative's decision affects the social efficiency of public good provision. We found higher incidences of social efficiency in treatments in which the representative and group members decided simultaneously; this pattern remained stable across time. When the representative and group members chose sequentially, groups performed better when the representative chose first. There was a strong tendency for groups to converge either to maximum contribution by all individuals (both group members and the representative) or to zero contribution by all, indicating reciprocity. The complementarity nature of the representative's efforts to group members' collective action introduces a new mechanism for enhancing group level efficiency, despite declining average contribution and effort over time.

This thesis makes two important contributions. First, we use laboratory experiments to investigate two core functions of a representative, namely i) improving the outcome of a collection action; and ii) channelling benefits to those that she/he presented. Both frameworks recognize the representative as a type of leader that motivates group members to act as a collective, while acknowledging the role of group members' cooperativeness and trust towards the representative as integral in shaping social outcomes. Our framework has provided an approach towards how representation could be investigated in a social organization. We also extend on literature exploring the issue of responsibility and deciding on behalf of others in experimental and behavioural economics. Second, the implementation of two lab-in-the-field experiments in Sarawak enabled this thesis to address research questions that have implications for development policies of developing countries. This further enabled us to tie cultural and norms to the representative's selection and its relationship with group level outcome.

Chapter 2

Representative Leadership, Trust and Social Status: Experimental Evidence from Borneo

2.1 Introduction

The presence of a representative acting on behalf of a group is ubiquitous in multiple social organizations – for example: elected representatives negotiating benefits for their constituents, heads securing funding for their departments, lobbyists influencing regulators on behalf of their clients, and in developing countries, village heads lobbying for development projects, from the government and NGOs, on behalf of the villagers.

The concept of representative leadership introduced in this chapter stems from the context that there is a group of team-producers, who might be villagers, citizens or trade union members, that requires the service of a representative to act as an intermediary in an exchange with a third party to increase group-level benefits. Here, representation is a function of leadership, in which the representative jointly interacts with the 'represented' in provision of a public good despite differences in function, status, characteristics, personality or motivation among them. At any level of team production, a representative is able to influence the public good provision and derive personal benefit from it. This form of leadership has three distinguishing features: (i) the representative and group members perform differentiated tasks – external bargaining and collective action, (ii) the representative has an opportunity to extract rent from the group while the group members have opportunities to free ride from the collective action, and (iii) the relationship requires mutual trust – the group members need to trust their representative to secure the best outcomes for the group and the representative needs to trust her/his group members to produce the collective action.

But to what extent can the mutual trust between the representative and the represented emerge in public good provision? We propose that inter-individual differences within a group, specifically in social status and relationship closeness, are relevant for the effectiveness of representative leadership. As the narrative behind the selection process of representation in multiple contexts, from democratic electoral processes to within-group succession planning, relies on the prior status of the potential leader, inclusion of social status in an investigation of representative leadership is a good starting point. Furthermore, evidence from the leadership literature shows that leadership is often more effective under a leader who has a high prior status – both in current modern societies (Hogg, 2010; Jack & Recalde, 2015) and in small-scale and egalitarian societies (von Reuden & van Vugt, 2015; von Rueden et al., 2014).

We explore the mutual trust between representative and non-representative group members within a pre-existing social group that has a delineate rule in appointing official representation. The study population are made of Kayan tribe members from rural Sarawak, Borneo. Village leaders, an inherited position through traditional strata, performed the role of an intermediary between villagers and outsiders even before the presence of the modern state. Defined as a stratified and agriculturalist society by Rosseau (1990), the presence of modern state and market institutions in these villages enables villagers - even individuals from former slave strata - to acquire modern status goods, such as modern education and positions in civil services, political parties or commercial entities. The economic development experienced by tribe members in these villages also links this work to the changing nature of social status, opening up the question of whether representation would still be effective if the role of representative was taken by villagers who lack high status as defined by traditional rules. Given the geographical isolation of these tribal villages and a recent policy shock - several villages being resettled from hydroelectric dam construction – effective representation is an integral element of the development process.

Experimental investigations of leadership tend to focus on testing mechanisms to improve leaders' effects on group outcomes. A commonly investigated mechanism involves leaders acting as coordinators, using signalling and/or communication within a group to move the group's outcome closer to the social optimum (Brandts, et al.,2016; Van der Heijden & Moxnes, 2012; Loerakker, & van Winden, 2017; Potters, et al. 2007). Another mechanism works through within-group incentive structures, e.g. punishment or rewards administered by the leader towards followers (Gurerk, et al. 2009), and provision of monetary or electoral incentives to the leader by the followers (Cappelen et al. 2016; Markussen & Tyran, 2017). Lab-in-the-field experiments on leadership, particularly in developing countries, often incorporate prior status of leaders in shaping the group's outcome (Jack & Recalde 2015; d'Adda 2017; Kosfeld

& Rustagi, 2015). Our work makes a new contribution to the leadership literature by proposing representation as a type of leadership, in which the representative's task is to improve on the collective action of the group members.

The role of representation in group-decision-making has previously been examined in relation to the hypothesis that, in games between groups, there is a discontinuity in individual decision-making between when the individual acts on his/her own behalf and when he/she acts on behalf of the group. Experimental investigations include: responsibility or risk taking on behalf of group members in a stag-hunt game (Charness & Jackson, 2009); deciding on behalf of a group of trustors (trustees) in an interaction with a group of trustees (trustors) (Song, 2008), allocation decisions on behalf of passive group members in a dictator game (Song et al., 2004), and contribution decisions on behalf of group members in an inter-group public good game (Hauge & Rogeberg, 2015). The focus of previous representation experiments was on the behaviour of the representative and not the group that they represented. Our research expands the understanding of representation-based decision-making processes by investigating mechanisms by which group members' decisions can shape representatives' decisions.

The model of representative leadership outlined below describes the complementary relationship between representative and group members. There is a public good that can be produced only through contributions from group members, but for it to generate the maximum benefit for them as a group, it requires an input from the representative. In a society like the Kayan of Sarawak, representation to advocate villagers' interests was traditionally done by those from aristocracy strata. The prestige held by these aristocrats facilitated collective action from the non-representative group members and with the complementary effort from the representative, everyone benefited. Village aristocrats have played the role of representation for a very long time in Sarawak, from halting the expansion of Bruneian Empire in the 15th century to advocating villages' demand for development funds in the present day.

We explore the role of social status in driving efficiency in representation by asking villagers to rank each other privately before playing a modified public good game. In the public good game, the roles of the representative and group members are randomly assigned, enabling those from the non-aristocrat strata to act as a representative for their respective group. Irrespective of who was assigned as the representative, we found most representatives used their input to increase group-level benefits while most group members made contributions to the public good. Some representatives chose to incur some cost to increase group-level benefits despite sub-optimal contributions from the group members. Social status acts as an amplifier to the representative's input and group members' contributions; as representatives with higher status made greater effort and high-status group members made larger contributions to the public good.

The rest of this paper is organized as follows. In Section 2, we link the literatures on representation and public good provision and formally model the concept of representative leadership through a novel modification of the public good game. Section 3 connects representative leadership with the literature on social status and trust by proposing hypotheses about the effect of status in the modified public good game. Section 4 describes the experimental procedure. This procedure introduces a novel methodology of incorporating real-world social status into a lab-in-the-field experiment. Section 5 describes the findings at group and individual levels. We conclude in Section 6.

2.2 Representation and Public Good Game

An individual's role as a representative of a group or another individual has been examined in the context of other-regarding behaviour and responsibility. Works by Charness and Jackson (2009), Hauge & Rogeberg (2015), Song (2008) and Song et al. (2004) define representation as a process in which an individual makes binding decisions on behalf of others. This work looks for within-person discontinuity effects, contrasting decisions made by individuals in a self-interest framework with decisions made when acting as a representative of a group or of another person. Subjects typically make two decisions in a between-treatment set-up. In the control treatment, subjects' decisions only affect their payoff directly. For example, if she/he is a trustee in a trust game, the amount of money returned will affect the trustor and affect the subject as the trustee. In the representative treatment, if a subject plays the role of trustee, her/his decisions also have direct implications for a passive trustee(s)'s payoff. Here, the representative-trustee has agency to decide the passive trustee(s)' payoff, her/his own payoff and the payoff of the trustor.

In Song et al.(2004), a group representative is provided with an opportunity to make an allocation decision for her/his group of two, playing a dictator game with another group. In the group representative treatment, a representative-dictator represents a passive dictator who needs to divide a pot of money with a group of recipients consisting of a representative-recipient and a passive-recipient. Both representative-dictator and passive-dictator will receive the same payoff at the end of the experiment. By incorporating the role of gender differences, the study found that male subjects were less other-regarding when they decided as a group representative in contrast to when they were acting on behalf of themselves. They found no such differences among the female participants. In a follow-up work, Song (2008) examined the within-person discontinuity effect using a trust game. Subjects were assigned as either a trustor or a trustee. In the first stage they decided as an individual, then decided as a group-representative in three-person trustor or three-person trustee groups. When deciding as an individual-trustor or individual-trustee, subjects decided based on the expectations and the actual decisions of the counterpart. However, the experimenter found that for a representative-trustor or representative-trustee, their decisions were also affected by their expectations about other group members' levels of trust or reciprocity. The experimenter found that subjects in the representative mode were more likely to underestimate other group members' levels of trust and reciprocity, and ended up trusting less as a representative-trustor and reciprocating less as a representative-trustee. Results from Song (2008) & Song et al. (2004) show that when subjects made decisions as a representative, they were more likely to be self-interested, i.e. transferring less as the representative-dictator, trusting less as the representative-trustor and returning less as the representative-trustee, and this was motivated by a desire to preserve the payoffs of other members of their group. Hauge & Rogeberg (2015) extend the analysis of representation and cooperation by examining it in a public good game setting. Here contributions by individuals within a group are compared with contributions made on behalf of a three-person group with each group playing an inter-group public good game with another two three-person groups. This work found that, for males, there were no statistically significant differences between contributions made as individuals and contributions made as representatives, but female subjects contributed more as representatives than as individuals.

Another strand of literature that relates to deciding on behalf of others revolves around responsibility in risk-taking. In a work by Charness & Jackson (2009), subjects play a Stag Hunt game as an individual and as an agent in a pair. Subjects could choose Hare, the low risk option, or Stag, the risky option. Picking Stag when the other player decided on Hare would reduce the subjects' payoff. The experimenters found that when subjects were told that their decisions would affect the payoff of a passive group member, they were more likely to choose the safer option, Hare. This has been interpreted as responsibility in risk taking. Works by Pahlke et al. (2012, 2015) extend the investigation of the relationship between group-representation and responsibility under risk taking by looking at it in the framework of prospect theory. In the gain domain, subjects who bear responsibility are found to be more cautious or to exhibit greater risk aversion, while in the loss domain the effect of responsibility on behalf of others disappears. In Pahlke et al. (2012), instead of asking the representative-decision maker to make two separate decisions, one as an individual and the other as the representative of a passive recipient with same incentive structure, the experimenters required representative-decision makers to justify their decisions to the passive recipients after they had made a choice between prospects. They found that accountability produced no effect on subjects' individual choices in either loss or gain domains but found evidence that representative-decision makers opted for less risky prospects when the stakes were increased.

The concept of representation studied in this chapter is different from that used in the works listed above. We made two distinctive contributions in this aspect. First, our group members were not passive, and their decisions formed a collective action that could benefit from an involvement of the representative. Second, the representative's role was to complement group members' gain from their collective action.

Representation in this chapter is examined through a variant of the public good game (PGG). The public good (PG) provision is jointly produced by the representative and the ordinary group members. The role of the representative is to improve the groups' outcome by complementing group members' input to the PG account by adjusting the value of marginal per capita return (MPCR). At the same time, ordinary group members have the option to contribute to the PG and benefits from the leader's action.

Our experimental design also contributed to the PG literature that examined risk and uncertainty in the determination of the MPCR and subsequently its effects on the public good contribution. Our experiment has elements from Levati & Morone (2013), Stoddard (2015) and Boulu-Reshef et al. (2017) in which there is a probabilistic element involved in the determination of group-level MPCR. Levati & Morone (2013) examines contribution levels under the condition that the minimum value from probable MPCR values allows for efficiency gain and found the stochastic determination of MPCR value does not affect public good contribution. Similar work by Boulu-Reshef et al. (2017) found that uncertainty, in terms of contributors' personal MPCR and probabilistic MPCR, is not detrimental to PGG contribution. On the other hand, Stoddard (2015), using a within-subjects design, exposed subjects to PGGs with uncertain and certain MPCR values between rounds. The experiment found effects on contribution levels depending on the order of the uncertainty treatment relative to treatment that have fixed MPCR value.[1]

Group members in the experiment described below faced uncertainty in ascertaining the actual MPCR value attached to their public good contribution and they needed to trust their representative to maximize their MPCR. On the other hand, the representative has to take a risky decision if she/he chooses to act as the group's representative since her/his input produces a probabilistic MPCR value in our set-up below. The PGG described below positions the representatives and group members as suppliers of complementary inputs (*contributions* by group members and *effort* by the representative). This provides the leader with a distinct function within the group. We employ an experimental design that clearly distinguishes representation as a function of leadership. Instead of positioning the leader to move first and be followed by others in contributing to the PG, as investigated by Gächter & Renner (2014), Gächter et al. (2012) and Arbak & Villeval (2013), the sequence of our public good game happened in the following manner:

i) Ordinary group members decide simultaneously and in private their contribution to the PG;

[1] Another category of PGG experiments that have stochastic determination of MPCR values vary its values among group members, i.e. heterogeneous MPCR's values for each subject in a group. For example, Fischbacher et al. (2014) and Gangadharan & Nemes (2009) found contributions are affected when the uncertainty involved differences of MPCR values within a group.

ii) information about the group members' total contribution is conveyed to the representative; and

iii) the representative decides how much of his/her endowment to allocate to effort; the greater this effort, the higher the multiplier attached to the group members' contributions.

This PGG design incorporates the possibility of the representative extracting rent from the ordinary group members' contributions. As provision of the PG is only possible if there are non-zero contributions by ordinary members, the representative is presented with a choice between representing the group by increasing the value of the public good and free-riding on the group members' contributions. In the experiment reported by Cox et al. (2013), group earnings are significantly higher in a treatment in which everyone contributes simultaneously than in a treatment in which there is a 'boss' who makes his/her contribution after everyone else has decided on theirs. This finding is attributed to first movers' expectation that the second mover/boss will free ride and the second mover fulfilling this expectation by exploiting cooperative decisions by first movers. The main interest of this game is whether knowing that the representative can affect the return on contribution may motivate group members to contribute.

2.2.1 A Model of Representative Leadership

In a group of n players there are two types of players: group members (i) and a representative (j). Within a group of n players, $i \in \{1,2,3 \ldots, n-1\}$, and j is the n[th] player.

Regardless of their type, everyone receives the same endowment, $a = 1$. i chooses a *contribution* to the public good ($0 \leq x_i \leq 1$), keeping the remaining $1 - x_i$ for private return. j decides as a representative on behalf of the group by choosing a level of *effort* e_j ($0 \leq e_j \leq 1$) to influence the probability distribution of the public good's possible multiplier values M_L and M_H where, $M_H > M_L$. j keeps the remaining $1 - e_j$ for private return. The implemented PG multiplier M^* is M_L or M_H. The higher is e_i, the higher is the probability of M_H being M^*.

Since this PG will be implemented in small villages with non-anonymised subjects, there is no deterministic relationship between e_j and M^* to allow for credible deniability and prevent experimental spill over into the real world. The stochastic implementation of M_L or M_H also provides player *j* with a wiggle room to shirk from representing the group.

Information on the values of M_L and M_H, and the role of e_j in determining the probability of M_L and M_H occurrence is common knowledge. The probabilities of M_L and M_H are determined by positive parameters λ and e_j. For M^* to be M_L :

$$Prob\ (M^* = M_L) = \lambda + (1-\lambda)(1-e_j)\ ; \qquad 0 < \lambda < 1$$

Simultaneously for M^* to be M_H:

$$Prob\ (M^* = M_H) = (1-\lambda)e_j; \qquad 0 < \lambda < 1$$

Thus, the expected value of the multiplier $E[M^*]$ in this PG is:

$$E[M^*] = e_j(1-\lambda)(M_H - M_L) + M_L$$

The payoff function for each player *i* is:

$$\pi_i = (1 - x_i) + \frac{(\sum_i x_i)(e_j(1-\lambda)(M_H - M_L) + M_L)}{n} \qquad (1)$$

where $\sum_i$ sums over all players *i*.

And player *j*'s payoff function is:

$$\pi_j = \left(1 - e_j\right) + \frac{(\sum_i x_i)(e_j(1-\lambda)(M_H - M_L) + M_L)}{n} \qquad (2)$$

The summation of the payoffs for players *i* and a player *j* in a group form the following group payoff,

$$\pi_G = \left(n - \sum_i x_i - e_j\right) + (\sum_i x_i)(e_j(1-\lambda)(M_H - M_L) + M_L) \qquad (3)$$

The PGG is implemented in a group of three individuals (i.e. *n*=3) with one player being randomly assigned the role of player *j* and the others the roles of players *i*. The game is played in one-shot form with a sequential move; both players *i* make contribution decisions simultaneously and the sum of the contributions $\sum_i x_i$ is reported to player *j* before he/she makes his/her effort decision. The public good is shared equally amongst the three players, but (as we will show) there are differences in marginal private returns on contribution for each type.

Under certain conditions on parameter values, this public good game has social dilemma properties. Due to asymmetry of payoff functions between player j and players *i*, there may be an additional collective dilemma faced by players *i*. Multiplier values will be set under conditions that ensure social and collective dilemmas.

In the section below, we outline how these conditions are derived when *n* =3.

2.2.1.1 Marginal private returns

We partially differentiate equations (1) and (2) to arrive at the marginal private return for each player type. From (1);

$$\frac{\partial \pi_i}{\partial x_i} = -1 + (\tfrac{1}{3})(M_L + e_j(1-\lambda)(M_H - M_L)) \quad (4)$$

The marginal private return for player i is independent of x_i but has an increasing relationship with e_j. This is a departure from the standard PGG, as effort from player j influences the marginal private return each player *i* receives. For a player *i*, non-contribution ($x_i = 0$) is a best response strategy when $e_j = 1$ under *Condition A*: $-1 + \left(\frac{1}{3}\right)[\lambda M_L + (1-\lambda)M_H] < 0$, hence $\lambda M_L + (1-\lambda)M_H < 3$.

From (2), the marginal private return for player *j* is:

$$\frac{\partial \pi_j}{\partial e_j} = -1 + (\tfrac{1}{3})(\textstyle\sum_i x_i)(1-\lambda)(M_H - M_L) \quad (5)$$

For player *j*, the marginal private return on exerting effort is increasing with x_i but independent of e_j. Player j receives positive marginal private return on effort if $(\frac{1}{3})(\sum_i x_i)(1-\lambda)(M_H - M_L) > 1$. If both players i have made maximum contributions, i.e. $\sum_i x_i = 2$, return on effort is negative if $(1-\lambda)(M_H - M_L) < 3/2$. The best response strategy for player *j* is to exert no effort if this condition (*Condition B*) *is* satisfied.

Under Conditions A and B, both types of players maximise personal payoff by refraining from contributing or exerting effort towards the PG.

2.2.1.2 Marginal social returns

Using (3) above, we derive the marginal social return for the contributions of players *i* and player *j*'s effort. For each player *i*, her/his marginal social return on contribution when $e_j = 1$ is;

$$\frac{\partial \pi_G}{\partial x_i} = -1 + M_L + e_j(1-\lambda)(M_H - M_L) \quad (6)$$

The marginal social return for player *j* when $x_i = 1$ is;

$$\frac{\partial \pi_G}{\partial e_j} = -1 + (\sum_i x_i)(1-\lambda)(M_H - M_L) \quad (7)$$

From (6), a contribution of $x_i = 1$ by both players *i* is socially optimal when $e_j = 1$, if the $\lambda M_L + (1-\lambda)(M_H - M_L) > 1$ $(Condition\ C)$ From (7), effort of $e_j = 1$ will be socially optimal when $\sum_i x_i = 2$ if $2(1-\lambda)(M_H - M_L) > 1$ (*Condition D)*. If Conditions C and D are satisfied, social return is maximised when $e_j = 1$ and $x_i = 1$ for both players *i*.

2.2.1.3 Marginal collective returns on contribution

Another layer of this public good game is for the two players *i* to cooperate with one another while treating the effort of player *j* as given. Using Π to denote the sum of the payoffs of players *i*, we sum the individual payoff functions (1) into:

$$\Pi = (2 - \sum_i x_i) + [(\tfrac{2}{3})(\sum_i x_i)\ [M_L + e_j(1-\lambda)(M_H - M_L)] \quad (8)$$

We partially differentiate (8) to derive the marginal collective return from contribution;

$$\frac{\partial \prod i}{\partial \sum_i x_i} = -1 + (\tfrac{2}{3})[\ M_L + e_j(1-\lambda)(M_H - M_L)] \quad (9)$$

Equation (9) shows that the marginal collective return on contribution for both players *i* is a positive function of player *j*'s effort, indicating the complementarity of players *i* and player *j*'s decisions in this PGG. If both players as a collective expect that player *j* will not exert any effort ($e_j = 0$), it is in the collective interest of players *i* not to contribute if $M_L < 3/2$ (*Condition E*) On the other hand, if both players *i* expect that player *j* will exert maximum effort ($e_j = 1$), it is in their collective interest to contribute if $M_L + (1 - \lambda)(M_H - M_L) > 3/2$ (*Condition F*). Hence, under Condition F, it is in the collective interest of players *i* not only that they show collective trust to a trustworthy player *j* (i.e. a player *j* who will exert maximum effort) but also that each of them trusts the other to contribute to the public good.

2.2.1.4 Conditions for multiplier values selection

The conditions that need to be satisfied concerning marginal private and social returns set out the social dilemma properties in the PGG. The multipliers selected as M_H and M_L in experiment must fulfil the following conditions:

- $\lambda M_L + (1 - \lambda)M_H < 3$; (Condition A)
- $(1 - \lambda)(M_H - M_L) < 3/2$; (Condition B)
- $\lambda M_L + (1 - \lambda)(M_H - M_L) > 1$; and (Condition C)
- $2(1 - \lambda)(M_H - M_L) > 1$. (Condition D)

For the collective dilemma of players *i*, selection of M_H and $M_L$must satisfies the following conditions:

- $M_L < \frac{3}{2}$ (Condition E)
- $M_L + (1 - \lambda)(M_H - M_L) > \frac{3}{2}$ (Condition F)

The selected positive λ parameter is 0.30.[2] The probability of $M^* = M_L$ is:

$$Prob\ (M^* = M_L) = 0.30 + (1 - 0.30)(1 - e_j)\ ; \qquad 0 < \lambda < 1$$

If player *j* does not allocate effort for the group, i.e. $e_j = 0$, the probability of the implemented multiplier, M^* being M_L is 1. If player *j* allocates maximum effort on the group behalf, i.e. $e_i = 1$, the probability of $M_L$happening is 0.3 implying that effort

[2] 0.30 or 30% is selected as the value of λ parameter to ease illustration during the lab-in-the-field experiment implementation that will be elaborated in Section 4.3 later.

from player *j* could still yield sub-optimal returns for the group. The probability that $M^* = M_H$ is determined by the following function:

$$Prob\ (M^* = M_H) = (1 - 0.3)e_j; \qquad\qquad 0 < \lambda < 1$$

By refusing to allocate effort for the group $e_j = 0$, the probability of $M_H$being implemented as M^* is 0. When $e_j = 1$, the probability of M^*= $M_H$is 0.7.

For M_H, the selected value for the implementation of lab-in-the-field experiment is 2.5 and for M_L, it is 1.25. The values of M_H, M_L, and λ selected satisfiy conditions (A) to (F) above. We assume risk neutrality among subjects as the conditions A to F above are applied to monetary payoffs and not just utilities.

2.2.2 Differences between Player *j* and Players *i*

The conditions A to F for social and collective player *i*s' dilemmas show asymmetries between player *j* and players *i*.

Consider the case where $x_1 = x_2 = e_j$. From (4), if $e_j = 0$, the marginal private return for each player *i* is $-1 + (\frac{1}{3})M_L$. The marginal private return for player *j* from (5) if $x_1 = x_2 = 0$ is -1. Comparing (4) and (5) when $x_1 = x_2 = e_j = 0$, the marginal private return is higher from (4); $\left(\frac{1}{3}\right)M_L > 0$. This indicates that the marginal private return for a player *i* is higher than the marginal private return for the player *j* when $e_j = 0$.

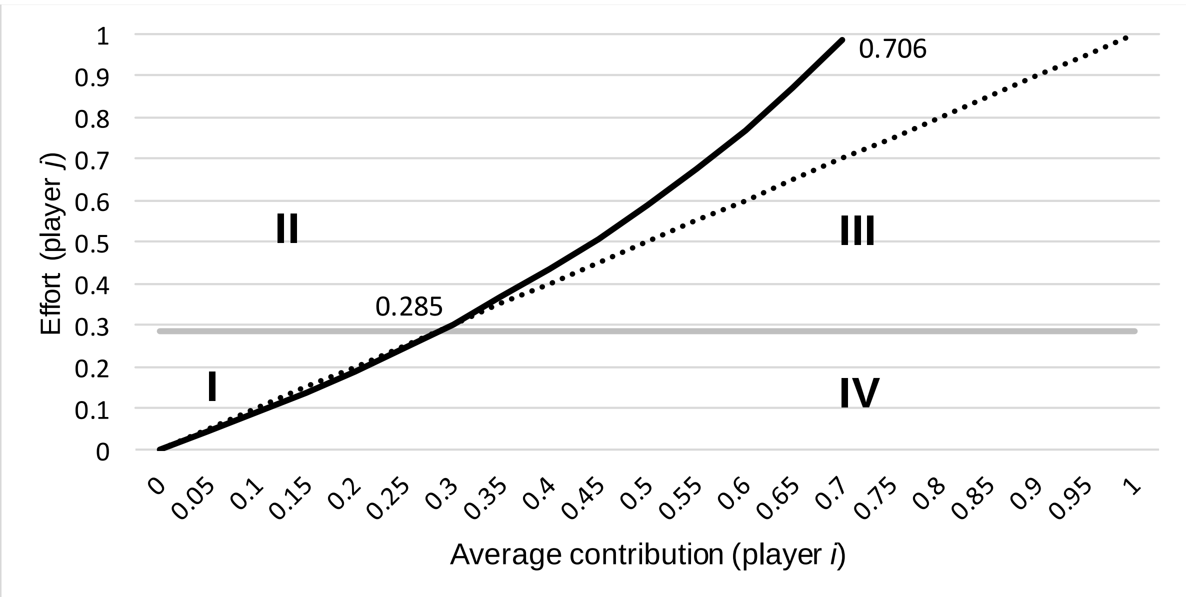
Consider now that $x_1 = x_2 = 1$ or both players *i* contribute fully to the PGG. The marginal private return for a player *i* from (4) is now $-1 + (\frac{1}{3})[M_L + (1 - \lambda)(M_H - M_L)]$. For player *j*, the marginal private return from (5) when $x_1 = x_2 = 1$ is $-1 + (\frac{1}{3})(2)(1 - \lambda)(M_H - M_L)$. Comparing the marginal private returns of (4) and (5) when there are maximum contributions and effort by others, $\left(\frac{1}{3}\right)[\lambda M_L + (1 - \lambda)(M_H)] > 0$, that player *i*'s marginal private return on contribution is higher than player *j's* when $e_j = 1$.

The marginal social return for a player *i* is $3 * [-1 + \left(\frac{1}{3}\right)[M_L + (1 - \lambda)(M_H - M_L)]] > 3$. This will result in $\left(\frac{1}{6}\right)[M_L + (1 - \lambda)(M_H - M_L)] > 0$. The marginal social return for player j is $3 * \left[-1 + \left(\frac{1}{3}\right)(2)(1-\lambda)(M_H - M_L)\right] > 3$ and this results in $\frac{1}{3} * (1-\lambda)(M_H - M_L) > 0$. Substituting the values of the values of M_H, M_L, and λ would yield a bigger marginal social return for a player *i* compared to the player *j*.

Figure 2.1 gives a graphical representation of the possible returns to players *i* and *j* relative to the Nash-equilibrium strategy benchmark in which their respective payoff equals 1, π =1, at zero contribution and zero effort by all players. To interpret Figure 2.1, we use the expected multiplier value that player *j*'s effort produces and derive payoffs for the group and everyone from these values. The probability element in multiplier determination will be incorporated in the experiment's implementation in Sarawak.

The space of the figure shows all possible combinations of effort by player *j* and average contributions by players *i*. This space is divided into regions according to the benefits received by the two types of players. A player's benefit is defined as the actual payoff they receive minus the Nash-equilibrium payoff of 1. The vertical axis refers to the effort space available to player *j* while the average contribution of players *i* is shown on the horizontal axis, i.e.$(x_1 + x_2)/2$. When discussing the figure, we will assume that both players *i* are contributing equally given their contribution space.

Figure 2.1. Possible benefits from public good based on combinations of effort and average contribution to public good



The dotted 45-degree line in Figure 2.1 represents the equality between, i) average payoff to the two players *i*, i.e. $(\pi_{i1} + \pi_{i2})/2$, and ii) the payoff to player *j*, i.e. π_j. The origin point of the graph is the non-interaction or Nash-equilibrium benchmark, in which both effort and contribution is zero. The solid black curve shows the combination of effort and contributions that result in π_j = 1, i.e player *j*'s payoff is equal to what she/he would have got in Nash-equilibrium. Player *j*'s payoff from maximum effort, π_j is 1 when average contribution, $(x_1 + x_2)/2$, is 0.706. It is the same payoff she/he would have made if she/he made zero effort and both players *i* had made zero contributions. On the other hand, the grey line represents the combination of decisions by both types of players that result in π_i = 1, i.e. the average payoff to players *i* is equal to to what they would have got in Nash equilibrium. When player *j*'s effort is 0.285, an average player *i*'s payoff π_i is 1, independent of their average contributions.

The point where the grey line and solid black curve cross marks the point at which positive effort and positive contributions produce an average payoff of the two players *i*, $(\pi_{i1} + \pi_{i2})/2$ and a payoff of player *j*, π_j, both of which are equal to 1, i.e. the payoff from exerting effort and contributing is equal to the payoff of zero effort and zero contribution. Here, player *j* must allocate 28.5% of her/his endowment as effort and both players *i* must contribute 28.5% of her/his endowment to the public good for everyone to receive a payoff that equals the Nash-equilibrium benchmark payoff.

Regions I, II, III and IV are defined by the solid black curve and grey horizontal line. If combinations of effort and average contribution fall in Region I, the payoffs for all players are less than 1. Region I is identified as a region of mutual losses, indicating that everyone is better off not engaging with the public good. For example, the average player *i* contribution is 0.1 and the effort from player *j* is 0.1. Combinations of decisions in Region II benefit an average player *i* at a cost to player *j*. An average player *i* receives a payoff more than 1, $\frac{\pi_{i1}+\pi_{i2}}{2} > 1$, while player *j*' payoff is less than 1, $\pi_j < 1$. In this region, player *j* is engaging in leading-by-sacrifice or is acting prosocially. Region III produces a mutually beneficial outcome for everyone and encompasses the area below the solid black curve and above the horizontal grey line.

On the other hand, combinations of decisions in Region IV benefit player j, $\pi_j > 1$ but at a cost for an average player i, $\frac{\pi_{i1}+\pi_{i2}}{2} < 1$.

Decision in Region III is characterised with combinations of effort and contributions benefitting both types of players beyond the Nash-equilibrium benchmark value. At the northeast point of the 45-degree dotted line is the socially optimal point.

Within Region III combinations of decisions could also result in one player type receiving bigger benefits than the other type. If decisions end up in between the 45-degree line and the horizontal grey line, the share of benefit is larger for player j compared to the average player i. On the other hand, share of benefits from the PGG is larger for the average player i than for player j if the combination of effort and contributions settles somewhere in between the solid black curve and the 45-degree line.

If the representative can be trusted to play her/his part by exerting effort at any point above the grey horizontal line, players i collectively will receive a positive return from their contributions. This covers Regions II and III. On the other hand, a representative benefits from effort as long as her/his effort corresponds with an average contribution value that is on the right side of the solid black curve. This refers to Regions III and IV. If her/his effort falls in Region III, the representative has played her/his role in the game and enhanced benefits for the group members. If her/his effort falls in Region IV, then the representative is free riding on the collective action by the group members. In the situation where players i and j match each others' decisions, their combination of decisions will end up on the 45-degree line and everyone will receive equal payoff from the public good, $\pi_j = \pi_{i1} = \pi_{i2}$.

2.3 Social status, trust and leadership

Social status that stems from social asymmetries acts as an information good. High-quality information that sets individuals apart from each other, like skills and expertise, are culturally transmitted over time, producing deference towards individuals that possess these qualities. These qualities provide individuals with privileges within their community (Henrich & Gil-White, 2001). Social status, therefore provides social information in leadership selection in traditional and small-scale societies as examined by von Rueden & van Vugt (2015) and in modern societies (Fiske, 2010). In modern societies, individuals perceived as high-status, exhibited by possession of prestigious jobs and economic success, are deemed to be highly competent, skillful and possessing more agency than the general population (Fiske, 2010). Within small-scale and traditional societies, the relationship between status and leadership is even clearer; individuals who possess advantages in verbal skill, religious knowledge, physical fitness, dense social networks, and prosocial behaviours, by themselves or by their forefathers, are found to be in leadership positions (von Rueden & van Vugt, 2015; Henrich & Gil-White, 2001; Geertz, 1963; van Vugt, 2006). Nonetheless, there are other individual characteristics, such as age, experience, gender and lineage, that can be important in determining social status, and these may be orthogonal to the possession of information and skills.

There is a link between prosocial behaviour, leadership and social status. Henrich et al. (2015) proposes a theory in which prestige promotes evolution of cooperation within a population. Individuals with high status or prestige are expected to take the lead on collective actions due to their advantageous abilities. This in turn enables high status individuals to sustain costly cooperation within a population through prosocial behaviour. Similarly, von Rueden & van Vugt (2015) hypothesise that the prosocial behaviour of high-status individuals informs leadership selection process in traditional societies. von Rueden et al. (2014) are able to confirm the link between prosocial behaviour and leadership through collective action experiments conducted among societies of forager-horticulturalists in Bolivia that are identified as small-scale, homogenous and relatively egalitarian. Leaders are found to be collaborative with followers in performing group tasks while they are also motivated to maintain their altruistic reputation by not over-rewarding themselves from the group's outcome. Leaders that possess physical dominance, have wide kin support and are deemed trustworthy are found to improve group-level performance.

The cooperative outcome that emerges from groups that have high status individuals as leaders could be attributed to norms internalized by high-status individuals and/or the social preferences of low status individuals to interact with high-status individuals. Anthropological and development works by Scott (1976) and Geertz (1963) in Southeast Asia elaborate on the duty of local-level elites, usually a landlord or an aristocrat, in providing the right to subsistence to the peasants. Scott (1976) particularly stresses the norm of reciprocity that formerly existed between the elites and the peasants. Peasants provided labour, grain and most importantly social standing to the landlords and in return the landlords had obligations to assist and protect the subsistence rights of the peasants. Local elites were found to adjust tenancy agreements during bad seasons or provide financial support for peasants for social ceremonies like births, weddings or funerals. Both works pointed to the sense of *noblesse oblige* possessed by local-level elites in ensuring that those in the lower class were able to meet basic subsistence, particularly before the presence of modern government and its related institutions. Status differences here provided moral norms guiding high status individuals' interactions with individuals of lower status. Within experimental settings, norms behind *noblesse oblige* have been explored by Fiddick & Cummins (2007) and Fiddick et al. (2013). In both works, individuals that have been artificially assigned and identified to possess high rank are found to be more tolerant to free-riding or non-reciprocation committed by low-ranking group members. In a related study using a public good game, Gong & Sanfey (2017) also found that highest-ranked individuals are more likely to be cooperative even when they have been partnered with individuals outside their social ranking.

Research that focuses on societal-wide status differences has also found that individuals belonging to high-status segments in a society have different preferences compared to non-high-status individuals. In an experiment by LeVeck et al. (2014), individuals characterised as policy elites in United States are found to be more demanding in bargaining decisions compared to student subjects. They are also found to favour more equitable outcomes by initiating high offers as a first movers and rejecting low offers as second movers in an ultimatum game. Subsequently, in an experiment investigating distributive preferences, Fisman et al. (2015) found the elites in the United States, sampled from Yale Law School students, are more likely to prefer efficiency over equality, and self-interest over fair-mindedness compared to subjects drawn from the more representative American Life Panel. With respect to redistributive preferences, Barr et al. (2015) found that subjects who are economically employed and students who classified themselves coming from high- or middle-income economic background were more likely to acknowledge entitlements originating from effort and productivity than those from lower income backgrounds.

These researches indicate that even in modern society, high status individuals behave differently than individuals with lower status.

High-status individuals are expected to justify their positions in the society by being generous to others, indicated by *noblesse oblige* found in contexts where there is clear identification of individuals in high and low ranks. At the same time, the socialization of high-status individuals with each other is shown to promote certain types of preference. It is expected that high-status villagers that have been randomly assigned to the role of representative leader will show different behaviour than representatives originating from lower status groups. For example, since the role of representation in our sampled population has always been conducted by members of aristocrat families, it is expected that there will be differences in representative leadership when it is conducted by individuals from non-aristocrat background.

HYPOTHESIS 1: Effort has a positive relationship with a representative's status. High level of effort is expected to be exerted by representatives with high social standing and privileged positions.

On the other hand, high-status individuals are commonly observed by group members, including their prosocial behaviour. Henrich & Gil-White (2001) describe this as infocopying, a process where groups acquire information from high-status individuals through imitation, influence or emulation. Qualities possessed by high-status individuals from expertise, wisdom or even wealth produce freely conferred deference from those of lower status. The role of imitation from high status subjects has been investigated by Kumru & Vesterlund (2010), d'Adda (2017) and Eckel et al. (2010). Kumru & Vesterlund (2010) found that artificially generated high-status subjects' contributions were likely to be mimicked by low-status followers. This resulted in higher payoffs for groups that had high-status players contributing first since the subsequent low-status followers mimicked the high-status leader. d'Adda (2017), through a public good game, provides further evidence on mimicking by recruiting villagers in Colombia as experimental subjects. High-ranked subjects contributed more to the public good than lower ranked subjects and over several rounds, lower ranked subjects mimicked high-status subjects' contribution levels. This resulted in high and stable cooperation. On the contrary, Eckel et al. (2010), using PGG, found no evidence of differences in average contributions across status. The authors pointed that ordinary subjects did take cues from high status subjects' initial decisions; but this did not translate to mimicry or influence since the high-status subjects did not do enough.

Mimicking real-world representation by high-status villagers could provide a potential explanation of a representative's exerting effort. This effect would be even stronger if a representative is matched with group members with higher status than the representative. By exerting effort when faced with one or two high-status group members, the representative would mimic decisions made by the real-world representative as a way to reinforce the norms of reciprocity between high and low status villagers. Under the norm of deference, a high level of effort from the randomly assigned representative could possibly serve as a way to confer status to the high-status group members as she/he would feel that this is the expected decision to be made if the high-status individuals were making it.

HYPOTHESIS 2: Effort has a positive relationship with contributors' status. High level of effort is expected from a representative leader assigned with high-status group members.

Contribution to the public good in the model above signifies an act of trust from the group members or players *i* towards the representative with the aim of generating social benefits. Trust is involved because the representative could free ride from the contributions by not exerting effort. Social position within a community could play a role in trusting behaviour. Barr et al. (2009) investigate individuals' willingness to risk trusting in order to facilitate benefits from trustworthy behaviours, taking account of subjects' standings in their social network. Orma villagers from Kenya were asked the following questions, "Who do you usually talk to about any kind of problem in this village?" A social network is then constructed based on the villagers' responses in relation to individuals that live in the village or other neighbouring villages. The ability to maintain reputation as a trustworthy individual in the society increases the likelihood that a person occupies a critical network position, e.g. as a social and political entrepreneur. Using a trust game, the authors are able to link trust and trustworthiness behaviours with subjects' positions in social networks, in which high levels of trust and trustworthy are positively correlated with network centrality. The trust and trustworthiness behaviours of individuals in privileged positions (through network centrality or belonging to high-status demographics) are the results of repeated willingness to risk vulnerability for higher return. In a related study that did not prime status differences, Hong & Bohnet (2007) documented trusting decision using demographic characteristics. Here, trust is framed as subjects' willingness to accept vulnerability, via i) willingness to accept the risk of being worse off than if one had not trusted, ii) willingness to accept being worse off than the trusted partners, and iii) willingness to accept the risk of being betrayed by the trusted party. In their experiment, subjects from demographic backgrounds that are associated with high status - men, Caucasians, Protestants, middle-aged - are found to not trust others, just like subjects from low-status backgrounds. However, the motives of distrust by high-status individuals stemmed from fear of being betrayed and not from concern about payoff differences.

Trusting behaviour by high-status individuals is expected to be driven by their drive to maintain their reputation in the community. At the same time, fear that a second mover might betray them, by not exerting effort, might make high-status individuals not contribute to the PG. The context of the experiment becomes integral here when examining the behaviour of the contributors as the first-movers. In small communities like the Kayan, the desire to maintain reputation as a trusting and/or prosocial individual in the community might offset the fear of betrayal.

HYPOTHESIS 3: Contributions have a positive relationship with contributors' status. High contribution level is expected from contributors with high social standing and privileged position.

Other things being equal, it is possible that group members make higher contributions when they are assigned to a high-status representative. On the part of the first mover, high contribution signals trust towards the representative. If there is an established norm in a village that ordinary villagers should trust their village leaders to represent their interests when dealing with outsiders, contribution levels might reflect this norm. A high-status representative is trusted and expected to exert effort, and contributors are expected to contribute in deference to the leader's status.

HYPOTHESIS 4: Contributions have a positive relationship with the representative's status. A high contribution level is expected when a group member is assigned to a high-status representative.

This PGG is implemented in small, rural and isolated villages in Sarawak. Within these villages, coordination and cooperation on collective actions are common among the villagers in non-anonymous settings, especially since houses in a village are arranged closed to each other. A picture of a typical housing arrangement among Kayan tribes is shown in Figure 2.18A of the Appendix. Naturally in these types of villages, there are variations in social relationships among its populace. Layered with stratification of social status and proximity of housing arrangement, social closeness is an ingredient that facilitates communal activities and solidarity among the villagers during hard times. Perceived social closeness has been examined as a mediator in facilitating cooperation and altruism in modern and traditional societies by Booysen, et. al (2018), Curry et. al (2013), Gächter et.al (2017), and Hackman et al. (2017). Booysen et al., (2018) investigate whether there are kinship and friendship premia among South African students as subjects. Subjects were told to list the 100 people closest to them in their world with the person occupying number 1 as the dearest friend or relative and the person at number 100 as a mere acquaintance. Using the social discounting task, subjects need to select an option from each of the ten choice tasks given to him. In each choice task, a subject could send money to an individual listed in the previous task or keep the money for her/himself. Altruism was measured as the amount of money the subject was willing to forego to give a fixed amount to a targeted person. This experiment found that there are altruism premia linked to kinship and friendship. The strongest effect was found among listed individuals categorised as partner, parent, siblings and friends. One way to elicit the closeness relationship within a social context is by using the Inclusion of Other in the Self Scale (IOS Scale) developed by Aron et al. (1992) and later evaluated by Gächter et al.(2015). Other things being equal, the perceived closeness of relationship among villagers would translate into experimental results.

HYPOTHESIS 5: Effort levels a have positive relationship with the representative's social closeness to the group members. A high effort level is expected when a representative leader assigns a high social closeness score to one or both group members.

HYPOTHESIS 6: Contribution levels have a positive relationship with a group member's social closeness to the representative leader. A high contribution level is *expected when a group member assigns a high social closeness score to the representative.*

HYPOTHESIS 7: Contribution levels have a positive relationship with a group member's social closeness to her/his co-group member. A high contribution level is expected when a group member assigned a high social closeness score to his/her co-group member.

A representative can choose how much of his/her endowment to keep and how much to use to improve the probability distribution of the implemented multiplier. Since this is a sequential PGG in which group members move first, it is possible that a representative exerts effort as a way to reciprocate contributions made previously. For example, if the representative finds that on average both group members have allocated four tokens to the Group Project, she/he might also allocate four tokens as effort. More generally, representatives might be willing to make more effort when total contributions are greater. Because of the marginal private and social returns of effort increase with contribution from group members, a representative's preference for reciprocity is not the only possible explanation for exerting effort. An increase in marginal social return to effort would also increase representative willingness to exert effort even if the representative was altruistic.

HYPOTHESIS 8: Effort has a positive relationship with contributions.

2.4 Experimental Design, Procedures and Field Settings

Our experimental session design reflected our research question. Sessions were conducted in seventeen close-knit rural villages in Sarawak. Each session required nine participants. Recruitment was done with the assistance of the village's community council, with the aim of ensuring a representative mix of participants[3]. Experimental sessions were conducted in each village in a closed venue[4]. Each session lasted approximately two hours.

[3] Councils were asked to ensure that in each session: i) there was at least one member from aristocrat strata, ii) there was balanced participation of female and male, iii) every subject had the ability to comprehend the local Malay dialect (the market language) and frequently made financial decisions, iv) no two or more subjects came from the same household, v) there were representative subjects from every communal block, and vi) recruited subjects were above 18 years old. Councils in most villagers could deliver on this but there were several exceptions, e.g. sessions that coincided with a death of an aristocrat in a neighbouring village and a funeral preparation in the village.
[4] Locations used included village meeting rooms, village homestays and chiefs' residences.

Before a session started, the experimenter was required to obtain written consent from the nine participants. After that, each participant was randomly assigned to a numbered chair that served as her/his identification (ID) number during the session. The participants were positioned in full view of each other during the session (see Figures 2.19A and 2.20A in the Appendix). They were then told that this was a group activity for a research project, and they needed to respond on cue to the instructions provided by the experimenter.

Sessions were structured into four parts. In Activities 1 and 2, participants were told they needed to provide responses to the experimenter's questions by writing on sheets of papers provided[5]. Activities 3 was devoted to the implementation of the modified public good game described in Section 2. In Activities 4, villagers answered questions about themselves in private with an enumerator. At the start of every part, villagers were reminded that their actions and decisions were private and would not be revealed to other villagers[6]. Table 1 below provides an overview of the session structure.

Table 2.1. Overview of experimental design

Activity 1	Social Closeness & Social Status Elicitation *(randomized order)*
Activity 2	
Activity 3	One-shot Public Good Game with Disclosure of villagers' roles and identities
Activity 4	Socio-economic Survey

Anonymity was not implemented in this experiment, as participants' perceptions of each other's actual social status was integral to the design. Un-incentivized social elicitation exercises were implemented in Activities 1 and 2, in which subjects reported their relative perceptions about themselves and each other. This experimental design

[5] Participants received pencil and eraser to conduct the elicitation tasks.
[6] Participants' names were only used in recruitment process, consent form and payment receipts. The documents with participants' names were not linked to participants' numerical identifiers in the session.

incorporates the villagers' perception of status defined by modern and market standards, as they have information on each other's status-relevant behaviours.

The elicitations were designed to measure; i) subjects' social status in a form of group-level positional ranking, and ii) social closeness. Participants' answers on the social elicitation sheets were private and they were told not to share their answers with other participants[7]. The elicitations were un-incentivized as this paper is interested in local hierarchy and closeness levels constructed based on participants' perceptions. The constructions of the local hierarchy happened under full disclosure of participants' identities based on Frank (1985) & Heffetz & Frank's (2011) requirement that social status needs to be socially visible. Our approach is similar with Barr et al. (2009) in which the social metrics of the subjects in the experiment were reported before the decision stage and the information was not used to design treatments in the experiment. This approach contrasts with that used in many experimental investigations of status by focusing on general characteristics of actual (i.e. outside the lab) social status as reported by subjects in private within a session, rather than by constructing a commonly observable status for experimental purposes within a specific context[8]. In our experiment, subjects have no information on their relative status perceived by other subjects and whether their perceptions about status are shared by others.

The PGG experiment in Activity 3 was also implemented in a non-anonymous setting, i.e. subjects were aware of who was in their three persons group, and who the representative was. This was an integral part of the design, since we wanted to investigate how participants' behaviour was influenced by the actual social status of other participants in the group. There may be some methodological concerns about this feature of the experiment. First, there is the risk of retaliation if a subject feels that her/his payoff from the experiment is lower than expected. Second, the experimental

[7] Participants could communicate to the research assistants and experimenter if they had any questions and weren't sure how to complete the sheets. The experimenter and research assistants examined the first elicitation sheet for every participant to ensure they understand the task.

[8] Examples of experimental investigations that used artificially constructed status include: Eckel & Ball (1996), which examines the role of status in negotiation, Ball et al. (2001) which looks at the market interactions between high and low status agents, Eckel et al. (2010) which explores contribution and punishment in public good provisions, and Falk (2017) which studies status inequality in moral disengagement. Within lab-in-the-field setting, d'Adda (2017) used subjects' constructed rankings, where subjects knew they were playing with individuals that villagers had clearly identified as high status. This strand of literature employed an additional task before the decision stage and subjects were then grouped into low or high-status groups.

data could be picking up a specific joint history among villagers in a group that is unobservable to the experimenter.

With respect to the risk of retaliation, there is an element of credible deniability built into the PGG through i) the stochastic determination of the multiplier value, and ii) the fact that only the sum of tokens contributed by the group members was communicated to their respective representative. Subjects were informed about these two elements of credible deniability in the experiment's instructions. Demonstrations using tokens and the randomization device were done twice during the instructions and two control questions were asked to ensure that subjects understood that individuals' decisions could not be easily inferred by others, unless they decided to truthfully report their personal decision to others outside and after the experiment. The experimental data are unable to determine whether the experiment picked up specific joint historical activities among subjects. However, with the incorporation of the IOS measures, some effects of the activities can be picked up. For example, if two members of the the group of three have history of friendship (enmity), their IOS scores will be high (low). Statistically the group-of-three specific feature are a source of random noise, in the case there is a history of enmity between two individuals within a group of three. These do invalidate statistical tests.

The villages involved are relatively small and houses shared common corridors, therefore these villagers have strong communal experiences with each other prior this experiment. The majority of villagers also participated in collective action activities organised by their village councils like cleaning up, preparing for festivities and fixing the village's public goods.[9] Some subjects recruited to the experiments treated the experimental session as a communal experience.

This experimental design received ethical approval from the University of East Anglia's ECO Ethics Committee. Permission to conduct this research has been granted by the Sarawak's Economic Planning Unit.

[9] The average number of households in villages visited is 103. The largest village has 196 households and the smallest village has 41 households. See Figure A?? in the Appendix for an example of a village's set-up.

2.4.1 Social status elicitation

Participants received a booklet of five pages. On each page, there was a diagram of a ladder. Participants were told that the ladder represented a positional rank of every villager in the session. Every page represented a different status dimension. On the first page participants ranked each other based on extraversion levels. Extraversion was described as having an 'outgoing personality' in the instructions. Participants were told to write the ID numbers of the other participants on the ladder and to write their own ID as 'X'. The top rung of the ladder was reserved for the participant perceived to be the most extravert in the session while the lowest rung was to be allocated to the least extravert participant. No rung should be left empty as each rung should have an ID and no ID should be repeated. After the experimenter had established that every participant in the session had completed the task on the first page correctly, the experimenter instructed participants to open the second page. Participants repeated the same procedure with a different dimension on each page. The subsequent status dimensions elicited were; i) physical fitness, ii) educational attainment, iii) wealth, and iv) success[10]. Each ladder was designed to provide a participant's perception of social hierarchy by comparing him/herself with other participants in the session. Participants' booklets were collected once this Part had concluded.

As this elicitation was based on participants' self-perception, there was no penalty if a participant's rankings were not in agreement with the rankings of other participants in the session, and there was no reward for agreement. This self-perceived assignment of subjective social status elicitation is adapted from Singh-Manoux et al. (2003). Instructions read for this task are in Appendix C.

2.4.2 Relationship closeness elicitation

The second type of elicitation task used is the Inclusion of the Other in the Self (IOS) Scale (Aron et al., 1992; Gächter et al., 2015). Information from this elicitation task is used as a control variable to link decisions made in the PGG with the extent of pre-existing social ties among participants. Each participant received a booklet with nine pages. One page was left blank. Each of the other pages contained seven diagrams and a question with its possible answers. Participants were instructed only to open

[10] The word 'success' is being employed as a placeholder for prestige given that there is no direct translation of the word prestige from English to Malay.

each page based on cues from the experimenter. The first page was designated to participant with ID 1 (participant with ID1 received a blank Page 1). Participants with ID2 to ID9 were told to look at participant ID1. Then they need to select one diagram from the seven options. Each diagram hads a score, the minimum was 1 and the maximum was 7. If a participant felt that she/he never had a social relationship with participant ID1, she/he should select 1, and if there was a very close social relationship outside the session setting, the participant should select 7. If the relationship was not characterised by either extreme case, participants could select any score between 2 to 6. After marking a diagram using the pencil, each participant needed to indicate the type of relationship he/she had with participant ID1. A participant could establish participant ID1 as a close family member, a neighbour, a co-worker, a close friend, a friend or just a co-villager. There was no limit on the numbers of ties a participant could report. After Page 1 had been completed by participants, everyone was asked to turn to Page 2 and based their decision on participant with ID 2. The routine was repeated until the page referring to participant with ID9 had been completed. The instructions of this task is under Appendix D of this chapter.

2.4.3 Public Good Game

After the completion of the social status and relationship closeness tasks, every participant was randomly assigned to a group of three. Each received an endowment of seven blue tokens in an envelope, regardless of their role within their group. For a representative, this translates to an action space of ($0 \leq e_j \leq 7$); and for group member, it is ($0 \leq x_i \leq 7$).

Those assigned as group members were informed that their endowment could be divided between a 'Group Project' and his/her 'Individual Account'. For each token kept in the Individual Account, the participant would receive Malaysian Ringgit 2 (MYR 2 = £0.36). They were told that each token placed in the Group Project (GP) had two possible values. Each token could be worth MYR 2.50 or MYR 5.00. The actual value would be determined after the representative had made his/her decision and would be applied to tokens contributed by both players i. The value of tokens in the GP would be shared equally among the 3 players.

Subjects were also told that endowment tokens received by representative could be divided between a Group Investment Account (GIA) and the representative's individual account. If the representative allocated no blue tokens to the GIA ($e_j = 0$), the value of each token in the GP would be MYR 2.50. The representative's decision influenced the probability that a token in GP would be worth MYR 5. We illustrated the implication of the representative's decision with the use of 10 white tokens and a black bag. Before the representative made his/her decision, there were 10 white tokens in the black bag. For every 1 blue token the representative allocated to the GIA, the experimenter removed 1 white token from the bag. For example, if the representative placed all his 7 blue tokens into the black bag, the contents of the bag would be adjusted so that it contained 7 blue tokens and 3 white tokens.

At the beginning of the decision stage, each group member was provided with a small black box at their decision console. They were told that any token placed in that box would be designated for the GP and the remaining tokens in the envelope will be designated for their Individual Account (IA). After both players i had decided, the tokens in their boxes would be accumulated. The representative would be informed of the number of accumulated tokens, but not the number of tokens in each black box.

After the representative had decided, the experimenter adjusted the content of the bag in front of the representative but out of sight of the group members. After the representative had left their decision console, the experimenter shook the bag and drew one token from the bag at random. If a white token was drawn, each token in the Group Project was worth MYR 2.50 or M_L =1.25. If a blue token was drawn, each token in the Group Project was worth MYR 5.00 or M_H = 2.5). The colour of the drawn token would not be revealed to the subjects. A representative would be able to work out the value of multiplier based on his effort and the total contribution from group members, but group members would not be able to gauge the effectiveness of the representative's effort, or to work out the other group member's contribution.

Essentially a representative's role is to influence the distribution of blue tokens in the black bag and this affects the probability of higher valued MPCR to be implemented. A full contribution of 7 tokens from a representative would not have directly resulted in M_H as there are still 30% chances that a group received the lower valued MPCR, $M_{L.}$

Every subject was aware of the decision-making sequences, the identity of villagers assigned the roles of representative and group members, and the implications of their actions for group and individual payoffs. Villagers randomly assigned the role of group members are identified as 'Member A1' or 'Member A2' while villagers in the representative role is 'Member B'. The verbal instructions in Malay language and its English translation, along with graphical illustrations that every player received can be found in under Appendix B on page 80.

After they had completed the session, villagers were handed cash payments in opaque envelopes at the entrance of the room. Villagers were paid MYR 10 (£1.82) as participation fee and on average earned MYR 16.50 (£3.00) from the PGG[11].

2.4.4 Experimental Subjects and Institutional Settings

Subjects for this experiment were recruited from the Kayan tribe that lives in rural Sarawak (Borneo), Federation of Malaysia. Its current population is concentrated along the Baram River and a dam resettlement area in Sungai Asap[12]. The tribe is a stratified society as one's position in life is inherited from birth. While distribution of strata is inconsistent between villages, a typical traditional village will have aristocrats (*maren*), commoners (*panyin*), and former slaves (*dipen*). Leaders in this tribe are selected from aristocrats' families, acting as the king/queen of their respective chiefdoms (now villages).

Before the banning of headhunting, Kayan tribal leaders used this practice to strengthen their position in the region by leading raids and enslaving captives (Rousseau, 1990). Another way that the tribe improved their survival was through alliances between neighbouring villages brokered by their leaders (Rousseau, 1990). In this context, leaders have the ability to i) act as a representative that seeks mutually beneficial outcomes for the villagers when dealing with friendly outsiders, and ii) act as a focal point in coordinating actions (attack or defence) against enemies. Despite the need to provide corvée or tribute to their tribe leader, villagers in general benefited

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[11] Average earnings plus participation fee worked out to 90% of the daily wage in the region. The average earning is also slightly above the return fare from a small village to the nearest small town by local 4WD transportations services. The incentive made available is slightly below the daily wage as a compromise with the permission granting body to keep the nature of this experiment as a research project.

[12] The Bakun dam construction caused around 5,000 Kayan population that lived along the Rajang river and its tributaries to be relocated to a new resettlement area between 1998-2000.

from this feudalistic setting due to constant threats from the other warring and headhunting tribes. This institutional setting also perpetuated inequality within villages over time due to lack of social mobility and restrictive migration opportunities for the non-aristocrats (Rousseau ,1990).

Mass conversion to Christianity that started to take place in 1950s for Kayan of Baram and in 1970s for Kayan of Rajang resulted in the emancipation of slaves and the abolishment of its strata. Exposure to market and nation-state institutions along with greater personal autonomy experienced by common villagers resulted in migration and accumulation of human capital and wealth.

The aristocrats responded to increasing exposure to modern institutions in multiple ways. Some urged their family members to seek education and economic opportunities outside their villages. Several chiefs also established a primary school in their respective villages and urged villagers to send their kids to their school (in a visited village, a chief established a school and ended up being the only teacher there, despite having only two years of primary education, due to difficulty in sourcing funding and human resource to run the school). Some chiefs asserted their influence by participating in policy-making at district levels, and over time, all the way to the national levels. The formal representation of tribal chiefs in State decision-making was formalized with the establishment of the Sarawak Native Customs Council in 1974[13]. The Council is unique to Sarawak as no other States in Malaysia have engaged local leadership in the policy process. A direct result from this engagement is the codified customary law, Adet Kayan-Kenyah 1994, administered under the Native Courts of Sarawak[14]. Members of the Council known as Paramount Chiefs also act in an advisory role to the State legislation process to ensure that no State law is detrimental to the progress of any native community in Sarawak. Therefore, the role of lobbying or representing the tribe members' interest is still crucial in modern institutions.

The role of local leaders has also been investigated in developing countries using lab-in-the-field experiments. Local leaders' importance in the production of local level collective actions and public goods have been documented in by Jack & Recalde

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[13] Council's membership also includes representatives from other tribes in Sarawak.

[14] The Native Court of Sarawak was established in 1870 under the administration of Rajah Charles Brooke to handle personal matters (marriage rights, divorce, and division of property from death or divorce).

(2015), d'Adda (2017), and Grossman & Baldassari (2012) by pointing out the role of legitimacy, reputational concerns and social capital in village-level collective actions. Kosfeld & Rustagi (2015) extended the investigation on local leadership by looking at the leaders' punishment patterns and relates it to village-level commons management outcomes. Trust in local leadership also shaped willingness to cooperate within a community; Beekman et al. (2014), for example, managed to link villagers' behaviour in public good game with their leaders' corrupt behaviours.

The isolation and rural location of the tribe villages make the delivery of basic amenities challenging. Of the seventeen villages visited, seven villages that were under the dam resettlement program now have direct access to electricity and water supplies. Other villages rely on gasoline as the main source of energy and harvested rainwater for water supply. Eight villages are still connected only by logging dirt roads and one village could only be accessed by river. Five villages visited don't have telecommunication connectivity. The average number of households per village is 147. The biggest Kayan village visited have 196 households while the smallest have 41 households. Houses in these villages are still in its traditional form, in which houses are build next to each other and everyone sharing a communal corridor (see Figure 2.18A in the Appendix).

We recruited 324 villagers, 216 of whom participated as group members and 108 as representatives. 36 experimental sessions were conducted from December 2016 to February 2017. Table 2.2 below contains the summary statistics of villagers that participated as subjects in this experiment.

Table 2.2. Summary statistics of subjects' characteristics

Personal Characteristics	Mean	Min	Max
Age (years)	44.4	18	86
Male	0.33		
Years in Education (years)	7.71	0	16
Engaged in cash crop	0.87		
Aristocracy strata	0.10		
Former slave strata	0.16		
Village council	0.29		
Observations	**324**		

Note: Variables in Table 2.2 were elicited in Part 4 of the experiment after the public good game was concluded. Age refers to the age of the subjects. Variable male takes a value of 1 if the subject is a male, if the subject is a female that variable will take a value of 0. Years in education is the number of years a subject received formal schooling.

Prior to 2015, the compulsory years of schooling in Malaysia was 6. Variable cash crop takes a value of 1 if the output from subjects' agricultural activities are commodities like palm oil or rubber. Aristocracy strata takes a value of 1 if a subject reported she/he is a *maren* (a member of aristocracy households), non-*maren* subjects are identified as 0 in aristocracy strata. Variable village council takes a value of 1 if the subject is a member of village community council. Those in the slave strata were prevented from migrating in the past. Migration to a village only happened with the permission from the village's head. If a villager is an adult migrant, variable migrant to the village takes a value of 1, otherwise it is 0. Only variable 'former slave strata' was not elicited directly from the subjects. The mean for variables male, cash crops, aristocracy strata, former slave strata, village council, and migrant to the village reports the share of the subjects that reports they have the variable's characteristics. For example, the share of aristocracy in sampled subjects are 0.10.

The heterogeneity in education levels among recruited subjects may raise a concern about subjects' comprehension during the experiment, particularly during the public good game. To mitigate this factor while ensuring variability in subjects' education level, subjects were required to answer control questions before they made their decisions. Control questions posed to subjects and their translations can be found in Appendix A3 to A6. Each subject was required to answer two questions. 70% of the subjects managed to answer both questions on their first try. The experimenters had to explain the game in its entirety to only four subjects, i.e. 1.2% of the total subjects. Subjects typically asked for additional explanation of the calculation of individual payoffs. Further breakdown of subjects' responses to the control questions can be found in Table 2.1A in the Appendix section.

2.5 Results and findings

2.5.1 Social elicitation data and measures

We focus on the role of social status, agreed implicitly by villagers within a session, as a motivating factor in representative leadership. Social status is conferred implicitly through villagers' assignment on a positional rank; i.e. if a targeted villager has 8 co-villagers in a session assigning her on the highest rung, the targeted villager has the highest possible social status in the group of 9. Hence, a villager's social status is identified by other co-villagers' assignments based on the social status elicitation task in a session. We believe that villagers reported their self-perception on their position and the positions of others accurately, particularly since the participants weren't aware that the subsequent part of the experiment was incentivized[15]. Each villager has a group-level positional rank constructed by the other 8 co-villagers. Ladder ranking by one villager is not dominant over the others. For example, one villager might assess land ownership of other villagers as the dominant measure of wealth ranking while another villager in the same session might make the assessment based on perceived wealth of family members.

A social index is constructed for each status dimension elicited in the experiment; success, wealth, education, physical fitness, and extraversion. Within a session, a villager assigned at the top rung by another villager received a score of 9. Villagers that have been ranked in subsequent lower rungs (Rung 2 to Rung 9) will be assigned a score between 8 and 1. A villager received a score from eight other villagers in a session and the accumulated value of the eight scores is denoted by X. The maximum score that can be attained is 72 and the lowest is 8[16]. A social status index, Z-index, is then calculated based on the following formula;

$$Z = \frac{X - 8}{72 - 8}$$

Receiving a Z-index of 1 indicates a villager is conferred with the highest possible status as every co-villager in the same session agreed that this targeted villager belongs to the highest rung. In most sessions, the value of Z-index received by the highest status villager is closer to 1. Similarly, Z-index values that are closer to 0 means a villager is perceived by others to have low status in the session. We pooled the social status index from every session and the summary statistics in Table 2.3.

[15] Anderson, et al. (2006) ran several self-assessed status experiments in face-to-face settings and concluded that individuals are more likely to accurately guess or self-efface their positions in their reference group for social acceptance. The results from the Singh-Manoux et al.(2003), where this ladder tool was adapted from, also concluded that individuals have the ability to identify their position in their society with respect to their socioeconomic status. Recent findings by Xie et al.(2017) found that in an incentivised task, their subjects across multiple spectrum of societies (WEIRD, nomadic herders in Tibet, and children subjects) have an aversion to reverse the other subjects' prior rank. Preserving pre-existing social status during ceremonies in villages were observed in several ceremonies in several villages. It is expected that this norm of preserving pre-existing rank would be reflected in the social status elicitation task. The social norm of preserving social rank within a society has been discussed by Charness & Villeval (2017).

[16] In the case that a Villager #1 made a mistake by forgetting to rank a Villager #7 in a session, the formula for local status index will be adjusted for Villager #7 to be Z = (X-7)/ (63-7). 125 mistakes were detected from 14,580 elicitations done, bring the rate of mistakes to 0.9%.

Table 2.3. Summary statistics on social status index, Z-index and its correlations

	Summary Statistics				Correlation				
Z - Index	Mean	SD	Min	Max	Success	Wealth	Edu	Fitness	Extra
Success	0.51	0.23	0.015	0.984					
Wealth	0.52	0.24	0.016	1	0.80***				
Education	0.50	0.26	0	1	0.34***	0.21***			
Fitness	0.50	0.21	0.016	1	0.17***	0.12**	0.44***		
Extraversion	0.49	0.17	0.078	0.953	0.39***	0.42***	0.27***	0.35***	
Composite Status	0.50	0.15	0.11	0.95	0.79***	0.74***	0.67***	0.56***	0.64***

Note: *Z*-index takes a value from 0 to 1. SD stands for standard deviation. Figures in correlation columns report the correlation between one status dimension with another. *** Significant at 1 percent; ** significant at 5 percent; * significant at 10 percent.

In some sessions there was unanimous agreement on which villagers belong in the highest rung in wealth, education and fitness dimensions. Similarly, unanimous agreement could be found in the lowest rung of education dimension. The means in Table 2.3 also serves as an indirect measure of villagers' tendencies to self-enhance or self-efface themselves when completing the social status elicitation sheet. Since the mean for success and wealth is above 0.5, this would mean that in general villagers tended to self-efface themselves by ranking themselves at a lower rung than the rung assigned by other villagers. Since the means for extraversion status is less than 0.5, it indicates that villagers tended to self-enhance their position on the ladder.

We tested the correlation of the *Z*-index for each status dimension and found they are positively correlated, i.e. a person that has been conferred high rank in one dimension is more likely to be conferred high rank in another dimension. The strongest correlation can be found between success and wealth, i.e. if a villager is deemed to be successful by villagers in a session that same villager is more likely to be deemed wealthy by others. To circumvent the multicollinearity issue in regression analysis using highly correlated dimensions, a composite social status index has been constructed by taking an average from the five social status indexes. The last row in Table 2.3 indicates that the composite status index is highly correlated to the five dimensions of status, particularly for success and wealth.

We controlled for each villager's self-perception in each dimension as it might affect their decision-making process. Some villagers might use their elicitation sheets to show dominance by exaggerating their position while some might self-efface their positional rank in their sheets. Table 2.3A in the Appendix contains the Wilcoxon signed rank test that compared a villager's self-perceived ranking in one status dimension with another.

A self-perceived index is constructed for each subject. When a subject places 'X' on the highest rung for a dimension, that subject will receive a self-perceived index of 1 for that dimension. The lowest rung is worth 0 for this index. The summary statistics for self-perceived status index is in Table 2.4. The results from this table indicate that villagers tend to place themselves towards the middle rung with clear self-effacement happening in the wealth dimension and self-enhancement in the extraversion dimension. Success and wealth dimensions are strongly correlated, suggesting villagers that rank themselves in a certain rung in a dimension will place themselves in similar positioned rung in the other dimension. Scatter plots of the relationship between self-perceived status and status assigned by other villagers can be found in Figures 2.1A to 2.5A in the Appendix section. We found that there is positive correlation between self-perceived status index with the index from group assignment for all dimensions.

Table 2.4. Summary statistics on self-perceived index and its correlations across dimensions

Self-perceived index	Summary Statistics		Correlations across dimensions				
	Mean	SD	Success	Wealth	Edu	Fit	Extra
Success	0.459	0.33					
Wealth	0.340	0.32	0.639***				
Education	0.419	0.29	0.308***	0.211***			
Fitness	0.517	0.35	0.278***	0.161***	0.360***		
Extraversion	0.615	0.33	0.239***	0.164***	0.205***	0.381***	
Composite	0.470	0.22	0.750***	0.656***	0.609***	0.675***	0.610***

Note: Self-perceived index takes a value from 0 to 1. SD stands for standard deviation. Figures in correlation columns report the correlation between one status dimension with another. *** Significant at 1 percent; ** significant at 5 percent; * significant at 10 percent.

We control for villagers' self-perception by incorporating the gap between status as perceived by self and status as perceived by the group. The gap in status perception indicates whether a villager self-enhanced him/herself (a positive gap) or self-effaced him/herself (a negative gap) when they completed the social status elicitation task. When the gap is zero between a villager's self -perceived and status perceived by the group, then a villager's self-perceived social status is in agreement with the status assigned by the other villagers. Table 2.5 reports the summary statistics of the gap in self-perceived status index with the social status index, *Z*-index.

Table 2.5. Summary statistics on gap between Z-index and self-perceived

Group – Self Status Gap	Summary Statistics	
	Mean	SD
Success	0.047	0.34
Wealth	0.181	0.31
Education	0.077	0.26
Fitness	-0.02	0.32
Extraversion	-0.13	0.35
Composite	0.032	0.20

Note: Group-self status gap takes a value from -1 to 1. SD stands for standard deviation.

The summary statistics in Table 2.5 show that on average villagers tend to self-efface their own success, wealth and education standing in comparison to social status assigned by other villagers. On the other hand, an average villager would be more likely to self-enhance their social standing in the physical fitness and extraversion dimensions. The status gap averages for success, education and physical fitness are very close to zero, meaning that in general villagers' self-perceived status for these three dimensions are on average close to the status assigned by their co-villagers. Status gap averages for wealth and extraversion dimensions are larger than the rest as villagers tend to self-efface and self-enhance their social status in comparison to the social status that their co-villagers assigned them to. The composite status gap is derived by taking an average from the status gaps in the five dimensions. A positive status gap indicates an overall tendency to self-efface; a negative status gap indicates an overall tendency to self-enhance. The composite status gap has strong positive correlation with all status gap dimension constructed.

To validate the social status elicitation task with traditional status, we correlate the social status *Z*-index with villagers' strata. Table 2.6 below shows the correlations between traditional strata and social status, Z-index. There are positive correlations, although weak, between professing to belong in aristocrat strata and occupying the highest status in the success, wealth and education dimensions.

Table 2.6. Correlations between traditional strata and Z-index, by dimensions

	Success	Wealth	Education	Fitness	Extraversion	Composite
Aristocrats	0.11**	0.13**	0.13**	-0.04	0.09	0.12**
Proxy Slaves	0.05	0.09*	-0.81	-0.09	0.07	0.0289

Notes: *** significant at 1 percent level, ** significant at 5 percent level, * significant at 10 percent level.

The weak correlation between aristocratic status and the Z-index may be due to the fact that the proportion of aristocrats in our experiment was quite low (10 per cent). It could also be due to the presence of more than one aristocrat within a session[17]. Another type of data elicited before the public good game is the social relationship closeness, elicited using the IOS scale. The lowest score that could be awarded to another villager within the same session is 1 and the highest is 7. A villager could receive a total score of 56 if every co-villager in the same session assigned the highest IOS score to her/him. The lowest possible total score a villager could receive is 8. An average villager received a total score of 36.2; the extremes were 19 and 53. Among the 36 groups of nine villagers, the lowest average score a villager received in a session was 3.36 and the highest average score was 5.4, implying that villagers recruited within each group identified closely with each other and had pre-existing social relationships. Are perceptions of closeness related to social status indexes and belonging to traditional strata? To answer this question, we correlated every villager's IOS score with their social status index in each dimension as shown in Table 2.7. There are positive but minor correlations between social status index and social relationship closeness. The stronger correlations between highly close relationship and high-status index could be found in the extraversion and education status dimensions, indicating that villagers on average perceived social closeness with co-villagers that had high education and extraversion social status. As the IOS scale measures social relationships, higher correlation with perceived extraversion is

[17] The recruiter with villager's council assistance tried their best to ensure there is a member of aristocrat strata present in a session, but there are sessions void participation of a member of aristocrat strata due to their small population share in the village. Rousseau (1990) reported that the share of aristocrat in a typical Kayan villagers are between 15-20% during his anthropological fieldwork in 1970s. Members of aristocrat strata are reportedly to be more socially mobile (at national-level) and are the first ones that left their villagers in order to seek economic opportunities outside their own village. An interview with an aristocrat researcher in a major city in Sarawak confirms the shrinking share of aristocrat in the villagers and we did in fact visited a village devoid of an aristocrat, but the village administration is still handled by them through a proxy.

consistent with the notion that more extraverted villagers had more active social relations.

Table 2.7. Correlation between awarded IOS and Z- index across dimension

	Success	Wealth	Education	Fitness	Extraversion	Composite
Total score	0.11**	0.09*	0.19***	0.12**	0.21***	0.1954***

Notes: *** significant at 1 percent level, ** significant at 5 percent level, * significant at 10 percent level.

Among those that self-identified to be in aristocrat strata, the average IOS score received is 4.69, while those from formerly slave strata received an average score of 4.67. There is no statistically significant difference in average IOS score received by those belonging to aristocrat or former slave strata in comparison to ordinary villagers, showing that strata differences are not the basis for relationship closeness among these villagers(*Mann-Whitney(M-W) statistics for aristocracy = 1.120, p-value = 0.2628; M-W stats former slave = 1.301, p-value = 0.1932)*. There are two main explanations of why no statistical differences can be detected between the average IOS scores received by members of aristocrat and former slave strata. First, the villages' sizes and physical arrangement promote tight and strong social relationship among villagers. Second, the emancipation of slaves happened 50 years ago and there is a possibility that the marks of strata no longer govern social relationships in these villages. While anthropological literature have painted this society to be highly stratified, data from IOS scores indicates that the society is not highly fragmented.

In the subsequent sections, player *j* is labelled as the representative while player *i* is labelled as a group member. The accurate label for player *i* is the non-representative group member but for sake of brevity, the label used is the group member. Table 2.8 shows the summary statistics of subjects based on the roles assigned to them. Results from this table shows that with the exception of belonging to the aristocracy, the process of randomization in assignment of roles produced no statistically significant differences in characteristics between representatives and group members.

Table 2.8. Balance: Demographic, social and economic background of representatives and group members

Personal Characteristics	Representative Mean	Group Members Mean	Difference (p-value)
Age (years)	45.5	43.9	0.9535 (0.3411)
Male	0.33	0.34	-0.1654 (0.8687)
Years in Education (years)	7.45	7.84	-0.7960 (0.4266)
Engaged in cash crop	0.89	0.86	0.5256 (0.5996)
Aristocracy strata	0.06	0.13	-0.2058** (0.0404)
Former slave strata	0.17	0.16	0.2134 (0.8312)
Village council	0.23	0.32	-0.1580 (0.1151)
Observations	**108**	**216**	

Note: Age refers to the age of the subjects. Variable male takes a value of 1 if the subject is a male, if the subject is a female that variable will take a value of 0. Years in education is the number of years a subject received formal schooling. Before 2015, the compulsory years of schooling in Malaysia is 6. Variable cash crop takes a value of 1 if the output from subjects' agricultural activities are commodities like palm oil or rubber. Aristocracy strata takes a value of 1 if a subject reported she/he is a *maren* (a member of aristocracy households), non-*maren* subjects are identified as 0 in aristocracy strata. Variable village council takes a value of 1 if the subject is a member of village community council. Only variable 'former slave strata' was not elicited directly from the subjects. The mean for variables male, cash crops, aristocracy strata, former slave strata, and village council reports the share of the subjects that reports they have the variable's characteristics. For example, the share of aristocracy in sampled subjects assigned as representatives are 0.06. Difference is calculated using two independent sample t-test to detect differences in variables' averages between representatives and group members. *** significant at 1 percent level, ** significant at 5 percent level, * significant at 10 percent level.

Table 2.9. Balance: Elicited indices and IOS of representatives and group members

	Representative Mean	Group Members Mean	Difference
Z-Index			
Success	0.506	0.506	0.0013 [0.9989]
Wealth	0.514	0.525	- 0.3805 (0.7038)
Education	0.461	0.513	- 0.17358* (0.0835)
Physical Fitness	0.476	0.512	- 1. 4642 (0.1441)
Extraversion	0.477	0.489	- 0.5932 (0.5535)
Composite	0.487	0.509	- 1.2214 (0.2228)
Self-Perceived Index			
Success	0.469	0.454	0.3576 (0.7209)
Wealth	0.390	0.315	2.0048** (0.0458)
Education	0.395	0.431	- 1.0709 (0.2850)
Physical Fitness	0.464	0.544	-1.9429* (0.0529)
Extraversion	0.593	0.626	- 0.8607 (0.3900)
Composite	0.462	0.474	- 0.4871 (0.6265)
IOS			
Total score received	35.58	36.5	-1.1659 (0.2445)
Observation	**108**	**216**	

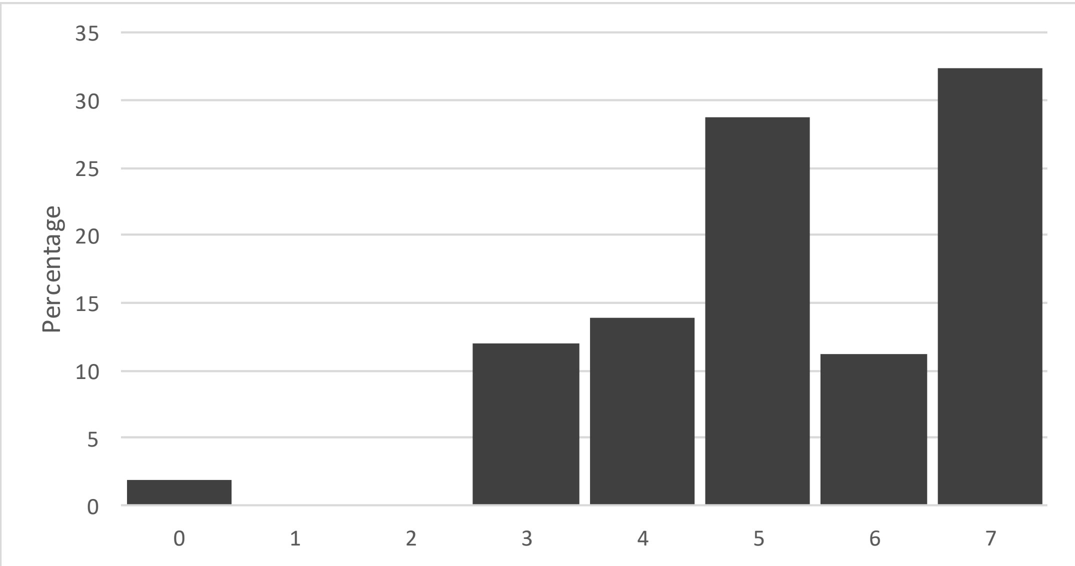
Difference is calculated using two independent sample t-test to detect differences in variables' averages between representatives and group members*** significant at 1 percent level, ** significant at 5 percent level, * significant at 10 percent level

Table 2.9 reports the average scores received by representatives and group members through the elicitation exercises. These data show that, except in a few cases, there are no statistically significant differences between subjects assigned as representatives and subjects assigned as group members.

2.5.2 Investing Effort as a Representative

There are variations in effort by representatives. Figure 2.2 below shows the distributions of tokens used as effort to increase the probability of the high multiplier value, M_H. 32.4% of representatives decided to exert full effort on behalf of their group. The second most frequent choice was of 5 tokens. This effort level was salient because it produced a 50-50 chance of of M_H or M_L implementation. In general, those in the representative role made effort to improve the probability of their group getting M_H. The average effort of a representative is 5.3 tokens Only two representatives decided to exert no effort and to free ride from the GP.

Figure 2.2 Representatives' efforts (tokens)



Hypotheses 1, 2, 5 and 8 explore the relationship between representative's effort and her/his status, the status of the contributors, social closeness with the contributors and the contributions made by the respective group members.

Hypothesis 1 states that representative's effort is positively related to her/his status. Table 2.10 below reports the correlation between the number of tokens exerted as effort by a representative and his/her status, as indicated by his/her Z-index and the strata to which he/she belongs. The Z-index for a subject used in the analysis is relative to the other 8 subjects in the same session, i.e. this is the session-level status.

Table 2.10. Relationship between number of effort tokens and social status

Social status indicator		Observation	Z-Index Spearman correlation [p-value]	Self-Rank Spearman in group of 9 correlation [p-value]
Ladder Elicitation	Success	108	0.1607* [0.0966]	-0.1000 [0.3031]
	Wealth	108	0.0836 [0.3899]	-0.1683* [0.0817]
	Education	108	0.1087 [0.2627]	-0.1278 [0.1874]
	Physical fitness	108	0.0393 [0.6862]	-0.0144 [0.8825]
	Outgoingness	108	0.0267 [0.7838]	0.1568 [0.1051]
	Composite	108	0.1345 [0.1651]	
Traditional strata	Aristocrat	108	0.1708* [0.0771]	
	Proxy slave	108	0.0696 [0.4742]	

Notes: *** significant at 1 percent level, ** significant at 5 percent level, * significant at 10 percent level.

Table 2.10 shows weak or non-existent correlations between representative's effort and social status elicited before and after the experiment, when social status is based on elicitation in a group of nine villagers. These results are consistent in the three types of measures used, i) the Z-index that captures the implicit ranking of villagers in the session, ii) the position on the ladder that the representatives placed themselves in the ladder elicitation and iii) the traditional strata data asked in the socio-economic survey. Even constraining the unit of analysis of a group of 3, no relationship could be established between effort made to the GIA and representative's social status.

Hypothesis 2 stated each representative's decision has relationship with the social status of the respective group members, i.e. the high-status group member elicited high effort level from the representative. Table 2.11 shows the correlations of representatives' decisions with group members' status.

Table 2.11. Relationship between number of effort tokens and group members' social status

Z-index	*Observation*	*Correlation to highest status contributor [p-value]*	*Correlation to contributor's average status [p-value]*
Success	*108*	*0.1132 [0.2434]*	*0.1222 [0.2075]*
Wealth	*108*	*0.0625 [0.5206]*	*0.1188 [0.2208]*
Education	*108*	*0.0916 [0.3456]*	*0.1001 [0.3027]*
Physical fitness	*108*	*0.0504 [0.6048]*	*0.0045 [0.9630]*
Outgoingness	*108*	*0.0839 [0.3878]*	*0.1016 [0.2956]*
Composite	*108*	*0.0936 [0.3353]*	*0.1230 [0.2046]*

Notes: *** significant at 1 percent level, ** significant at 5 percent level, * significant at 10 percent level.

Table 2.11 shows no statistical relationship can be established between representatives' decisions and group members' status elicited from the ladder measures. With respect to the membership of one or more group members in the traditional upper and lower strata, I found that effort from representative has no relationship with her/his respective group members belonging to, i) aristocrat strata (Spearman correlation = 0.0181, *p-value* = 0.8526), ii) former slave strata (Spearman correlation = -0.0035, *p-value* = 0.9713).

According to Hypothesis 5, representatives' closeness to group members has a postive effect on her/his effort to GIA. Here, we will use the accumulated IOS score assigned to both group members, for which the lowest possible value is 0 and the highest is 14. The average IOS score for a pair of group members is 9.29 with a standard deviation of 3.29. There is a positive but weak statistically significant relationship between representative's effort and the accumulated IOS of the two group members, 0.2527*** (Spearman *p-value = 0.0086*). This means that representatives that have assigned high IOS score to the two group members in the elicitation stage, exerted more tokens to the GIA.

Before exerting effort, every representative receives information on the total number of tokens contributed by group members. The lowest possible value of tokens is 0 while the highest is 14. Hypothesis 8 predicts that the number of tokens contributed has a positive influence on representatives' effort. A Spearman correlation test on effort by representative and information on contribution found no statistically significant effect (Spearman correlation = 0.0915, *p-value = 0.3461).*

Empirical Strategy and Econometric Results

Given that the experiment took place in a non-anonymous setting and most of the relationship data were elicited before the decisions, the variables used could be interacting with each other, making it hard to establish direct a relationship with any specific variable. It is also very likely that characteristics of representatives, the respective group members and village-level heterogeneity affect representatives' effort to GIA. A notable variable that is usually expected to have a strong positive relationship with effort is information on the group members' contributions; usually driven by the representatives' desire to reciprocate group members' contributions. Therefore, subsequent analysis will be analysed using econometrics to provide explanation to representatives' decisions.

We estimate the econometric equations below using cross-sectional ordinary least squares (OLS). First, the type of regression estimation used focuses on the status of representatives' data on her/his social status and the information on group members' contributions. The subsequent estimation will incorporate leaders' control variables followed by village-level effects and control variables for the group members.

This the specification of the first regression model:

$$e_j = \alpha_1 GS_j + \alpha_2 TS_j + \alpha_3 GP_{\boldsymbol{j}} + \varepsilon_j$$

e_j represents the number of blue tokens used as effort, GS_j is the group status z-index given by participants in a session to the representative, TS_j is the representative's traditional status, either as a member of aristocrat or former slave strata, and GP_j represents the information on total contribution made by both group members to the public group. Regression based on representative's status is presented in Model (1) of Table 2.8. GS_j *will* use the value of composite z-index constructed using the five z-index from the status dimension elicited in the experiment.

Model (2) tests for relationships between the representative's effort level and social properties of, and contributions by, their respective group members. The model incorporates the following new terms; $GS_{\bar{\imath}}$ which is the average of the status indexes of the group members in the same group, GP_I is the total contribution to the Group Project by group members, $IOS_{\bar{\imath}}$ is the dispersion in IOS scores given by the representative to both group members, and TS_i is the group members' traditional status.

$$e_j = \alpha_1 GS_j + \alpha_2 TS_j + \alpha_3 GP_j + \alpha_4 GS_{\bar{\imath}} + \alpha_5 TS_{\bar{\imath}} + \alpha_6 IOS_{\bar{\imath}} + \varepsilon_j$$

The subsequent Model (3) is a replication of Model (2) but with the inclusion of village-level effect. This is to control for possibility of village-level heterogeneity in our data. Subsequent regression models that seek to establish determinants of representatives' effort included more control variables. In Model (4), control variables like gender, age, membership of representatives into the village council and villager's status as a migrant are incorporated. Model (5) included control variables for the group members.

Table 2.12. Determinants of representatives' efforts

VARIABLES	No controls (1)	GM's status (2)	Village level effect (3)	Rep's control (4)	GM's control (5)
Composite z-index	1.371	1.563	2.205*	2.121*	2.060*
	(1.070)	(1.126)	(1.197)	(1.171)	(1.203)
Aristocrat	1.026**	1.076**	0.836	0.834	0.517
	(0.512)	(0.515)	(0.689)	(0.732)	(0.713)
Proxy slave	0.425	0.462	0.319	0.232	0.272
	(0.346)	(0.365)	(0.377)	(0.426)	(0.463)
Total tokens from group members	0.0661	0.0544	0.0511	0.0640	0.0626
	(0.0598)	(0.0631)	(0.0657)	(0.0694)	(0.0717)
Status index control				0.0261	0.772
(self-perceived index)				(0.810)	(0.879)
Group members' status					
Group members' z -index		1.695	1.541	1.131	1.805
		(1.413)	(1.277)	(1.415)	(1.575)
Aristocrat		-0.320	-0.906	-0.877	-1.104*
		(0.407)	(0.555)	(0.587)	(0.611)
Proxy slave		0.00676	-0.368	-0.267	-0.0829
		(0.402)	(0.581)	(0.623)	(0.635)
Dispersion in IOS score		-0.0267	-0.0574	-0.00834	-0.0796
		(0.114)	(0.118)	(0.132)	(0.141)
Constant	3.885***	3.134***	3.400***	3.946***	3.435*
	(0.866)	(1.122)	(1.215)	(1.372)	(1.834)
Representative's controls	No	No	No	Yes	Yes
Group members' controls	No	No	No	No	Yes
Village fixed effect	No	No	Yes	Yes	Yes
Observations	108	108	108	107	103
R-squared	0.065	0.083	0.299	0.309	0.371

Robust standard errors in parentheses ***p<0.01, **p<0.05, *p<0.1

Notes: Linear regression. Dependent variable is the number of effort tokens located by the representative to the Group Investment Account. The table reports coefficient with clustered standard errors on session in parentheses. Variables derived from indices take any value for 0 to 1. Composite z-index of Group Member (GM) takes a value from 0 to 1 and is the average of the status indexes of the group members in the same group. Total tokens from group members takes a value from 0 to 14 and derived by the sum of contributions by group members in the same group. Dispersion of IOS is the difference in the IOS scores assigned by the representative to the two group members. The aristocrat variable takes a value of 1 if the representative reports that she/he a member of aristocrat family at the end of the experiment, and 0 otherwise. Former slave strata take the value of 1 if the representative is inferred to belong formerly in the slave strata, and 0 otherwise. Control variables used in regression models above are age, membership in village council, gender, and identification as a migrant to the village. Age is a continuous variable and only the eldest group member is considered. Village council takes a value of 1 if the representative reported that she/he belong to their village's committee council, and 0 otherwise. Male takes a value of 1 if the representative is a male, and 0 if a female. Migrant takes a value of 1 if the representative reported that she/he is a migrant to the village, and 0 otherwise. *** significant at 1 percent level, ** significant at 5 percent level, * significant at 10 percent level. (d) is dummy variable

Estimations in Models (1) and (2) showed that representatives without social status would have contributed tokens to the GIA. Belonging to an aristocrat family increases the contributions by more than 1 token in comparison to non-aristocrat. However, the positive effect of aristocracy disappears once village level effect is incorporated in the subsequent estimations in Models (3) to (5). Instead the positive effect of status on effort is shown to be coming from the elicited success status and this result is consistent across models and after including controls despite its weak statistical power. The switch of significant in aristocracy to social status index implies there is an interaction effect among representatives that have been identified to possess high success status in the session and have self-identified themselves to be a member of the aristocrat family. Robustness test using different dimensions of z-index can be found in Table 2.3A to Table 2.7A in the Appendix section.

Result 1: Social status as assigned by co-villagers has a positive relationship with effort level in the public good game. Representatives deemed to possess high status by other villagers and belonging to the highest traditional strata exerted more effort to improve their respective group's multiplier outcome.

In all estimations from Models (1) to (5), information on total contributions from group members did not affect representative's desire to invest in group investment account (GIA). This is consistent with the non-parametric test above in which we found no correlation between effort and contributions' information. Both findings indicate that direct reciprocity is not the main channel in prompting the representative to exert effort on behalf of the group.

Result 2: Representatives' effort has no relationship with her/his group members' contributions as effort level is not conditional to contributions made by group members.

Another variable that showed statistically significant results is the status of group members. In Model (5) after village-level effect has been incorporated, the aristocrat status of any group member has negative effect on representative's investment. In this regression, representatives exerted almost one less token than representatives that weren't assigned to a group that had at least one aristocrat. However, in the non-parametric test, this relationship can't be detected. The control variables related to group members like age, gender, membership in village council and their identity as a migrant did not influence effort since none of the variables produce statistically significant results.

Result 3: There is a possibility that aristocracy status of group members has negative effect on their representative's effort. However, other social status indicators possessed by group members did not influence representatives' decisions.

In the non-parametric test, accumulation of IOS score awarded to the respective group members produced weak positive statistical relationship with her/his effort to GIA. Estimations in Models (2), (3), (4), and (5) did not use the accumulation of IOS score as a control variable on group members' status. Instead, it uses the dispersion in the IOS score awarded by the representative. It measures social closeness distances of the 2 group members as judged by the representative., i.e. whether representative values one relationship over the other, and indirectly perceived equality in relationship status between representative and their respective two group members. Estimation of the social closeness distance did not affect representatives' effort[18].

Result 4: Social relationship closeness with group members did not affect representative's decision to exert effort on behalf of the group.

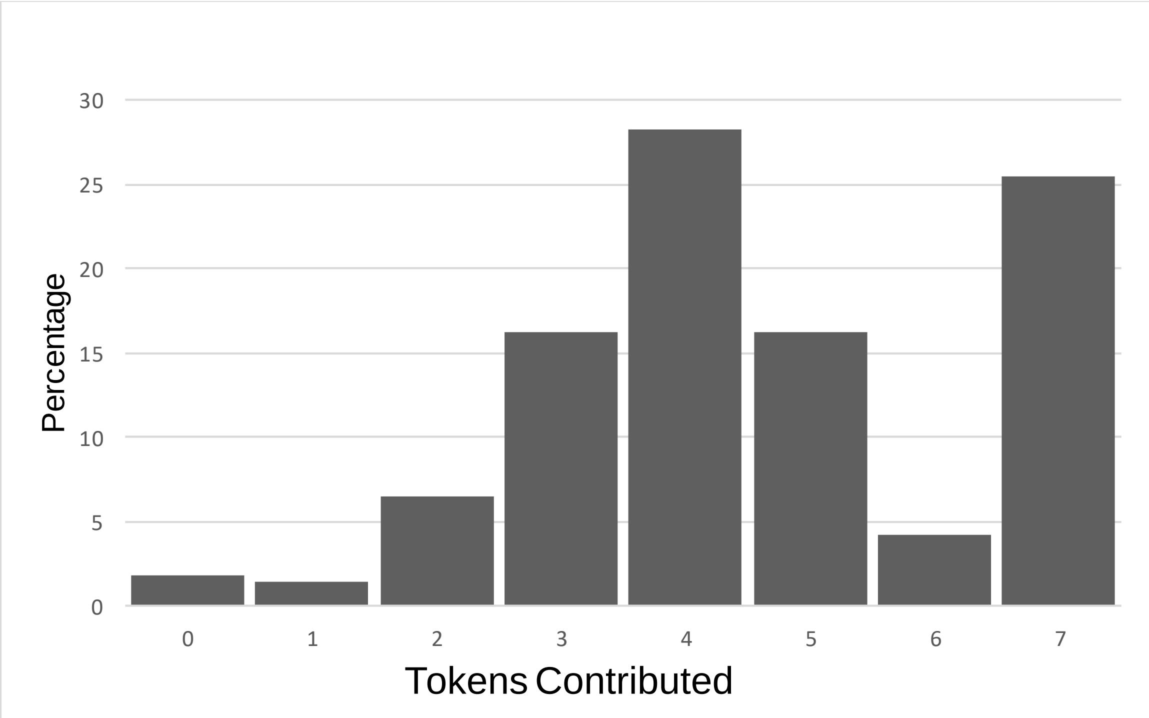
[18] Spearman coefficient for effort and dispersion on IOS assigned to group members is -0.0103 (p-value = *0.9160*). Not statistically significant but the negative correlation value indicates should a representative's valuation of a group member relationship is more intense than the other, it adversely affected representative's effort.

To recap, the average representative's effort is 5.3 tokens and limited free-riding is taking place. The results related to social status and suggests that full effort is a possibility once the representative is a villager with high social status, either by being conferred by the villagers or by birth.

2.5.3 Trusting the representative to lead

Figure 2.3 below shows the contributions to public good made by group members. The mean contribution by a group member is 4.6 tokens. 25.5% of group members decided to allocate all endowed tokens to the Group Project (GP). 4 group members (1.85%) decided to free-ride completely, while the contribution mode is at 4 tokens.

Figure 2.3. Group members' contributions(tokens)



The relevant hypotheses that are expected to explain group members' willingness to trust their respective representatives are Hypotheses 3, 4, 6 and 7. Hypothesis 3 predicts that higher-status group members make larger contributions to the GP. Hypothesis 4 predicts that the status of the representative has a positive influence on group members' contributions. Hypotheses 6 and 7 predict that group members make higher contributions, the closer their relationship with the representative (Hypothesis 6) and their fellow group member (Hypothesis 7). The non-parametric tests on these hypotheses can be found in Tables 2.13 and 2.14.

Table 2.13: Relationship between number of contribution tokens and social status

Social status indicator		*Observation*	*Z-Index Spearman correlation [p-value]*	*Self-Rank Spearman in group of 9 correlation [p-value]*
Ladder Elicitation	*Success*	*216*	*0.1694** [0.0126]*	*0.1619** [0.0178]*
	Wealth	*216*	*0.0844 [0.2169]*	*0.1209* [0.0762]*
	Education	*216*	*0.1147* [0.0926]*	*0.0785 [0.2509]*
	Physical fitness	*216*	*0.1472** [0.0305]*	*0.0329 [0.6320]*
	Outgoingness	*216*	*0.0885 [0.1949]*	*-0.0023 [0.9736]*
	Composite	*216*	*0.1795*** [0.0082]*	*0.1127* [0.0720]*
			Spearman correlation [p-value]	
Traditional strata	*Aristocrat*	*216*	*0.0101 [0.8829]*	
	Proxy slave	*216*	*-0.0382 [0.5762]*	

Notes: *** significant at 1 percent level, ** significant at 5 percent level, * significant at 10 percent level.

Table 2.13 aims to address Hypothesis 3, in which the higher the status of the group members, the more she/he contributes to the public good. This relationship is examined based on three aspects, i) the z-index value received by each group member during the social status elicitation exercise, ii) the positional rank each group member placed themselves on each ladder, and iii) belonging to the aristocrat or slave strata. Weak positive and statistically significant correlations between contributions and status perceived by others can be found in success, education, physical fitness and the composite status. Similarly, weak positive and statistically significant correlations can be found between contribution and group members' self-perceived status in success, wealth and the overall composite of the five status dimensions. This means that how a group member perceived themselves in the ladder elicitation task influenced their contribution levels. On the other hand, no correlations can be found between traditional strata and tokens contributed to the public good.

Hypothesis 4 considered the possibility that group members' contributions are influenced by the status of their matched representatives. The results of the non-parametric test are in Table 2.14.

Table 2.14: Relationship between number of contribution tokens and representative's social status

Z-index	*Observation*	*Spearman correlations with representative's z-index [p-value]*
Success	*216*	*0.0204* *[0.7652]*
Wealth	*216*	*0.0244* *[0.7215]*
Education	*216*	*0.0634* *[0.3541]*
Physical fitness	*216*	*0.1095* *[0.1084]*
Outgoingness	*216*	*0.0191* *[0.7800]*
Composite	*216*	*0.0693* *[0.3104]*

Notes: *** significant at 1 percent level, ** significant at 5 percent level, * significant at 10 percent level.

There are no correlations between group members' contribution and representative's z-index, and this is applicable for all the status dimension elicited prior to the experiment. Simultaneously, traditional status of the representative, be it a member of an aristocrat or a former slave strata did not have relationship with group members' contributions to PG (*Spearman's rho for aristocrat = 0.0384, p-value = 0.5749; Spearman's rho for former slave = -0.1035, p-value = -0.1035*).

Group members are hypothesised to contribute more if they have strong relationship closeness with the representative under Hypothesis 6. However, the non-parametric test found there is no correlation between contribution and IOS score assigned to the representative (*Spearman's rho = -0.0540, p-value = 0.4311).* Social relationship closeness towards co-group members is the focus for Hypothesis 7 and similar to Hypothesis 6, we found no statistical relationship between contribution and relationship closeness with co-group member (*Spearman's rho = -0.0150, p-value =0.8269).*

Empirical Strategy and Econometric Results

Both representative and group members' decisions happened under the same settings, i.e. non-anonymised status elicitation and decision-stage. Unlike the representative, a group member decides simultaneously with an identifiable co-group member along with her/his beliefs about the co-group member's cooperativeness. Similar to the representative, the co-group member's social status might have effect on a group member's contribution. As with the analysis of representative, there is the possibility of unobservable factors like village fixed effects in influencing group members' decision-making, especially since non-parametric test only established weak relationship between contribution and group members elicited social status. Therefore, the following econometric analysis incorporate the necessary controls in explaining group members' contributions.

Similar to the econometric analysis of representatives, we will use cross-sectional ordinary least squares (OLS). The estimation (1) focuses on variables relevant to group members' status only. Variables that are relevant to the group members' decisions and control variables are incorporated in the subsequent estimations (2) to (6).

Model (1) is specified in the following manner;

$$x_i = a_1 GS_i + \alpha_2 TS_i + \varepsilon_i$$

x_i is the number of tokens a representative placed in the public good, GS_i is the constructed composite group status index given by villagers in a session to a group member and TS_i is the traditional status of the group members. Robustness tests on other z-index dimensions elicited from the experiment can be found in Tables 2.8A to 2.12A of the Appendix.

Model (2) maintains the variables of interest from Model (1) and incorporates representatives' z-index on success dimension, their traditional strata and the IOS score that the group members assigned to their representatives. This is the specification for Model (2);

$$x_i = a_1 GS_i + \alpha_2 TS_i + \varepsilon_i$$

Model (3) estimated the same variables in Model (2) with the incorporation of village-level effect to the estimation. This is to control for unobserved village level characteristics that can affect estimation of the status variables with group members' decisions to contribute.

Models (4), (5) and (6) incorporated more control variables to the variables of interest in Model (1) and (2). In Model (4), group members' decisions are controlled by other relevant variables that could have influenced decisions to contribute. They are; i) age, ii) gender, iii) membership in village council and iv) having migrated to the village. Model (5) considers the control variables of the respective representative matched with the group member while Model (6) controlled the same variables for the assigned co-group member.

Estimation results for Models (1) to (6) are in the Table 2.15.

Table 2.15. Determinants of group members' contributions

VARIABLES	No controls 1	Rep's status 2	Village level effect 3	GM's control 4	Rep's control 5	Co-GM's control 6
Composite z-index	1.775**	1.744**	1.690**	2.354**	2.290**	2.303**
	(0.770)	(0.785)	(0.810)	(0.981)	(0.979)	(1.024)
Aristocrat	-0.0783	-0.153	0.113	0.109	0.126	0.118
	(0.376)	(0.407)	(0.440)	(0.464)	(0.467)	(0.481)
Proxy Slave	-0.147	-0.178	-0.0404	-0.0512	0.00210	0.0235
	(0.294)	(0.294)	(0.381)	(0.383)	(0.396)	(0.415)
Status index control				1.255*	1.300*	1.265*
(self-perceived index)				(0.673)	(0.674)	(0.696)
Representative's status						
Representative's z-index		0.711	0.525	0.430	0.444	0.339
		(0.827)	(0.865)	(0.889)	(0.910)	(0.916)
Aristocrat		0.236	0.534	0.445	0.658	0.481
		(0.485)	(0.504)	(0.530)	(0.569)	(0.580)
Proxy slave		-0.445	-0.527	-0.599*	-0.642*	-0.637
		(0.330)	(0.363)	(0.358)	(0.384)	(0.399)
IOS score to rep		-0.0447	-0.0683	-0.0560	-0.0685	-0.0738
		(0.0691)	(0.0668)	(0.0655)	(0.0657)	(0.0781)
Constant	3.731***	3.667***	4.209***	3.550***	3.185***	3.422**
	(0.400)	(0.586)	(0.857)	(1.028)	(1.156)	(1.526)
Group member's control	No	No	No	Yes	Yes	Yes
Representative's control	No	No	No	No	Yes	Yes
Village fixed effect	No	No	Yes	Yes	Yes	Yes
Observations	216	215	215	215	213	212
R-squared	0.025	0.043	0.104	0.134	0.141	0.148

Notes: *** significant at 1 percent level, ** significant at 5 percent level, * significant at 10 percent level.

Notes: Linear regression. Dependent variable is the number of tokens allocated as contribution by each group member to the Group Project. The table reports coefficient with clustered standard errors on session in parentheses. Variables derived from indices take any value for 0 to 1. Composite group status index of representative in the same group takes a value from 0 to 1. Perceived closeness to representative takes a value from 1 to 7. Perceived closeness to co-group member takes a value from 1 to 7 and directed to the co-group member in a group of three. The aristocrat variable takes a value of 1 if the group member reports that she/he a member of aristocrat family at the end of the experiment, and 0 otherwise. Former slave strata take the value of 1 if the group member is inferred to belong formerly in the slave strata, and 0 otherwise. The control variables, i) village council takes a value of 1 if the group member reported that she/he belong to their village's committee council, and 0 otherwise; ii) gender takes a value of 1 if the group member is a male, and 0 if a female, iii) migrant takes a value of 1 if the group member reported that she/he is a migrant to the village, and 0 otherwise, and iv) is age in years is a discrete variable. *** significant at 1 percent level, ** significant at 5 percent level, * significant at 10 percent level.

In the basic Model (1), a group member with the lowest composite status contributes 4 tokens to the public good. This result is consistent in all estimation for Models (1) to (6), i.e. without incorporating social status and other controls, an average group member contributed around 4 tokens to the public good.

Group members' status or z-index constructed from the elicited social status ranking before the public good game is found to be the strongest variable in increasing group members' contribution to the GP. This relates to Hypothesis 3 that predicts group members with high social status and privileged positions are more willing to contribute to the GP. Consistent with the results from the non-parametric statistics in Table 2.13, contribution to GP is a function of social status conferred by villagers in the session, implicitly. However, kinds of traditional status that are clearly visible to everyone do not affect group members' contributions. Our estimation of the most comprehensive model, Model (6) implies that after controlling for other social status characteristics and socio-economic variables, a group member who has been regarded by co-villagers to have z-index of 1 in status dimension would contributed 2.3 more tokens than group members perceived by everyone to have the lowest possible status in the community. Concurrently, when group members' status is controlled for self-perception of status on the ladder, group members that have self-enhanced their position on the ladder in relation to where other 8 villagers have placed them are found to contribute more tokens to the PG. Self-enhancement is indicated by the positive sign in the self-perceived index estimation for results in Models (4) to (6). In an extreme case of self-enhancement of status, a group member would have contributed 1.3 more tokens than an average group member if she/he have placed her/himself at top of the ladder while every co-villager place her/him at the bottom of the ladder. Hence the decision to trust the representative could also be explained by how a group member sees her/himself in the ranking and this translated to more contribution as a way for them to self-signal their perceived position in the village.

Result 5: Group members' social status as conferred by other villagers has a positive relationship with their contributions to the Group Project. A group member with high conferred status contributes more than a group member with lower status. Group members that self-perceived themselves to be high status when they are not, contributed more than group members that accurately perceived their position or did not self-enhance their position in the village.

Consistent with the results in the non-parametric test, variables that are relevant to Hypotheses 4, 6, and 7 in the regression analysis do not produce statistically significant results and are unable to explain group members' contribution behaviour. The only status of representative that matters is their belonging to the former slave strata. However, this variable is only statistically significant under Models (4) and (5). On the other hand, this variable is not statistiscally significant in the non-parametric test. Social relationship closeness towards the representative, and social relationship closeness towards the co-group member are unable to explain contribution decisions. None of the control variables in Models (4) to (6) reported statistically significant results.

Result 6: The representative's social status as a former slave might have negatively influenced group members' contributions but other social status markers of representatives and relationship closeness with group members do not explain group members' contribution to the Group Project.

Additional regressions that use the directly elicited dimension-specific social status from the session can be found in Tables 2.8A to 2.12A of the Appendix.

2.5.4 Complementarity of representative and group members in public good game

To interpret this section, we used the expected value of the multiplier attached to representative's effort, as a representative's actual task in the implemented game is to influence the probability that the high-valued multiplier will occur Each token in the GIA increases the expected value of the multiplier by 0.143. As such, full effort would result in certainty that the group will enjoy the multiplier valued at 2.5 while zero effort yields a multiplier value of 1.25.

Provision of the public good is socially optimal when; i) total tokens contributed by the two group members is 14, and ii) the representative exerted full effort to improve the probability of high value multiplier by allocating 7 blue tokens to the Group Investment Account. According to Figure 2.1 in Section 2.2, a representative would benefit from allocating effort to GIA if her/his decision corresponded to average contribution in Regions III and IV. If a representative plays her/his part by maximising effort, i.e. allocating 7 tokens to the GIA, the representative will receive benefit from public good when the average contribution is more than 70% of average endowment or 4.9 tokens. If the representative exerted effort and the average contribution to GP is less than 4.9 tokens, representative's payoff from interacting with the game is less than the zero effort and zero contribution Nash-equilibrium benchmark. On the other hand, the Nash-equilibrium of strategy of both representative and group members is to place no token to the public good.

Figure 2.4. Group members' collective contributions (tokens)

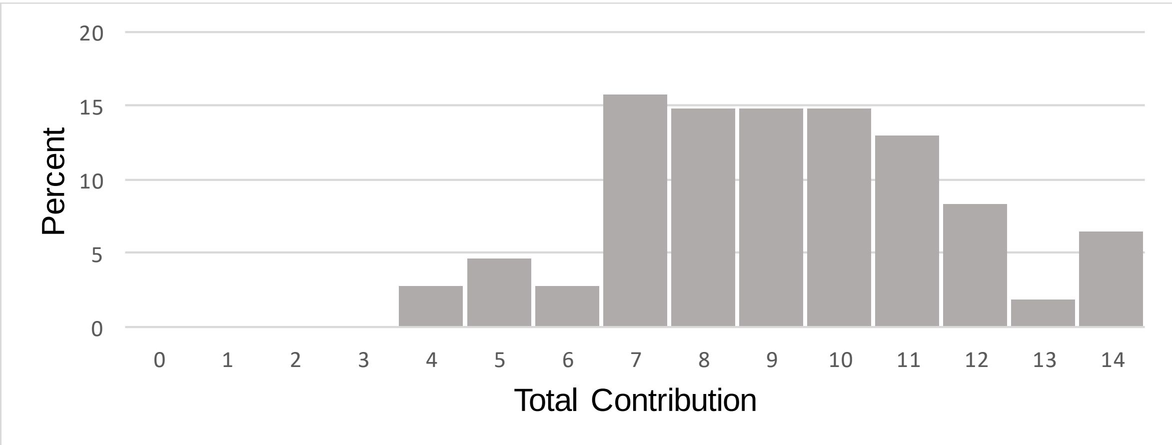


Figure 2.4 shows that in every group at least one group member is willing to cooperate and trust their representative. Groups members in 7 groups contribute all their endowment to the public good. Total contributions by group members ranged from 4 to 14 tokens with a mean of 9.19 tokens. However, only 2 out of 108 groups socially maximised the public good.

Figure 2.5. Combinations of effort and contributions for each group

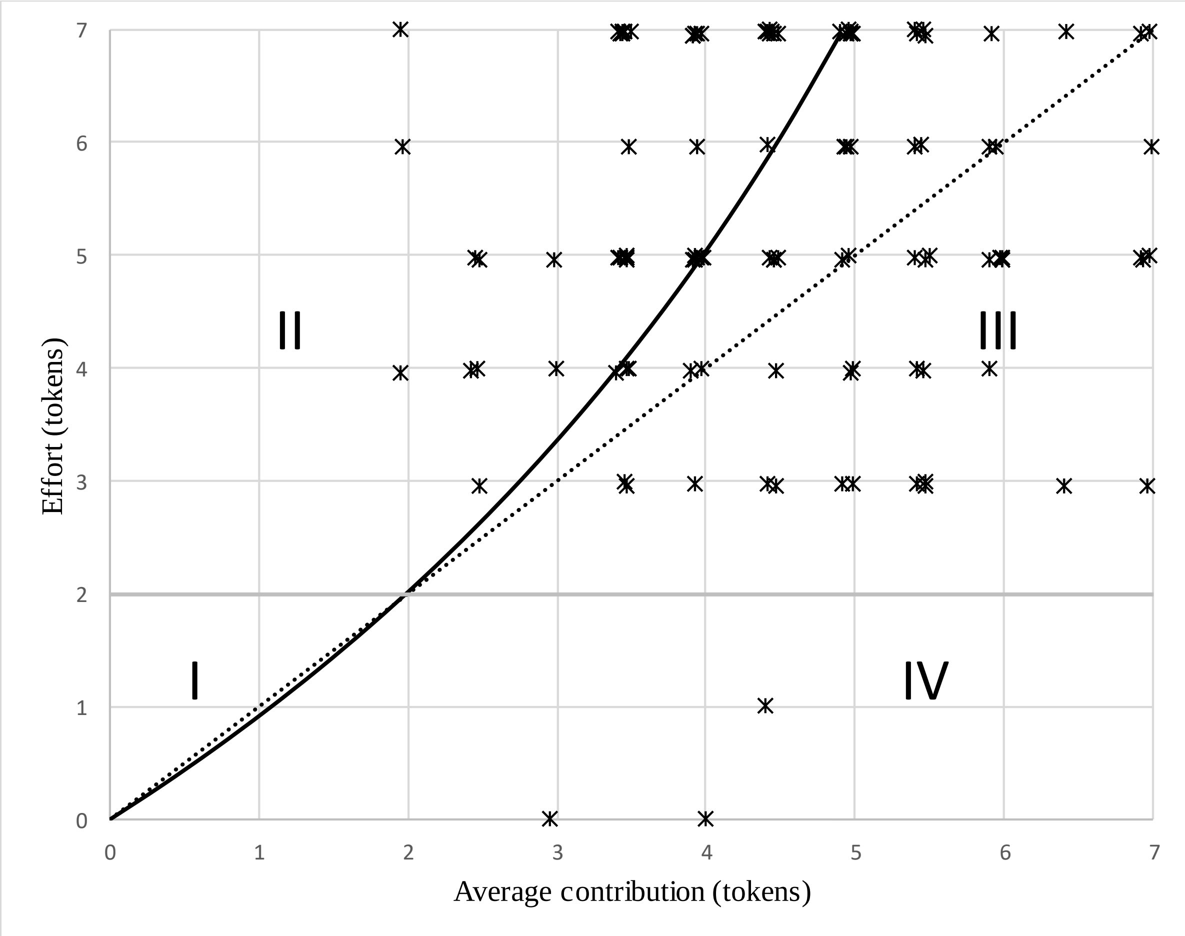


Figure 2.5 plots the combinations of effort and contributions made by representative and group members collectively. The layout of Figure 2.5 is the same as that of Figure 2.1 above, except that contributions and effort are measured in units of tokens. Recall the game, both group members made contribution to the GP and the total contribution is then communicated to the representative. A representative performed her/his function by increasing the multiplier or benefit from group members' contribution by allocating 2 tokens to the GIA, as long as any group member has placed a positive contribution to the GP. Assuming that group members have contributed, effort that is below 2 tokens indicates rent-seeking by the representative. This is represented by Region IV in the Figure 2.5.

No group made any decision that ended up in Region I. Groups that ended in Region II have a prosocial representative as she/he is willing to utilise more tokens as effort than the average contribution to increase the probability of a higher multiplier. These representatives knowingly accept disadvantageous inequality by sacrificing personal payoff to improve group members' payoff. In Region II, the representative's personal payoff is lower than the Nash-equilibrium benchmark. 32.4% or 35 representatives have knowingly accepted lower personal payoff to increase group members' payoff.

Decisions by a majority of groups are in Region III, i.e. the representative and the group members both benefit from interaction by receiving payoffs that are higher than the Nash-equilibrium benchmark. 63.9% or 70 representatives are willing to exert effort to complement group members' contributions. In Region III, 8 groups engaged in pure reciprocation as effort is equal to average contribution. There are representatives in Region III that accepted lower payoff than the average group member, as well as representatives that received more payoff that the average group member. In the area between the solid black line and the 45-degree line, everyone in the group benefits from the public good but the payoff is lower for the representative. Representatives here also willingly accept disadvantageous inequality but unlike the representatives in Region II, their effort produces benefit for them, not a cost to them. 32 or 29.6% representatives benefited from her/his effort, but their payoff is lower than the average group member. On the other hand, there are 30 or 27.8% representatives that benefited from public good and received a bigger share of benefit than the average group member. Their decisions can be found in Region III's area between the 45-degree line and the grey horizontal line. Rather than rent-seeking, these representative still perform their role while profiteering on group members' contributions.

Because a majority of representatives accept disadvantageous inequality, the average earning of representatives was MYR15.16 while the average earning of groups members was 16.91. A non-parametric test found that this difference is significant (M-W test: z = 2.431, p = 0.015). Hence, being assigned as a representative made villagers willing to accept disadvantageous inequality on behalf of the group.

Overall, effort from 64 or 59.3% of representatives resulted in M_H being implemented, while remaining 44 PGG multiplier were M_L.

Result 7: In most groups, contribution and effort levels were such that the representative and the group members benefited from the provision of the public good. A majority of representatives knowingly and willingly accepted lower individual payoff compared to the average group member.

2.6 Discussion and Conclusion

Effective leadership by the representative is crucial for a successful collective action. Here, we have introduced the concept of representative leadership using a variant of the standard public good game framework. As the role of representative in the real world is often occupied by individuals who possess higher status or better skills than the rest of the group, we incorporate social status and relationship closeness in our investigation of representative leadership. We implemented a novel experimental design among Kayan villagers in rural Sarawak using face-to-face elicitation tasks to elicit social features internalised by these villagers in their daily interactions. The elicitation exercise allowed the identification of villagers' social status position and their relationship closeness with each other. We found some evidence that the traditional strata mapped on to the social status data elicited. However, no link could be established between strength of social relationship and traditional strata. Villagers were assigned in a group of 3 in a non-anonymous experiment after the elicitation exercise. The experimental design and villagers' responses to social status and social relationship questions, and individual's decisions were not revealed to them. Our primary aim was to examine whether social status plays a role in the effectiveness of representative leadership. Social status could affect villagers through two main channels, i) the norm of *noblesse obligee* that originates from high-status to low-status villagers, and ii) the norm of deference from the low-status to high-status villagers.

In general, these Kayan villagers exhibited high level of mutual trust with each other. Most group members exhibited high level of trust to their representative to complement their contribution and their respective representatives did return her/his group's trust by exerting effort to increase the probability of high value multiplier to occur.

The general finding of this chapter is that those who were assigned randomly as their group's representative behaved prosocially and exerted effort to complement contributions from the group members. The complementarity between representative and group members did not happen through the channel of direct reciprocation, i.e. effort level being conditional to contribution level, but it came from the representative's willingness to play her/his part to improve the social outcome. This resulted in a substantial share of representatives accepting disadvantageous inequality by willingly accepting lower individual payoffs relative to the rest of the group. These results are consistent with findings from experiments that have examined other modes of representation and have found that individuals do not behave in a self-interested manner when they are making decisions on behalf of other group members (Hauge & Roberg, 2015; Song et al., 2004; Charness & Jackson, 2009).

With respect to social status, the primary finding is that representatives' decisions have positive relationships with their social status in relation to the status of the group members. The norm of *noblesse oblige* is found among these representatives and have influenced their decision-making. Representatives who are perceived by fellow-villagers as having high status, and those belonging to aristocrat strata, tend to exert higher levels of effort compared to representatives with lower status. We found weak evidence that representatives matched with higher status group members reduced their effort level. It can be interpreted that noblesse oblige produces the intended effect; high status representatives being compelled to maximize the PG's potential while low status representatives don't feel this responsibility.

A unique feature of the PGG introduced above is that effort by the representative has a positive effect on the amount of the public good produced only if there are contributions from the group members. A substantial share of group members contributed to the public good and these contributions are positively correlated with the how the group member perceived their status and how they perceived their social status position. Noting that only 4 out of 216 group members contributed nothing to the public good, we acknowledge that conducting this experiment in a face-to-face setting might have reduced the tendency of villagers to fully free ride as a group member. However, we feel the face-to-face design strengthens our results, as villagers in small-scale settings have more incentive to maintain their reputation as non-free riders in their community, particularly those that perceive themselves to be high status. Even among group members, the norm of *noblesse oblige* obligated those with high status, as determined by their own perceptions or by those of other villages, to contribute at a higher level than an average group member.

Previous works on leadership typically provide followers with a prior signal on how to act as an efficient group. This work suggests that ordinary group members have the incentive and motivation to initiate a collective action by trusting their representative leader to reciprocate their actions by increasing the group-level benefit. This work also teases out an important political economy context relevant to developing countries, whereby individuals who are deemed to be high status in their community are the ones able to contribute to high valued public good provision, regardless of their roles as a group member or as a representative.

Appendix A: Robustness checks and further testing

Table 2.1A. Breakdown on control questions comprehension by subjects (percentage of total subjects)

	Number of trials on Question 2					
Number of trials on Question 1	*1*	*2*	*3*	*4*	*5*	*Total*
1	226	33	18	3	2	282
2	10	6	1	3	0	20
3	5	0	2	0	0	7
4	1	0	0	3	2	6
5	1	0	0	0	4	5
Total	243	39	21	9	8	320

Observations from 4 subjects are missing. If a subject failed to correctly answer a control question in five tries, the research assistant assigned to them will explain the entire game. Research assistance only provided guidance in solving the control questions when subjects are wrong in the first place. A few mistakes in the first trial could be attributed to the small print on the materials used as reference.

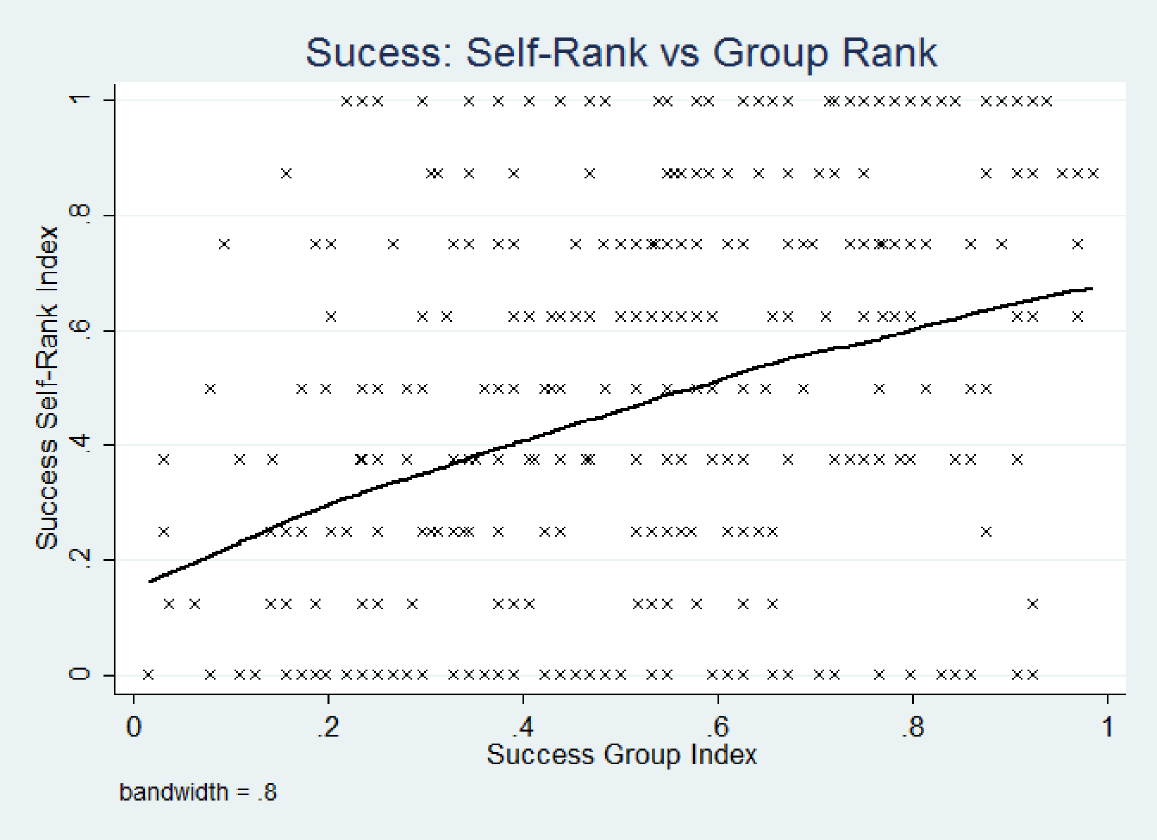
Table 2.2A. Wilcoxon signed rank test on self-perceived status dimension

Dimensions	Signed ranks test
Success = Wealth	7.332***
Success = Education	1.854*
Success = Fitness	-3.102***
Success = Extraversion	-6.017***
Wealth = Education	-4.000***
Wealth = Fitness	-7.480***
Wealth = Extraversion	-10.104***
Education = Fitness	-4.4925***
Education = Extraversion	-7.990***
Fitness = Extraversion	-4.274***

Correlations * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Interpretation for Table 2.2A: Positive test values indicate that the self-perceived status dimension on the left are ranked higher than the self-perceived status dimension on the right. Negative test values indicate the self-perceived status dimension on the left is ranked lower than the self-perceived status dimension on the right. For example, success = wealth yields a value of 7.332, meaning that in general villagers tend to perceive their own success at higher rank than their own wealth. Similarly, in education = extraversion that yields a value of -7.990 indicates that in general villagers tend to perceive their own education at lower rank than their extraversion rank.

Figure 2.1A. Success dimension dispersion: Self-rank vs, group rank



Correlation: 0.35***, z = -2.369**

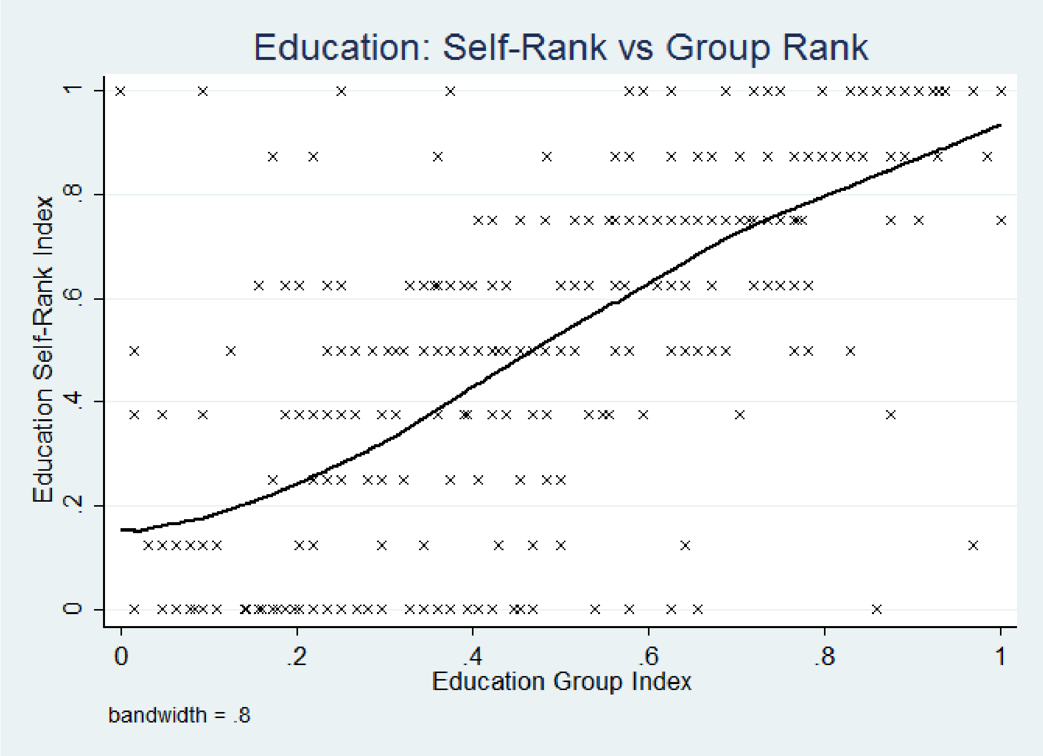
Interpretation of Figure 2.1A: The fitted line indicates that there is low positive correlation between self-perceived rank in success dimension with the success status assigned by the 8 villagers in a session. The scatter points at the bottom of the graph indicate that there are villagers the perceived themselves as the least successful villager among the 9 villagers, but the other 8 villagers place this villager at higher status ranking. The scatter points at the top of the graph shows the villagers that perceived themselves as the most successful villagers among the 9 villagers.

Figure 2.2A. Wealth dimension dispersion: Self-rank vs. group rank

Correlation: 0.41*** z= -9.52***

Interpretation of Figure 2.2A: The fitted line indicates that there is low positive correlation between self-perceived rank in wealth with the wealth status assigned by the 8 villagers in a session. The scatter points at the bottom of the graph indicate that there are villagers the perceived themselves as the least wealthy villager among the 9 villagers, but the other 8 villagers place this villager at higher status ranking. The scatter points at the top of the graph shows the villagers that perceived themselves as the wealthiest villagers among the 9 villagers. The scatter points tend to populate the bottom half of the fitted line indicating that villagers are more likely to self-efface the status of their wealth.

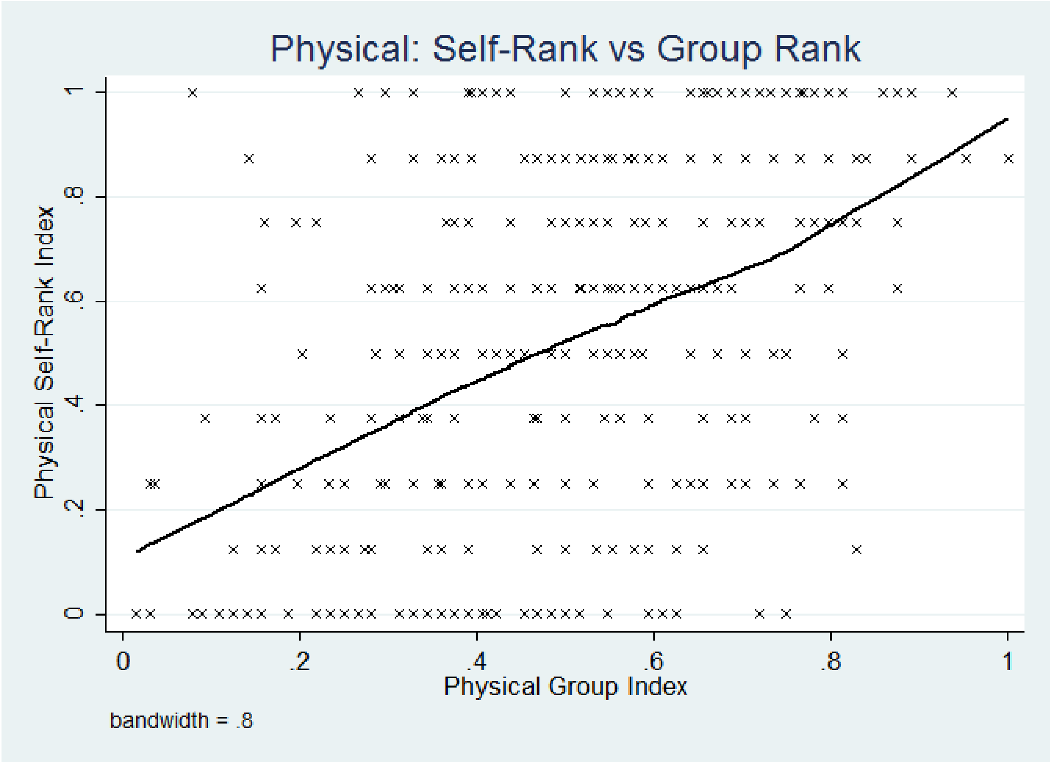
Figure 2.3A. Education dimension dispersion: Self-rank vs. group rank



Correlation: 0.51*** z = -5.70***

Interpretation of Figure 2.3A: The fitted line indicates that there is moderately positive correlation between self-perceived rank in education with the education status assigned by the 8 villagers in a session. The scatter points at the bottom of the graph indicate that there are villagers the perceived themselves as the least educated villager among the 9 villagers, but the other 8 villagers place this villager at higher status ranking. The scatter points at the top of the graph shows the villagers that perceived themselves as the most educated villagers among the 9 villagers.

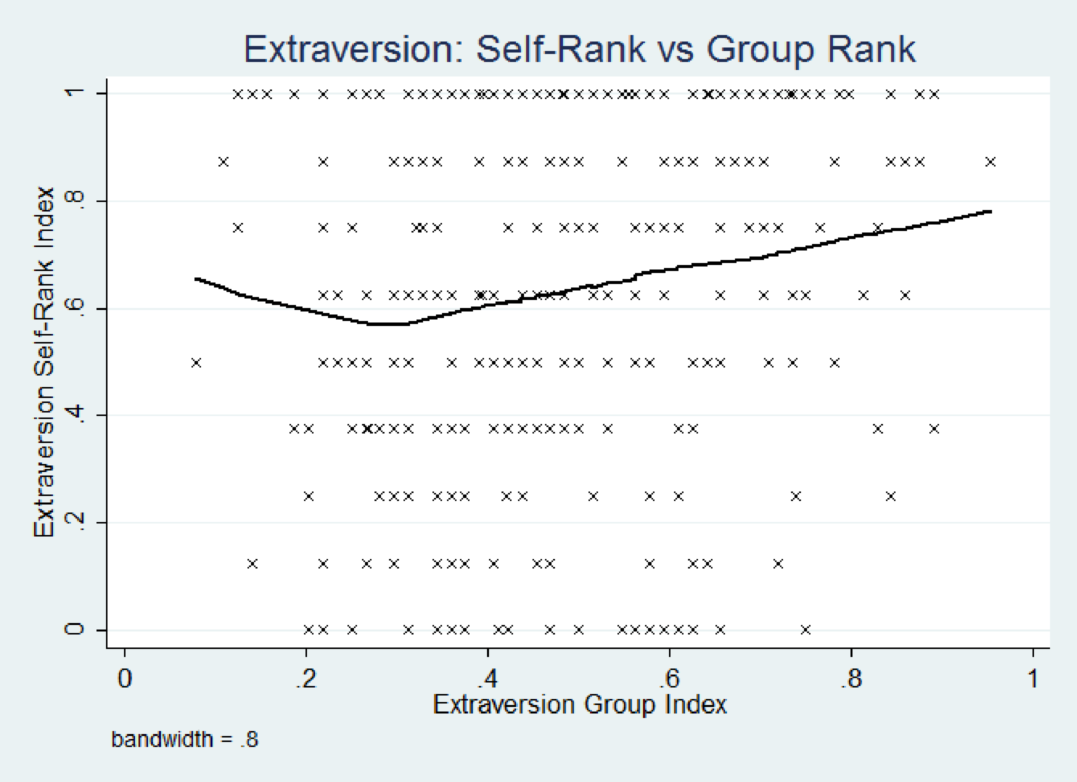
Figure 2.4A. Physical fitness dimension dispersion: Self-rank vs. group rank



Correlation: 0.44*** z= 0.941

Interpretation of Figure 2.4A: The fitted line indicates that there is low positive correlation between self-perceived rank in physical fitness with the physical fitness status assigned by the 8 villagers in a session. The scatter points at the bottom of the graph indicate that there are villagers the perceived themselves as the least physically fit villager among the 9 villagers, but the other 8 villagers place this villager at higher status ranking. The scatter points at the top of the graph shows the villagers that perceived themselves as the most physically villagers among the 9 villagers.

Figure 2.5A. Extraversion dimension dispersion: Self-rank vs. group rank



Correlation: 0.13**; z = 6.2***

Interpretation of Figure 2.5A: The fitted line indicates that there is very low positive correlation between self-perceived rank in extraversion with the extraversion status assigned by the 8 villagers in a session. The scatter points at the bottom of the graph indicate that there are villagers the perceived themselves as the least extravert villager among the 9 villagers, but the other 8 villagers place this villager at higher status ranking. The scatter points at the top of the graph shows the villagers that perceived themselves as the most extravert villagers among the 9 villagers.

Table 2.3A. Robustness check for success dimension (representative)

VARIABLES	No controls (1)	GM's status (2)	Village level effect (3)	Rep's control (4)	GM's control (5)
Success z-index	0.983	1.086	1.512**	1.777**	1.720**
	(0.639)	(0.708)	(0.727)	(0.867)	(0.843)
Aristocrat	1.032**	1.121**	0.885	0.876	0.624
	(0.496)	(0.505)	(0.662)	(0.693)	(0.689)
Proxy slave	0.337	0.372	0.201	0.193	0.254
	(0.350)	(0.374)	(0.400)	(0.435)	(0.486)
Total tokens from group members	0.0691	0.0603	0.0552	0.0683	0.0771
	(0.0610)	(0.0644)	(0.0670)	(0.0697)	(0.0745)
Status index control (self-perceived index)				-0.118	0.261
				(0.425)	(0.486)
Group members' status					
Group members' z -index		1.035	0.929	0.559	0.541
		(1.030)	(0.958)	(1.051)	(1.142)
Aristocrat		-0.322	-0.897*	-0.875	-1.038*
		(0.403)	(0.536)	(0.557)	(0.583)
Proxy slave		0.0760	-0.226	-0.153	0.00424
		(0.408)	(0.597)	(0.636)	(0.659)
Dispersion in IOS score		-0.0440	-0.0907	-0.0421	-0.0987
		(0.115)	(0.121)	(0.132)	(0.142)
Constant	4.041***	3.650***	4.106***	4.938***	4.992***
	(0.711)	(0.901)	(1.040)	(1.160)	(1.501)
Representative's controls	No	No	No	Yes	Yes
Group members' controls	No	No	No	No	Yes
Village fixed effect	No	No	Yes	Yes	Yes
Observations	108	108	108	107	103
R-squared	0.070	0.087	0.302	0.319	0.372

Table 2.4A. Robustness check for wealth dimension (representative)

VARIABLES	No controls (1)	GM's status (2)	Village level effect (3)	Rep's control (4)	GM's control (5)
Wealth z-index	0.367	0.650	1.119	1.497*	1.508*
	(0.611)	(0.642)	(0.680)	(0.854)	(0.906)
Aristocrat	1.094**	1.268**	1.020	0.990	0.693
	(0.521)	(0.535)	(0.737)	(0.765)	(0.773)
Proxy slave	0.400	0.425	0.202	0.172	0.221
	(0.357)	(0.368)	(0.393)	(0.434)	(0.479)
Total tokens from group members	0.0709	0.0620	0.0543	0.0752	0.0759
	(0.0608)	(0.0616)	(0.0644)	(0.0661)	(0.0703)
Status index control				0.512	0.193
(self-perceived index)				(0.514)	(0.593)
Group members' status					
Group members' z -index		1.540	1.446	1.171	1.244
		(0.992)	(0.958)	(0.960)	(1.211)
Aristocrat		-0.303	-0.896	-0.875	-0.984
		(0.406)	(0.579)	(0.608)	(0.619)
Proxy slave		0.0565	-0.312	-0.285	-0.108
		(0.420)	(0.628)	(0.669)	(0.710)
Dispersion in IOS score		-0.0235	-0.0628	-0.0191	-0.0691
		(0.116)	(0.121)	(0.131)	(0.143)
Constant	4.319***	3.520***	3.887***	4.586***	4.782***
	(0.699)	(1.016)	(1.135)	(1.224)	(1.585)
Representative's controls	No	No	No	Yes	Yes
Group members' controls	No	No	No	No	Yes
Village fixed effect	No	No	Yes	Yes	Yes
Observations	108	108	108	107	103
R-squared	0.070	0.087	0.302	0.319	0.372

Table 2.5A. Robustness check for education dimension (representative)

VARIABLES	No controls (1)	GM's status (2)	Village level effect (3)	Rep's control (4)	GM's control (5)
Education z-index	0.757	0.905	1.291*	1.753**	1.347
	(0.664)	(0.667)	(0.704)	(0.787)	(0.857)
Aristocrat	1.010*	0.990*	0.709	0.651	0.228
	(0.517)	(0.516)	(0.714)	(0.802)	(0.763)
Proxy slave	0.531	0.557	0.478	0.287	0.240
	(0.361)	(0.382)	(0.430)	(0.450)	(0.501)
Total tokens from group members	0.0729	0.0639	0.0611	0.0789	0.0605
	(0.0601)	(0.0675)	(0.0713)	(0.0738)	(0.0785)
Status index control				0.675	0.0710
(self-perceived index)				(0.679)	(0.748)
Group members' status					
Group members' z -index		0.624	0.820	0.690	1.923*
		(0.849)	(0.839)	(0.896)	(1.079)
Aristocrat		-0.274	-0.851	-0.884	-1.104*
		(0.409)	(0.570)	(0.601)	(0.616)
Proxy slave		-0.0548	-0.522	-0.374	-0.437
		(0.413)	(0.620)	(0.690)	(0.674)
Dispersion in IOS score		-0.00494	-0.0336	0.00927	-0.0736
		(0.116)	(0.117)	(0.133)	(0.138)
Constant	4.124***	3.897***	4.092***	3.440**	2.735
	(0.743)	(0.877)	(1.018)	(1.364)	(2.013)
Representative's controls	No	No	No	Yes	Yes
Group members' controls	No	No	No	No	Yes
Village fixed effect	No	No	Yes	Yes	Yes
Observations	108	108	108	107	103
R-squared	0.061	0.069	0.286	0.309	0.363

Table 2.6A. Robustness check for physical fitness dimension (representative)

VARIABLES	No controls (1)	GM's status (2)	Village level effect (3)	Rep's control (4)	GM's control (5)
Physical z-index	0.623	0.614	0.678	0.788	1.091
	(0.745)	(0.782)	(0.813)	(0.852)	(0.954)
Aristocrat	1.147**	1.163**	1.009	1.041	0.816
	(0.507)	(0.508)	(0.732)	(0.786)	(0.816)
Proxy slave	0.552	0.569	0.457	0.278	0.401
	(0.395)	(0.407)	(0.452)	(0.443)	(0.501)
Total tokens from group members	0.0670	0.0663	0.0683	0.0813	0.0730
	(0.0579)	(0.0625)	(0.0686)	(0.0726)	(0.0755)
Status index control				0.0759	0.0371
(self-perceived index)				(0.498)	(0.565)
Group members' status					
Group members' z -index		-0.147	-0.568	-0.805	-0.0715
		(1.112)	(1.057)	(1.129)	(1.248)
Aristocrat		-0.181	-0.677	-0.664	-0.788
		(0.411)	(0.552)	(0.595)	(0.639)
Proxy slave		-0.0588	-0.492	-0.345	-0.245
		(0.408)	(0.616)	(0.665)	(0.682)
Dispersion in IOS score		0.0170	0.00141	0.0544	0.00679
		(0.119)	(0.121)	(0.133)	(0.145)
Constant	4.219***	4.333***	4.930***	5.042***	4.597**
	(0.775)	(1.022)	(1.161)	(1.384)	(1.869)
Representative's controls	No	No	No	Yes	Yes
Group members' controls	No	No	No	No	Yes
Village fixed effect	No	No	Yes	Yes	Yes
Observations	108	108	108	107	103
R-squared	0.055	0.058	0.263	0.284	0.328

Table 2.7A. Robustness check for outgoingness dimension (representative)

VARIABLES	No controls (1)	GM's status (2)	Village level effect (3)	Rep's control (4)	GM's control (5)
Outgoing z-index	0.377	0.609	0.723	0.128	0.105
	(0.785)	(0.828)	(0.819)	(0.896)	(0.909)
Aristocrat	1.134**	1.127*	0.981	0.903	0.522
	(0.520)	(0.577)	(0.781)	(0.799)	(0.797)
Proxy slave	0.459	0.450	0.269	0.318	0.351
	(0.350)	(0.366)	(0.362)	(0.417)	(0.458)
Total tokens from group members	0.0731	0.0730	0.0645	0.0696	0.0790
	(0.0608)	(0.0626)	(0.0662)	(0.0689)	(0.0736)
Status index control				0.824	0.931*
(self-perceived index)				(0.532)	(0.521)
Group members' status					
Group members' z -index		2.053	2.423	1.585	1.680
		(1.653)	(1.488)	(1.566)	(1.771)
Aristocrat		-0.215	-0.751	-0.825	-0.963
		(0.422)	(0.598)	(0.618)	(0.650)
Proxy slave		-0.0638	-0.642	-0.491	-0.365
		(0.385)	(0.564)	(0.569)	(0.567)
Dispersion in IOS score		-0.00835	-0.0334	0.0210	-0.0301
		(0.119)	(0.122)	(0.133)	(0.140)
Constant	4.296***	3.260**	3.417**	4.709***	4.406**
	(0.782)	(1.312)	(1.440)	(1.479)	(2.017)
Representative's controls	No	No	No	Yes	Yes
Group members' controls	No	No	No	No	Yes
Village fixed effect	No	No	Yes	Yes	Yes
Observations	108	108	108	107	103
R-squared	0.051	0.073	0.280	0.314	0.361

Table 2.8A. Robustness check for success dimension (group members)

VARIABLES	No controls 1	Rep's status 2	Village level effect 3	GM's control 4	Rep's control 5	Co-GM's control 6
Success z-index	1.222**	1.126**	0.946*	1.474**	1.518**	1.553**
	(0.529)	(0.549)	(0.560)	(0.612)	(0.620)	(0.677)
Aristocrat	-0.0713	-0.116	0.143	0.123	0.151	0.152
	(0.373)	(0.402)	(0.437)	(0.457)	(0.460)	(0.473)
Proxy Slave	-0.114	-0.159	0.00829	-0.0140	0.0309	0.0744
	(0.290)	(0.293)	(0.389)	(0.379)	(0.389)	(0.403)
Status index control				0.875*	0.899**	0.894**
(self-perceived index)				(0.444)	(0.438)	(0.443)
Representative's status						
Representative's z-index		0.113	0.248	0.253	0.123	0.0935
		(0.575)	(0.557)	(0.542)	(0.585)	(0.586)
Aristocrat		0.297	0.565	0.500	0.731	0.527
		(0.486)	(0.515)	(0.534)	(0.576)	(0.614)
Proxy slave		-0.428	-0.533	-0.522	-0.565	-0.566
		(0.357)	(0.385)	(0.365)	(0.357)	(0.377)
IOS score to rep		-0.0429	-0.0702	-0.0710	-0.0894	-0.105
		(0.0675)	(0.0643)	(0.0644)	(0.0641)	(0.0710)
Constant	4.010***	4.253***	4.763***	4.122***	3.556***	3.902***
	(0.293)	(0.465)	(0.722)	(0.949)	(1.074)	(1.483)
Group member's control	No	No	No	Yes	Yes	Yes
Representative's control	No	No	No	No	Yes	Yes
Village fixed effect	No	No	Yes	Yes	Yes	Yes
Observations	216	215	215	213	211	210
R-squared	0.025	0.037	0.097	0.137	0.149	0.161

Table 2.9A. Robustness check for wealth dimension (group members)

VARIABLES	No controls 1	Rep's status 2	Village level effect 3	GM's control 4	Rep's control 5	Co-GM's control 6
Wealth z-index	0.543	0.490	0.358	1.013	1.035	0.972
	(0.527)	(0.546)	(0.563)	(0.644)	(0.644)	(0.667)
Aristocrat	-0.0316	-0.104	0.177	0.122	0.135	0.143
	(0.375)	(0.408)	(0.434)	(0.453)	(0.454)	(0.470)
Proxy Slave	-0.119	-0.138	0.0259	-0.0120	0.0301	0.0719
	(0.290)	(0.290)	(0.374)	(0.352)	(0.364)	(0.379)
Status index control				0.829*	0.902*	0.916*
(self-perceived index)				(0.458)	(0.474)	(0.490)
Representative's status						
Representative's z-index		0.479	0.592	0.511	0.488	0.438
		(0.486)	(0.479)	(0.487)	(0.577)	(0.597)
Aristocrat		0.269	0.578	0.506	0.759	0.585
		(0.482)	(0.483)	(0.492)	(0.526)	(0.550)
Proxy slave		-0.533	-0.647*	-0.639*	-0.655*	-0.641
		(0.352)	(0.388)	(0.382)	(0.383)	(0.394)
IOS score to rep		-0.0434	-0.0706	-0.0529	-0.0666	-0.0666
		(0.0666)	(0.0641)	(0.0669)	(0.0682)	(0.0790)
Constant	4.339***	4.393***	4.902***	4.552***	4.286***	4.704***
	(0.297)	(0.499)	(0.783)	(0.926)	(1.066)	(1.462)
Group member's control	No	No	No	Yes	Yes	Yes
Representative's control	No	No	No	No	Yes	Yes
Village fixed effect	No	No	Yes	Yes	Yes	Yes
Observations	216	215	215	215	213	212
R-squared	0.006	0.023	0.088	0.119	0.128	0.135

Table 2.10A. Robustness check for education dimension (group members)

VARIABLES	No controls 1	Rep's status 2	Village level effect 3	GM's control 4	Rep's control 5	Co-GM's control 6
Education z-index	0.734*	0.779*	0.772*	1.091	1.049	1.203
	(0.439)	(0.443)	(0.462)	(0.689)	(0.696)	(0.739)
Aristocrat	-0.0410	-0.0885	0.197	0.135	0.142	0.109
	(0.368)	(0.393)	(0.420)	(0.469)	(0.470)	(0.495)
Proxy Slave	-0.158	-0.215	-0.0653	-0.0886	-0.0323	-0.0136
	(0.293)	(0.291)	(0.369)	(0.377)	(0.392)	(0.412)
Status index control				-0.655	-0.674	-0.775
(self-perceived index)				(0.447)	(0.487)	(0.517)
Representative's status						
Representative's z-index		0.205	-0.130	-0.190	-0.0996	-0.162
		(0.521)	(0.545)	(0.559)	(0.703)	(0.692)
Aristocrat		0.197	0.534	0.428	0.618	0.400
		(0.478)	(0.509)	(0.497)	(0.533)	(0.543)
Proxy slave		-0.450	-0.550	-0.602*	-0.638	-0.650
		(0.318)	(0.357)	(0.361)	(0.388)	(0.403)
IOS score to rep		-0.0318	-0.0482	-0.0386	-0.0507	-0.0550
		(0.0694)	(0.0684)	(0.0671)	(0.0680)	(0.0804)
Constant	4.255***	4.348***	4.913***	4.328***	3.975***	4.194***
	(0.252)	(0.477)	(0.704)	(0.975)	(1.201)	(1.543)
Group member's control	No	No	No	Yes	Yes	Yes
Representative's control	No	No	No	No	Yes	Yes
Village fixed effect	No	No	Yes	Yes	Yes	Yes
Observations	216	215	215	215	213	212
R-squared	0.013	0.030	0.094	0.113	0.119	0.131

Table 2.11A. Robustness check for physical fitness dimension (group members)

VARIABLES	No controls 1	Rep's status 2	Village level effect 3	GM's control 4	Rep's control 5	Co-GM's control 6
Physical z-index	1.093*	1.294**	1.431**	1.847**	1.753**	1.766**
	(0.591)	(0.590)	(0.595)	(0.721)	(0.733)	(0.723)
Aristocrat	0.0721	0.0557	0.390	0.402	0.397	0.403
	(0.368)	(0.406)	(0.436)	(0.462)	(0.470)	(0.479)
Proxy Slave	-0.0993	-0.176	-6.79e-05	0.0148	0.0713	0.0876
	(0.302)	(0.294)	(0.370)	(0.379)	(0.396)	(0.409)
Status index control				0.0298	-0.0407	-0.104
(self-perceived index)				(0.398)	(0.397)	(0.415)
Representative's status						
Representative's z-index		0.896	0.636	0.644	1.023	0.968
		(0.554)	(0.591)	(0.615)	(0.733)	(0.747)
Aristocrat		0.204	0.500	0.282	0.482	0.275
		(0.544)	(0.535)	(0.491)	(0.546)	(0.584)
Proxy slave		-0.311	-0.406	-0.425	-0.471	-0.497
		(0.331)	(0.369)	(0.364)	(0.376)	(0.392)
IOS score to rep		-0.0534	-0.0778	-0.0685	-0.0822	-0.0891
		(0.0656)	(0.0624)	(0.0624)	(0.0629)	(0.0754)
Constant	4.048***	3.803***	4.302***	3.167***	2.296*	2.797
	(0.329)	(0.575)	(0.829)	(1.114)	(1.378)	(1.687)
Group member's control	No	No	No	Yes	Yes	Yes
Representative's control	No	No	No	No	Yes	Yes
Village fixed effect	No	No	Yes	Yes	Yes	Yes
Observations	216	215	215	213	211	210
R-squared	0.017	0.045	0.109	0.133	0.142	0.150

Table 2.12A. Robustness check for outgoingness dimension (group members)

VARIABLES	No controls 1	Rep's status 2	Village level effect	GM's control 4	Rep's control 5	Co-GM's control 6
Outgoing z-index	0.919	1.145	1.209	1.343	1.192	1.169
	(0.725)	(0.726)	(0.800)	(0.910)	(0.931)	(0.948)
Aristocrat	-0.0284	-0.0949	0.183	0.257	0.296	0.298
	(0.374)	(0.406)	(0.431)	(0.441)	(0.447)	(0.462)
Proxy Slave	-0.158	-0.224	-0.109	-0.0193	0.0473	0.0910
	(0.294)	(0.289)	(0.385)	(0.393)	(0.408)	(0.420)
Status index control				0.259	0.270	0.215
(self-perceived index)				(0.365)	(0.383)	(0.394)
Representative's status						
Representative's z-index		0.354	0.208	0.145	0.0306	0.0103
		(0.617)	(0.630)	(0.652)	(0.686)	(0.697)
Aristocrat		0.260	0.592	0.390	0.583	0.360
		(0.448)	(0.462)	(0.471)	(0.511)	(0.545)
Proxy slave		-0.476	-0.578	-0.568	-0.604	-0.623
		(0.324)	(0.360)	(0.350)	(0.376)	(0.388)
IOS score to rep		-0.0587	-0.0844	-0.0672	-0.0790	-0.0937
		(0.0678)	(0.0644)	(0.0638)	(0.0641)	(0.0764)
Constant	4.181***	4.238***	4.700***	4.384***	4.035***	4.379***
	(0.382)	(0.543)	(0.864)	(1.009)	(1.171)	(1.538)
Group member's control	No	No	No	Yes	Yes	Yes
Representative's control	No	No	No	No	Yes	Yes
Village fixed effect	No	No	Yes	Yes	Yes	Yes
Observations	216	215	215	214	212	211
R-squared	0.008	0.028	0.093	0.109	0.117	0.129

Appendix B: Instructions for the Public Good Game

B1. English Instructions Script

This Activity C. You have the chance to increase your earnings in this Activity.

You will make a decision as a member of a group. You are a member of one of the following group of 3 individuals: Circle, Triangle, or Square.

<Point to the tag and desks>

The identities of the members of your group are known to you but the information about your personal/individual decisions in this activity will be kept private from the other members of your group.

*Your turn to decide and your task will be determined by the role assigned to you. Your role is one of the following; **MEMBER A1, MEMBER A2** or **MEMBER B.** MEMBER A1 and MEMBER A2 will make their decisions first. MEMBER B will make his/her decision after MEMBER A1 and MEMBER A2.*

After I have read the instructions for this activity, you will be told your role.

Regardless of your turn and role, you will receive an endowment of 7 blue tokens.

Task of Member A1 and Member A2

*The task for MEMBER A1 and MEMBER A2 is to decide how many tokens each of them would like to allocate to a **Group Project** and how many to keep in an **Individual Account**. Member A1 will have A1 Individual Account; Member A2 will have A2 Individual Account. Both Member A1 and Member A2 can allocate any number of blue tokens from 0 to 7; it can be 0, 1, 2, 3, 4, 5, 6 or 7 to the Group Project. The tokens not allocated to the Group Project will be allocated to their respective Individual Accounts.*

Only MEMBER A1 or A2 can allocate tokens to the Group Project.

Members A1 and A2 will make their decisions privately at their Group Desk. Member A1 and A2 will place the blue tokens that she/he wants to allocate to the Group Project in the box labelled with his/her role on the desk. For example this is a box for Member A1. <Session Leader (SL) shows a box labelled A1 to the subjects>*Tokens left in envelope by Member A1 and Member A2 will be automatically allocated to his/her Individual Account.*

The decision of Member A1 will not be revealed to Member A2, or vice versa. The decisions of Members A1 and A2 will never be revealed to Member B.

After both A1 and A2 have placed tokens in their respective boxes, the tokens in the two boxes will be added up. The total can be any of the following; 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13 or 14.

*Turn to page **PG1**.*

Any question on the task and role of Member A1 and A2?

<Pause>

Task of Member B

Member B will make his/her decision after Members A1 and A2 have made their decisions.

*Before making a decision, Member B will be informed of the **total** number of tokens allocated to the Group Project by Members A1 and A2. Member B will only be informed of the total, and not the individual allocations made by Member A1 or A2.*

*Member B's task is to decide how many tokens she/he would like to allocate to a **Group Investment Account** and how many to keep for her/himself in an **Individual Account**. Member B can allocate any number of tokens from 0 to 7; it can be 0, 1, 2, 3..., or 7, to the Group Investment Account. The tokens not allocated to the Group Investment Account will be allocated to his/her Individual Account.*

Note that the Group Investment Account is different from the Group Project. Only Member B can allocate tokens to the Group Investment Account.

Member B will make his/her decision privately at his/her Group Desk. Member B will place the tokens she/he wants to allocate to the Group Investment Account on top of a black bag on the table. <SL shows the black bag to the subjects>. *Tokens left in the envelope will be automatically allocated to his/her Individual Account.*

Member A1 and MemberA2 will never be informed of Member B's decision.

*Turn to **PG2**.*

Any question on the task and role of Member B?

<Pause>

Earnings

*You will receive earnings from your Individual Account, AND from the **value** of tokens in the Group Project.*

Earnings from your Individual Account: Regardless of whether you are assigned as Member A1, A2 or B, you will receive RM 2.00 for each blue token you allocate to your Individual Account.

*Earnings from the Group Project: The **value of the Group Project** will be divided **equally** among all three members of your group (Members A1, A2 and B). The value of the Group Project depends on two things:*

(i) the total number of blue tokens allocated to the Group Project by Members A1 and A2.

This is determined by the decisions of Members A1 and A2 as explained.

*(ii) the value of each token in the Group Project, which will be determined by the number of tokens allocated to the Group Investment Account by Member B **and** chance.*

Your earnings in this Activity = Earnings from your Individual Account

+ Earnings from the Group Project

*Turn to **PG3**.*

Do you have any question on the earnings for this Activity?

<Pause>

Let's see about how the value of tokens in Group Project will be determined.

The Group Investment Account bag will contain 10 tokens at all times, regardless of the colour of the tokens. In its original state, this bag has 10 white tokens.<SL pause for a while an RA counts from 1 to 10 and progressively adding 1 white token to the bag until 10 tokens are in the bag.> *For every blue token that is placed on top of this bag by Member B, 1 white token will be removed and will be replaced with 1 blue token. For instance, if Member B allocated 3 tokens to the Group Investment Account, we will add the 3 blue tokens to the bag and remove 3 white tokens from the bag. The bag will then contain 3 blue tokens and 7 white tokens. Note that there can be a maximum of 7 blue tokens in the bag, i.e., there will always be a minimum of 3 white tokens in the bag.*

We will then draw one token at random from the bag.

If the token drawn is blue, the Group Project is 'successful', and each token in the Group Project will be worth RM 5.00. The value of the Group Project is then the total number of tokens in the Group Project (allocated by Members A1 and A2) multiplied by RM 5.00.

If the token drawn is white, the Group Project is 'unsuccessful', and each token in the Group Project will be worth RM 2.50. The value of the Group Project is then the total number of tokens in the Group Project (allocated by Members A1 and A2) multiplied by RM 2.50.

Note: The minimum chance of 'success' is 0% - this occurs when Member B allocates 0 tokens to the Group Investment Account. The maximum chance of 'success' is 70% - this occurs when Member B allocates 7 tokens to the Group Investment Account. Thus, even if Member B allocates all 7 blue tokens to the Group Investment Account, there is still a 30% chance that the Project is 'unsuccessful'.

Each member of your group (Members A1, A2 and B) will receive an equal share (one-third) of the value of the Group Project. Each member of your group (A1, A2 and B) will receive the same earnings from the Group Project, regardless of their individual allocation decisions.

Note that:

(a) The greater the number of blue tokens allocated to the Group Project by Members A1 and A2, the greater the value of the Group Project, whether or not the Project is 'successful'.

(b) The greater the number of blue tokens allocated to the Group Investment Account by Member B, the greater the chance that the tokens in the Group Project will be worth RM 5.00 each (i.e., the Project is 'successful').

*Turn to **PG4**.*

Any question on the determination of earnings from Group Project?

<Pause>

We will go through two examples.

Example 1*: Suppose Member A1 allocates 3 blue tokens to the Group Project and Member A2 allocates 6 blue tokens to the Group Project. The total number of blue tokens in the Group Project is 9. Suppose Member B allocates 4 blue tokens to the Group Investment Account. The chance that the Group Project is 'successful' is 40%.*

If a blue token is drawn from the bag, the value of the Group Project is RM 5.00 × 9 = RM 45.00. Each member of your group will receive RM 15.00 from the Group Project. If a white token is drawn from the bag, the value of the Group Project is RM 2.50 × 9 = RM 22.50. Each member of your group will receive RM 7.50 from the Group Project.

In either case, each member also receives RM 2.00 × the number of blue tokens allocated to their Individual Accounts.

Example 2*: Suppose Member A1 allocates 0 blue tokens to the Group Project and Member A2 allocates 0 blue tokens to the Group Project. The total number of blue tokens in the Group Project is 0. In this case, it does not matter how many blue tokens Member B allocates to the Group Investment Account. Even if the project is successful, the value of the Group Project will be RM 5.00 × 0 tokens = RM 0. In this case, each member only receives RM 2.00 × the number of blue tokens allocated to their Individual Accounts.*

*Turn to **PG5** to see few more examples on earnings from Group Project.*

The draw from the Group Investment Account bag will be done after this Activity. We will not inform you whether the draw resulted in a blue or white token. You will be paid accordingly.

Are there any questions?

<Pause>

Role Assignment

*RA1, RA2, and RA3 will approach you with a bag filled with envelopes. Pick an envelope from the bag. In each envelope you will find 7 blue tokens as your endowment and a card labelled one of the following; **A1, A2** or **B.** This is your role in this activity. You will make your decision at your Group Desk when it is your turn.*

<All RAs will approach each subject to pick an envelope from the bag in their hands>

Open your envelope. Check that you have 7 blue tokens and take out the card. Place this card in the card holder. Observe your group members and their roles.

<RAs will place A4-label that identifies subjects' role in front of each subject's desk. SL will record subjects' role assignment>

Subjects' Decision Stage

I will call you in turn. When it is your turn, please come to your Group Desk. Come along with your envelope and tokens. There will be an RA at your Group Desk. This RA will ask you several questions to ensure that you understand the instructions. You are provided with the pages from the booklet C so you can refer to it when you are answering the questions. Once it is clear that you have understood the instructions, the RA will leave you at the desk to make your decision. Signal to your RA once you have competed your task. The RA will ask you several short questions. Then, he/she will dismiss you.

MEMBER A1/A2, please approach the Group desk.

<RA1, RA2 and RA3 will check for Member A1/A2 comprehension. Leave the subject when they make their decisions. Wait for the signal from Member A1/A2.Verbally ask the Additional Member A1 & A2 Questions and record their responses. Dismiss Member A1/A2 >

<RA1, RA2, and RA3 will collect Member A1 & A2 box from the Group Desk. RA1, RA2 and RA3 will open Member A1 and Member A2 boxes, mentally summed the content of the box. RA1, RA2, and RA3 will circle the number on **PG6** that correspond with summation of allocation from Member A1 and Member A2 >

Member B, please approach your Group Desk.

<RA1, RA2, and RA3 will place a black bag on the table and 10 white tokens. RAs will check for Member B comprehension on the instructions. RAs will show **PG6** with a number circled. RAs will set up the bag for investment draw in front of Member B. Verbally ask the Additional Member A2 Question and record their responses. Dismiss Member B. >

-End of Instructions-

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B2. Malay-language Instructions Script

Ini Aktiviti C. Anda ada peluang untuk tambah pendapatan anda dengan Activiti ini.

Anda akan buat satu keputusan sebagai seorang ahli kumpulan. Anda adalah ahli kepada salah satu kumpulan yang ada 3 ahli, iaitu Kumpulan Bulat, Segitiga atau Segieempat.

<Point to the tag and desks>

Anda tahu identity ahli kumpulan anda tetapi maklumat tentang keputusan anda akan dirahsiakan dari ahli kumpulan anda.

Giliran dan tugas anda akan ditentukan dengan peranan yang diberi. Peranan anda adalah; ***AHLI A1, AHLI A2*** *atau* ***AHLI B.*** *Ahli A1 dan Ahli A2 akan buat keputusan mereka dulu. Ahli B akan buat keputusan dia lepas Ahli A1 dan Ahli A2.*

Lepas saya baca aturan aktiviti ini, peranan anda akan diberitahu.

Tak kira giliran dan tugas, anda akan terima 7 token biru sebagai anugerah.

Tugas Ahli A1 dan Ahli A2

Ahli A1 dan A2 kena putuskan sendirian berapa token mahu diletakkan pada Projek Kumpulan *dan berapa mahu diletakkan pada Akaun Sendiri. Ahli A1 ada Akaun Sendiri A1. Ahli A2 ada Akaun Sendiri A2. Ahli A1 dan Ahli A2 boleh letak seberapa banyak token biru dari 0 ke 7; boleh jadi 0, 1, 2, 3, 4, 5, 6, atau 7. Token yang tak di letakkan pada Projek Kumpulan akan di letakkan kepada Akaun Sendiri masing-masing.*

Hanya Ahli A1 dan A2 boleh letak token pada Projek Kumpulan.

Ahli A1 dan A2 akan buat keputusan dengan rahsia di Meja Kumpulan masing-masing. Ahli A1 dan A2 akan letak token biru yang di mahu letak pada Projek Kumpulan dalam kotak yang dilabel dengan peranan mereka. Contoh, ini kotak Ahli A1. SL shows a box labelled A1 to the subjects> *Token yang tinggal dalam sampul Ahli A1 dan Ahli A2 akan masukkan dalam Akaun Sendiri masing-masing.*

Keputusan Ahli A1 takkan diberitahu kepada Ahli A2, dan sebaliknya. Keputusan Ahli A1 dan Ahli A2 takkan diberitahu kepada Ahli B.

Lepas Ahli A1 dan A2 dah letak token dalam kotak masing-masing, token dalam dua kotak ini akan kami tambah. Jumlah hasil tambahan boleh jadi salah satu; 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13 or 14.

Buka muka surat ***PG1.***

Ada soalan tentang tugas dan peranan Ahli A1 dan A2?

<Pause>

Tugas Ahli B

Ahli B akan buka keputusan dia lepas Ahli A1 dan A2 buat keputusan mereka.

Sebelum Ahli B buat keputusan, dia akan diberitahu hasil campuran token dalam Projek Kumpulan yang Ahli A1 dan A2 dah letak. Hanya hasil campuran akan diberitahu, bukan keputusan Ahli A1 dan A2 sorang-sorang.

Ahli B perlu tentukan berapa token dia mahu letak dalam Akaun Pelaburan Kumpulan dan berapa dia mahu simpan untuk diri sendiri dalam Akaun Sendiri. Ahli B boleh letak seberapa banyak token dari 0 ke 7; boleh jadi 0, 1, 2, 3, 4, 5, 6, atau 7 ke Akaun Pelaburan Kumpulan. Token yang lebih akan di letak dalam Akaun Sendiri Ahli B.

Ambik perhatian yang Akaun Pelaburan Sendiri lain dari Projek Kumpulan. Hanya Ahli B boleh letak token dalam Akaun Pelaburan Kumpulan.

Ahli B akan buat keputusan dengan rahsia di Meja Kumpulan masing-masing. Ahli B akan letak token yang di mahu letak dalam Akaun Pelaburan Kumpulan atas beg hitam atas meja. <SL shows the black bag to the subjects>.*Token yang tinggal dalam sampul akan di letak dalam Akaun Sendiri Ahli B.*

Keputusan Ahli B tak kan di beritahu kepada Ahli A1 dan A2.

*Buka **PG2**.*

Ada soalan pasal tugas dan peranan Ahli B?

<Pause>

Pendapatan

Anda akan terima pendapatan dari Akaun Sendiri anda, DAN dari nilai token dalam Projek Kumpulan.

Pendapatan dari Akaun Sendiri anda: *Tak kira anda peranan anda Ahli A1, A2 atau B, anda terima RM2.00 untuk tiap-tiap token biru yang anda letak dalam Akaun Sendiri anda.*

Pendapatan dari Projek Kumpulan: ***Nilai Projek Kumpulan*** *akan di pecah sama rata untuk semua ahli kumpulan anda (Ahli A1, A2 dan B). Nilai Projek Kumpalan bergantung pada 2 benda;*

(i) jumlah token biru dalam Projek Kumpulan yang Ahli A1 dan A2 dah letak

Ini di tentukan dengan keputusan Ahli A1 dan A2.

(ii) nilai setiap token dalam Projek Kumpulan, yang akan ditentu oleh nombor token yang Ahli B dah letak dalam Akaun Pelaburan Kumpulan ***dan*** *nasib.*

Pendapatan Anda dalam Aktiviti ini = Pendapatan dari Akaun Sendiri anda

+ Pendapatan dari Projek Kumpulan

*Buka muka **PG3**.*

Anda ada apa-apa soalan pasal pendaptan dari Aktiviti ini?

<Pause>

Mari kita tengok macam mana nilai token dalam Projek Kumpulan akan ditentukan.

Bag Akaun Pelaburan Kumpulan mesti ada 10 token dalam di untuk setiap masa, tak kira token tu warna apa. Mula-mula bag ini ada 10 token putih. .<SL pause for a while an RA counts from 1 to 10 and progressively adding 1 white token to the bag until 10 tokens are in the bag.> *Tiap token biru yang Ahli B letak atas bag ini, 1 token putih akan di buang dan diganti dengan 1 token biru. Contoh, kalua Ahli B letak 3 token biru atas bag Akaun Pelaburan Kumpulan, kami akan buang 3 token putih dan ganti dengan 3 token biru – bag ini sekarang ada 3 token biru dan 7 token putih. Ambik perhatian, token biru paling banyak boleh ada dalam bag ini; 7, pada waktu yang sama token putih yang paling sikit boleh ada dalam bag ini; 3.*

Lepas tu kami akan buat cabutan satu token dari bag.

Kalau token cabutan itu warna biru, Projek Kumpulan berjaya dan tiap-tiap token dalam Projek Kumpulan akan bernilai RM5.00. Nilai Projek Kumpulan adalah jumlah token dalam Projek Kumpulan yang Ahli A1 dan A2 dah letak kali RM5.00.

Kalau token cabutan itu warna putih, Projek Kumpulan tak berjaya, dah tiap-tiap token dalam Projek Kumpulan akan bernilai RM2.50. Nilai Projek Kumpulan adalah jumlah token dalam Projek Kumpulan yang Ahli A1 dan A2 dah letak kali RM2.50.

Perhatian: Nasib paling rendah untuk Projek Kumpulan berjaya adalah 0% - ini boleh jadi bila Ahli B letak 0 token pada Akaun Pelaburan Kumpulan. Nasib paling tinggi untuk berjaya adalah 70% - ini boleh jadi bila Ahli B letak 7 token pada Akaun Pelaburan Kumpulan. Jadi, kalua Ahli B letak semua 7 token biru dia pada Akaun Pelaburan Kumpula, ada 30% lagi nasib yang Projek Kumpulan tak berjaya.

Tiap ahli kumpulan (Ahli A1, A2 dan B) akan terima bahagian yang sama rata dari nilai Projek Kumpulan. Tiap ahli kumpulan (Ahli A1, A2 dan B) akan terima pendapatan yang sama dari Projek Kumpulan, tak kira keputusan yang dia dah buat.

Perhatian:

(a) Lagi banyak token biru diletak dalam Projek Kumpulan oleh Ahli A1 dan A2, lagi tinggi nilai Projek Kumpulan, tak kira Projek tu 'berjaya'.

(b) Lagi banyak token biru di letak dalam Akaun Pelaburan Kumpulan oleh Ahli B, lagi tinggi nasib untuk tiap token biru Projek Kumpulan bernilai RM5. Ini maksudnya Projek Biru berjaya.

Buka muka ***PG4***

Ada soalan tentang macam mana pendapatan Projek Kumpulan terjadi?

<Pause>

Kita akan lihat 2 contoh.

Contoh 1: Anggap Ahli A letak 3 token biru pada Projek Kumpulan dan Ahli B letak 6 token pada Projek Kumpulan. Jumlah token biru dalam Projek Kumpulan, 9. Aggap Ahli B letak 4 token biru dalam Akaun Pelaburan Kumpulan. Nasib untuk Projek Kumpulan berjaya, 40%.

Kalau dalam cabutan token biru di cabut, nilai Projek Kumpulan adalah RM5.00 X 9 = RM45.00. Tiap ahli kumpulan akan dapat RM15.00 dari Projek Kumpulan. Kalau dalam cabutan, token putih dicabut, nilai Projek Kumpulan adalah RM2.50 X 9 = RM22.50. Tiap ahli kumpulan akan dapat RM7.50 dari Projek Kumpulan.

Dalam mana-mana keadaan, tiap ahli kumpulan akan juga dapat RM2.00 X token yang dia letak dalam Akaun Sendiri masing-masing.

Contoh 2: Anggap Ahli A1 letak 0 token biru pada Projek Kumpulan dan Ahli A2 letak 0 token biru pada Projek Kumpulan. Jumlah token biru pada Projek Kumpulan adalah 0. Dalam contoh ini, token biru Ahli B letak pada Projek Pelaburan Kumpulan tak ada makna. Kalau Projek berjaya, nilai Projek adalah RM5.00 X 0 token = RM0. Dalam contoh ini, tiap ahli kumpulan akan dapat RM2.00 X token yang dia tinggalkan dalam Akaun Sendiri masing-masing.

Buka muka ***PG5*** *untuk tengok contoh pendapatan lain dari Projek Kumpulan.*

Cabutan dari bag Akaun Pelaburan Kumpulan akan dibuat lepas Aktiviti ini. Kami tak akan bagi tahu sama ada cabutan jadi token biru atau token putih. Anda akan dibayar dengan sewajarnya.

Ada apa-apa soalan?

<Pause>

Pembahagian Peranan

RA1, RA2 dan RA3 sedang pegang satu beg yang ada 3 sampul. Ambil satu sampul dari beg tersebut. Dalam tiap sampul, ada 7 token biru sebagai anugerah anda dan satu kad yang dilabel dengan salah satu; ***Ahli A1, Ahli A2*** *atau* ***Ahli B****. Ini peranan anda dalam Aktiviti ini. Anda akan buat keputusan di Meja Kumpulan bila tiba giliran anda.*

<All RAs will approach each subject to pick an envelope from the bag in their hands>

Buka sampul anda. 'Check' anda ada 7 token biru dan keluarkan kad. Masuk kad ini pada tag nama. Tengok ahli kumpulan anda yang lain.

<RAs will place A4-label that identifies subjects' role in front of each subject's desk. SL will record subjects' role assignment>

Peringkat Keputusan Subjek

Saya akan panggil anda ikut giliran. Bila tiba giliran anda, sila datang ke Meja Kumpulan dengan sampul dan 3 token biru anda. Seorang RA akan berada di meja Kumpulan. RA ini akan mengemukan beberapa soalan secara lisan untuk memastikan anda faham peraturan aktiviti. Anda akan diberikan muka surat dari risalah {C/D} untuk rujukan. Bila ianya jelas yang anda faham peraturan diatas, RA akan tinggalkan anda di meja kumpulan untuk membuat keputusan. Beri isyarat pada RA bila anda selesai tugas anda.RA akan tanya beberapa soalan. Lepas tu anda boleh pulang ke tempat duduk anda.

Ahli A1/A2, sila datang ke meja kumpulan.

<RA1, RA2 and RA3 will check for Member A1/A2 comprehension. Leave the subject when they make their decisions. Wait for the signal from Member A1/A2.Verbally ask the Additional Member A1 & A2 Questions and record their responses. Dismiss Member A1/A2 >

<RA1, RA2, and RA3 will collect Member A1 & A2 box from the Group Desk. RA1, RA2 and RA3 will open Member A1 and Member A2 boxes, mentally summed the content of the box. RA1, RA2, and RA3 will circle the number on **PG6** that correspond with summation of allocation from Member A1 and Member A2 >

Ahli B sila datang ke Meja Kumpulan anda.

<RA1, RA2, and RA3 will place a black bag on the table and 10 white tokens. RAs will check for Member B comprehension on the instructions. RAs will show **PG6** with

a number circled. RAs will set up the bag for investment draw in front of Member B. Verbally ask the Additional Member A2 Question and record their responses. Dismiss Member B. >

-Peraturan Tamat-

Figure 2.6A Page 1 of Subjects' Reference (English)

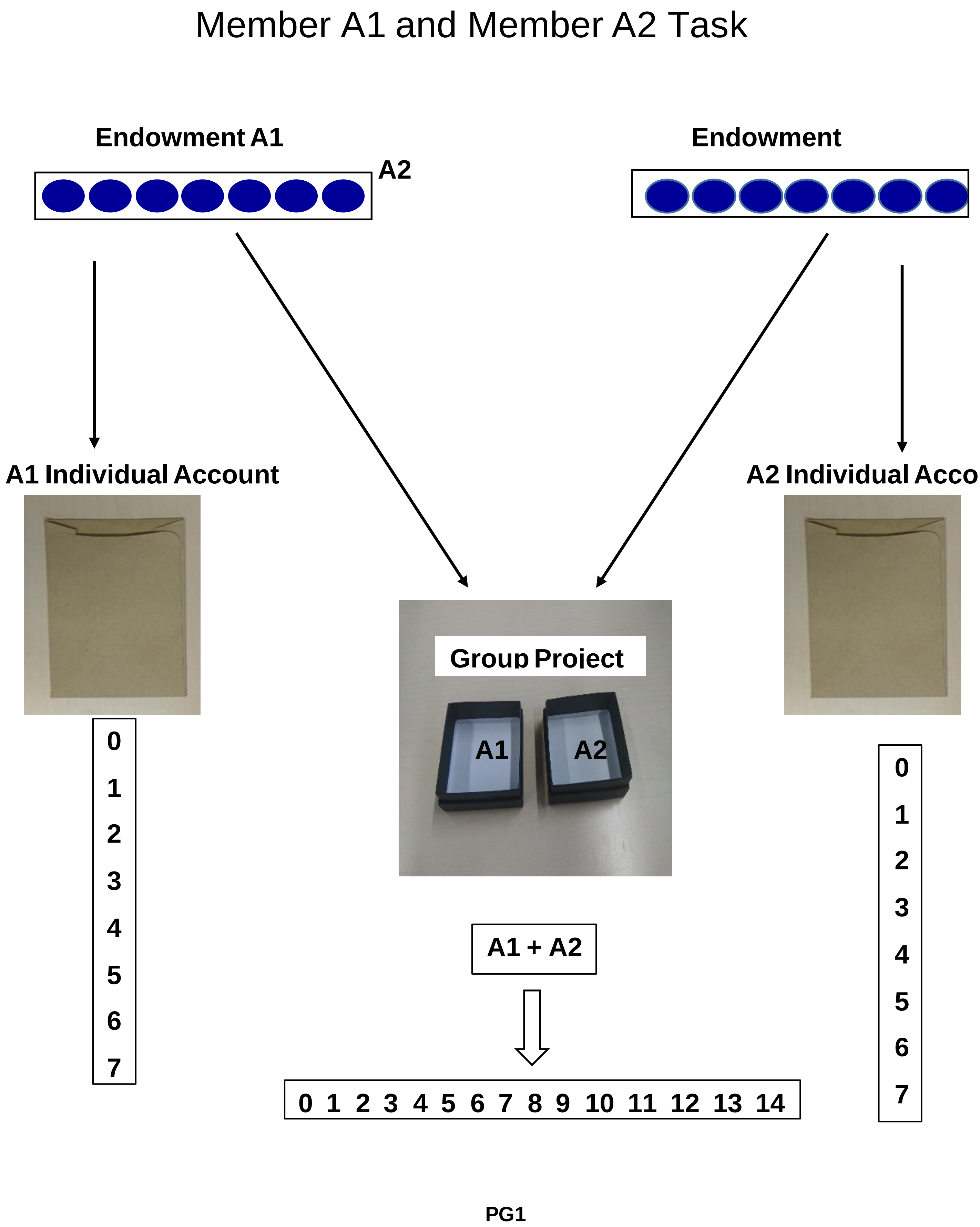
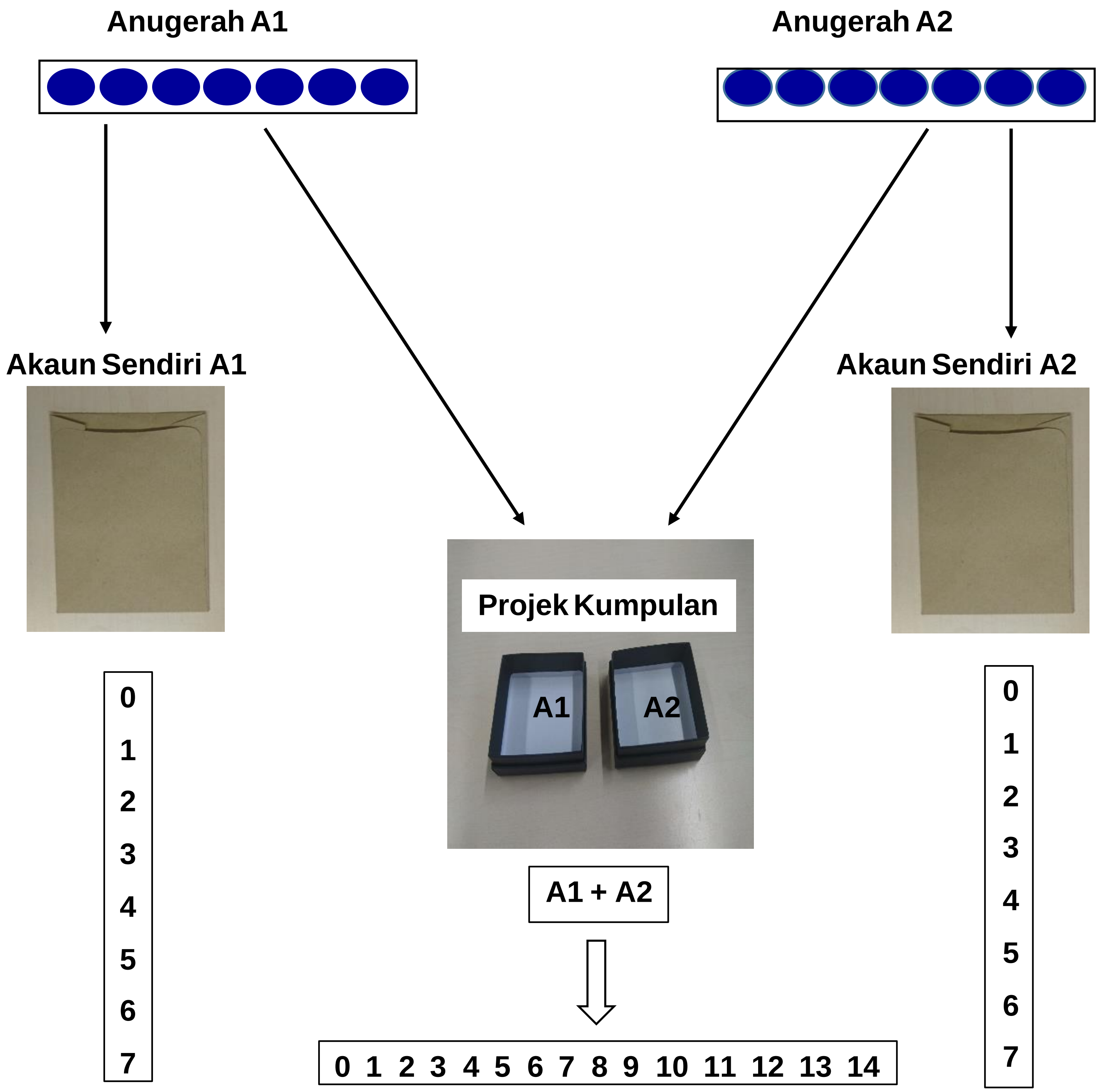


Figure 2.7A. Page 1 of Subjects' Reference (Malay translation)

Tugas Ahli A1 dan Ahli A2

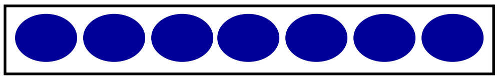


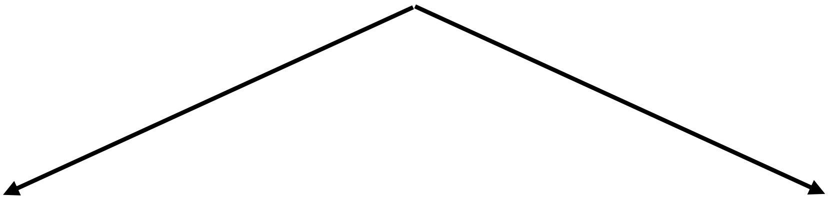
PG1

Figure 2.8A. Page 2 of Subjects' Reference (English)

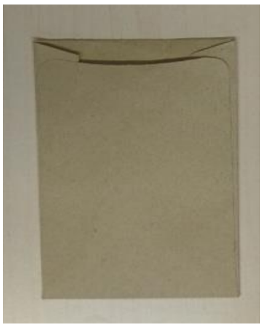
Member B Task

Member B Endowment





B Individual Account



0
1
2
3
4
5
6
7

Group Investment Account

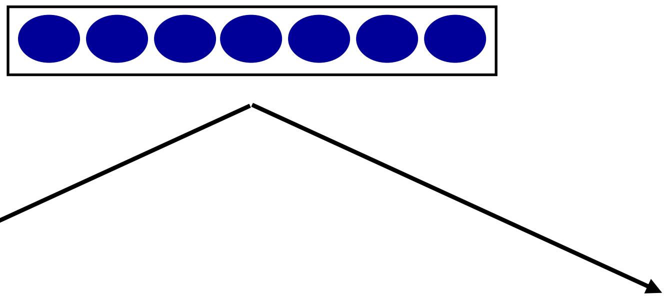
0
1
2
3
4
5
6
7

PG2

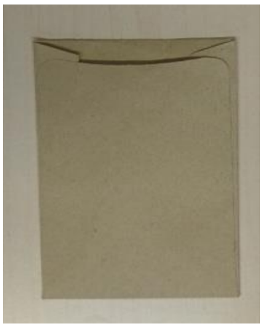
Figure 2.9A. Page 2 of Subjects' Reference (Malay translation)

Tugas Ahli B

Anugerah Ahli B



Akaun Sendiri B



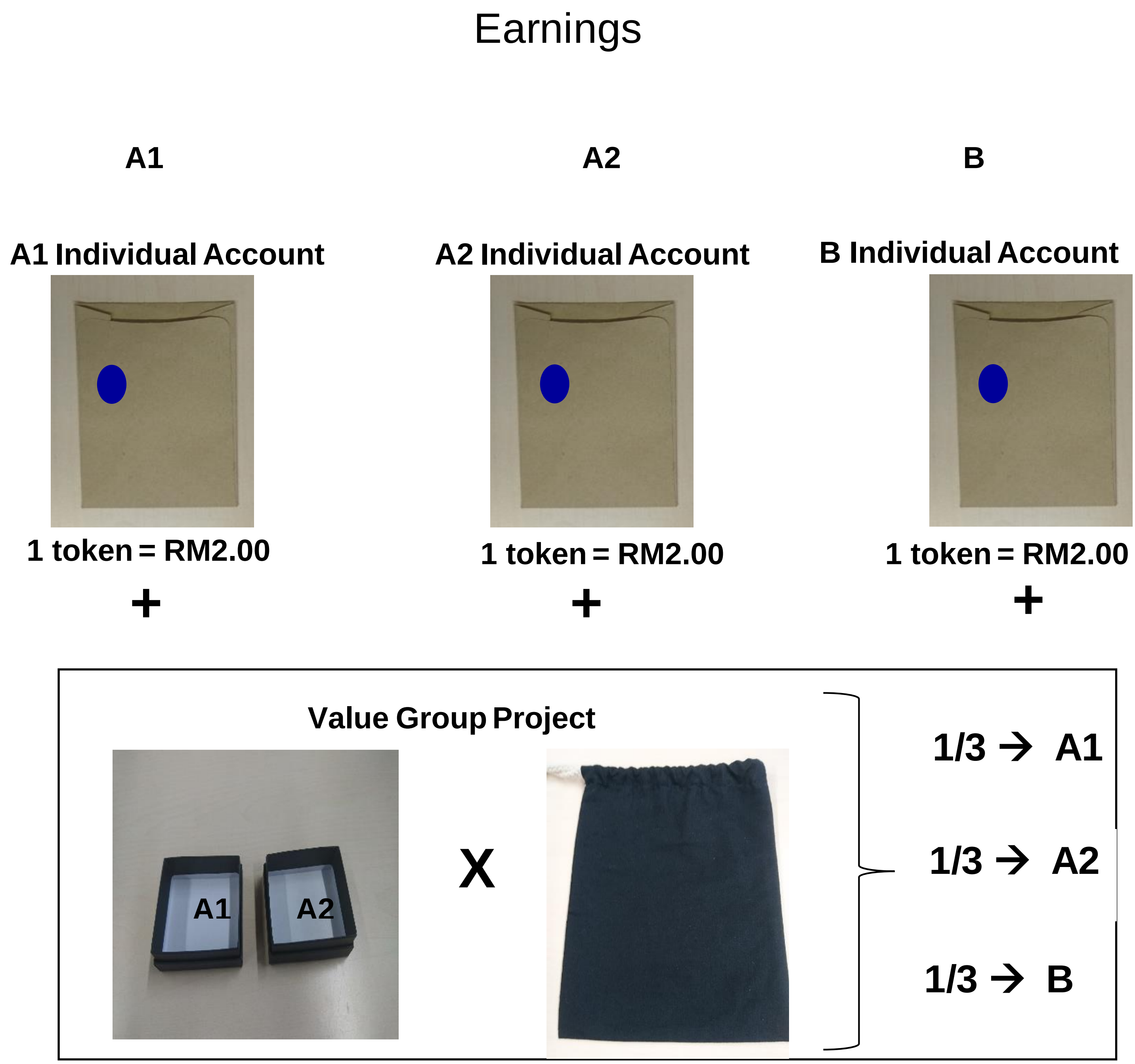
0
1
2
3
4
5
6
7

Akaun Pelaburan Kumpulan

0
1
2
3
4
5
6
7

PG2

Figure 2.10. Page 3 of Subjects' Reference (English)



PG3

Figure 2.11A. Page 3 of Subjects' Reference (Malay translation)

PG3

Figure 2.12A. Page 4 of Subjects' Reference (English)

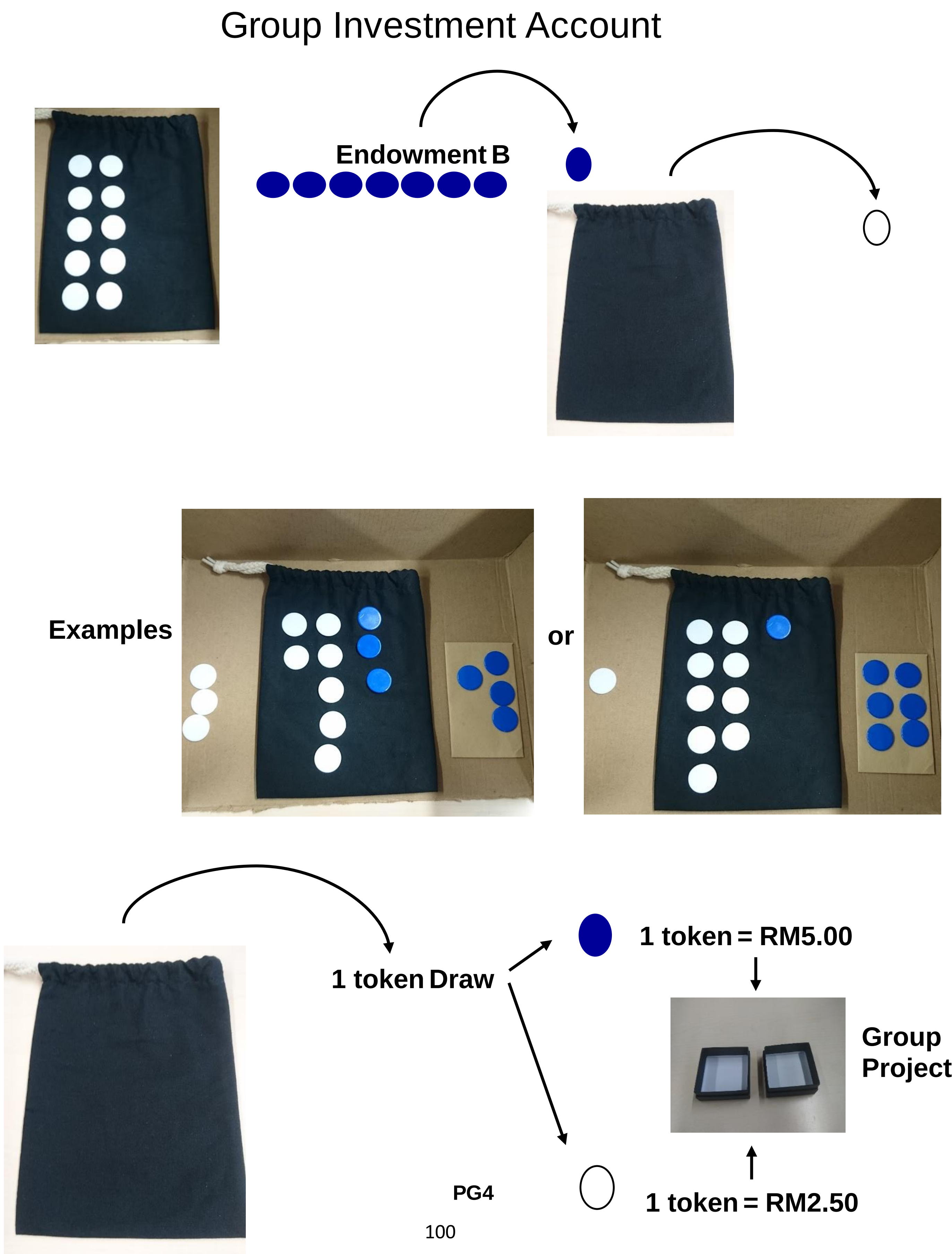


Figure 2.13A Page 4 of Subjects' Reference (Malay translation)

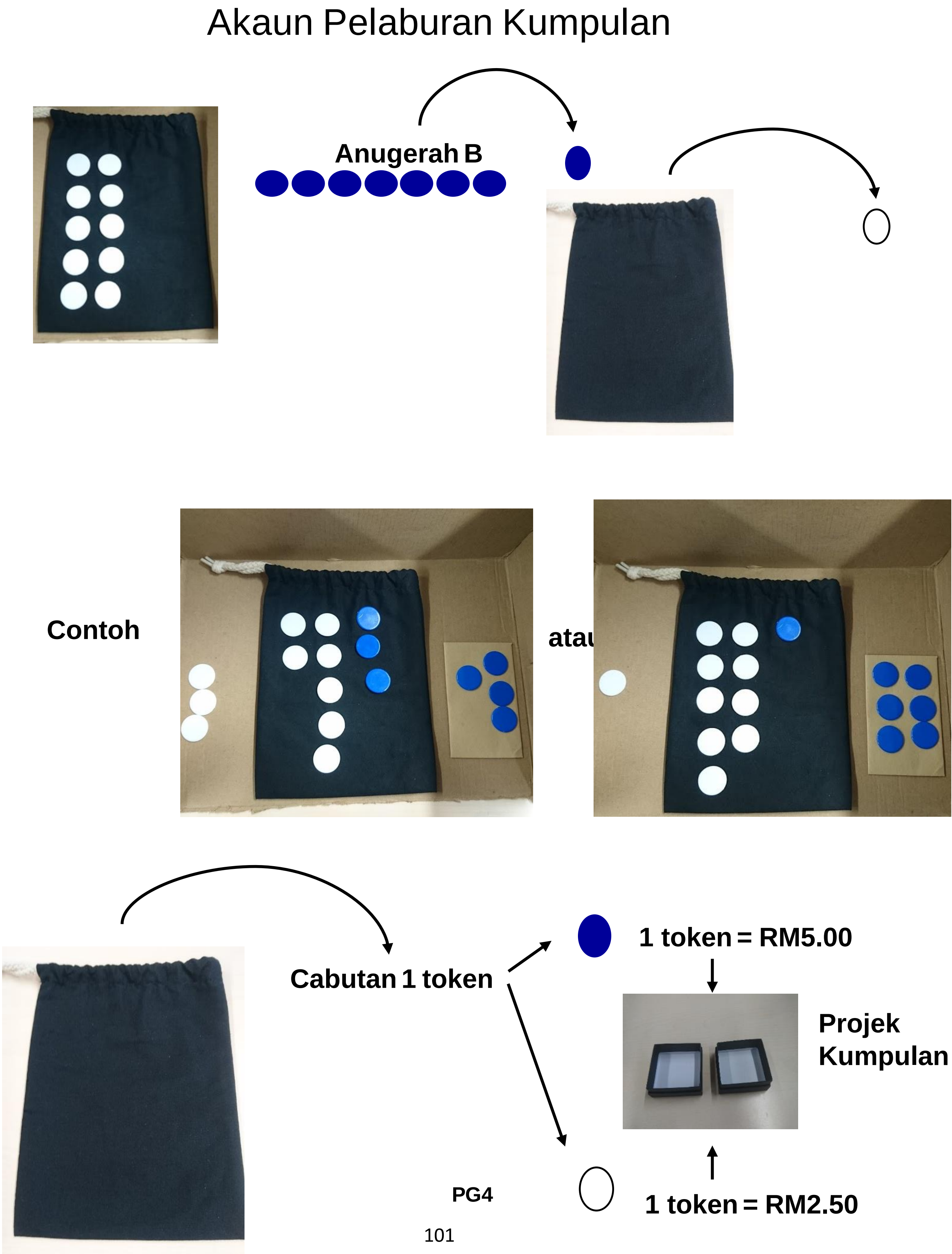
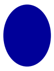
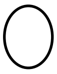
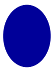
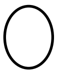
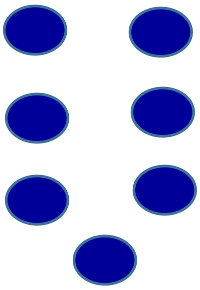
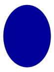
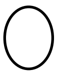
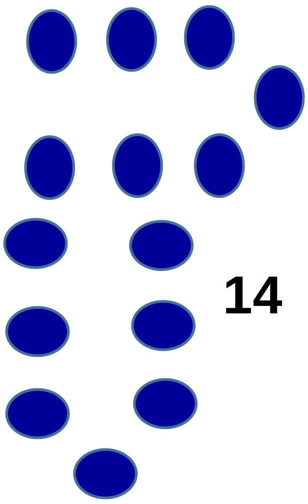
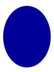
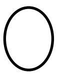


Figure 2.14A Page 4 of Subjects' Reference (English)

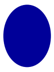
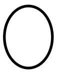
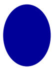
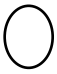
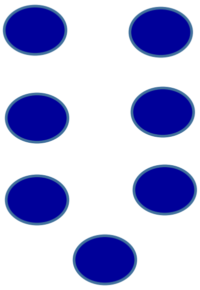
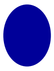
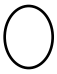
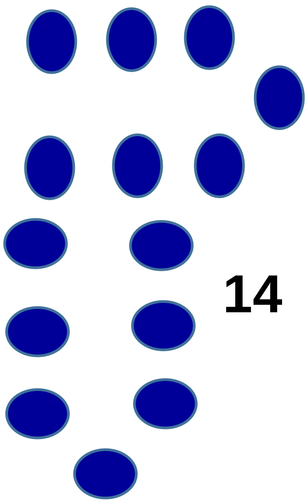
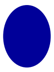
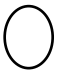
Value of Group Project and Earnings -Example

Token in Group Project	Draw	Value of Group Project	Earnings
 0		0	0
		0	0
 1		RM 5.00 	RM1.67
		RM 2.50 	RM0.83
 7		RM 35.00 	RM11.67
		RM 17.50 	RM5.83
 14		RM 70 	RM23.33
		RM 35 	RM11.67

PG5

Figure 2.15A Page 5 of Subjects' Reference (Malay translation)

Nilai Projek Kumpulan dan Pendapatan - Contoh

Token Projek Kumpulan	Cabutan	Nilai Projek Kumpulan	Pendapatan
 0		0	0
		0	0
 1		RM 5.00 	RM1.67
		RM 2.50 	RM0.83
 7		RM 35.00 	RM11.67
		RM 17.50 	RM5.83
 14		RM 70 	RM23.33
		RM 35 	RM11.67

B3: Control questions for representative (English instructions)

Before you make any decision, please answer the following questions to ensure you comprehend the rules of this activity;

- *If you allocated 5 blue tokens to the Group Investment Account, this Bag would then contain ___ white tokens.*
- *If there are 14 blue tokens in the Group Project and your investment is unsuccessful, the Group Project is worth _________.*

<When subjects answer both questions above correctly>

Congratulations, you've answered correctly. You will now make your decision now.

<When subjects answer any one or both questions above incorrectly>

Sorry, they are wrong. Please indicate to me the part that require more explanation; your role, the roles of other group members or how the earnings will be derived. I will explain it to you until you understand. Then you will attempt the questions above again.

<RAs will explain to the subjects matters that require attention. RAs will record the number of attempts made by each subject in **Public Good Control Questions Comprehension Observation Form** >

<RA shows **PG6** with total number of tokens in the Group Project circled>

You have seen the sum of tokens allocated to the Group Project. You will make your decision now.

Please make your decision by placing the tokens you wish to allocate to the Group Investment Account on top of this bag. Retain the tokens that you wish to allocate in Individual Account in the envelope. Leave your envelope on the table.

Now you will see me adjust the tokens and place them in the bag.

<RA swaps the same amount of white token(s) with the blue tokens that Member B placed on the bag. Make no noise for this task>

I will ask you a few questions, please point your answer on this piece of paper.

<RA asks the Additional Member B questions>

You have completed the task. Please return to your desk.

B4: Control questions for representative (Malay-language instructions)

Sebelum anda membuat apa-apa keputusan, sila jawab soalan berikut untuk pastikan anda faham peraturan aktiviti ini.

- *Kalau anda letakkan 5 token biru kepada Akaun Pelaburan Kumpulan, Bag Kumpulan akan ada____ token putih.*
- *Kalau ada 10 token biru dalam Projek Kumpulan dan pelaburan anda tidak Berjaya, nilai Projek Kumpulan adalah______.*

<When subjects answer both questions above correctly>

Tahniah, jawapan anda betul. Anda boleh membuat keputusan sekarang.

<When subjects answer any one or both questions above incorrectly>

Maaf,jawapan salah. Sila beritahu saya bahagian yang anda perlukan penerangan lebih; tugas anda, tugas Ahli-ahli lain atau macam mana pendapatan dikira. Saya akan terangkan pada anda sampai anda faham. Lepas tu anda akan cuba jawab soalan diatas lag.

<RAs will explain to the subjects matters that require attention. RAs will record the number of attempts made by each subject in **Public Good Control Questions Comprehension Observation Form** >

< RA shows **PG6** with total number of tokens in the Group Project circled>

Anda telah lihat jumlah token biru yang telah diletakkan kepada Projek Kumpulan. Anda akan buat keputusan sekarang.

Sila buat keputusan dengan letakkan token yang anda mahu letakkan pada Akaun Pelaburan Kumpulan atas bag ini. Simpan token yang anda mahu letak dalam Akaun Individu Anda dalam sampul. Letak sampul ini atas meja.

Sekarang tengok saya 'adjust' token biru dan putih dan letakkan dalam bag.

<RA swaps the same amount of white token(s) with the blue tokens that Member B placed on the bag. Make no noise for this task>

Saya akan tanya beberapa soalan, sila tunjuk jawapan anda atas kertas ini.

<RA asks the Additional Member B questions>

Tugas anda sudah selesai. Sila pulang ke meja anda

B5: Control questions for group members (English instructions)

Before you make any decision, please answer the following questions to ensure you comprehend the rules of this activity.

- *If you decide to allocate 4 blue tokens to the Group Project and your co-member A2 (A1) allocates 3, Member B will be informed that there are ______ blue tokens in the Group Project.*
- *If there are 14 blue tokens in the Group Project and Member B's investment is unsuccessful, the Group Project is worth ________ (refer to sheets provided)*

<When subjects answer both questions above correctly>

Congratulations, you've answered correctly. You will now make your decision now.

<When subjects answer any one or both questions above incorrectly>

Sorry, they are wrong. Please indicate to me the part that require more explanation; your role, the roles of other group members or how the earnings will be derived. I will explain it to you until you understand. Then you will attempt the questions above again.

<RAs will explain to the subjects matters that require attention. RAs will record the number of attempts made by each subject in **Public Good Control Questions Comprehension Observation Form** >

Please make your decision by placing the tokens you wish to allocate to the Group Project in the box labelled Member A1/A2. Retain the tokens that you wish to allocate to your Individual Account in the envelope. Leave your envelope on the table.

<RAs leave Member A1/A2 to make decision>

After you have placed the token(s) in the box, signal me. I will ask you a few questions, please point your answer on this piece of paper.

<RAs ask the Additional Member A1 & A2 questions>

You have completed the task. Please return to your desk.

B6: Control questions for group members (Malay-language instructions)

Sebelum anda membuat apa-apa keputusan, sila jawab soalan berikut untuk pastikan anda faham peraturan aktiviti ini.

- *Kalau anda letak 4 token biru ke dalam Projek Kumpulan dan ahli Kumpulan A1/A2 letak 3, kami akan bagi tahu ahli B ada ____token biru dalam Projek Kumpulan.*
- *Kalau ada 14 token biru dalam Projek Kumpulan dan pelaburan Ahli B tidak berjaya, nilai Projek Kumpulan adalah _____ (rujuk risalah)*

<When subjects answer both questions above correctly>

Tahniah, jawapan anda betul. Anda boleh membuat keputusan sekarang.

<When subjects answer any one or both questions above incorrectly>

Maaf,jawapan salah. Sila beritahu saya bahagian yang anda perlukan penerangan lebih; tugas anda, tugas Ahli-ahli lain atau macam mana pendapatan dikira. Saya akan terangkan pada anda sampai anda faham. Lepas tu anda akan cuba jawab soalan diatas lag.

<RAs will explain to the subjects matters that require attention. RAs will record the number of attempts made by each subject in **Public Good Control Questions Comprehension Observation Form** >

Sila buat keputusan anda dengan letakkan token yang anda mahu letakkan kepada Projek Kumpulan ke dalam kotak berlabel Ahli A1/A2. Simpan token yang anda mahu letakkan ke dalam Akaun Sendiri di dalam sampul. Tinggalkan sampul ini di atas meja.

<RAs leave Member A1/A2 to make decision>

Lepas anda letak token biru dalam kotak, panggil saya. Saya akan tanya beberapa soalan, sila tunjuk jawapan anda atas kertas ni.

<RA will ask the Additional Members A1 a& A2 questions>

Tugas anda sudah selesai. Sila pulang ke meja anda.

Appendix C: Instructions for Social Status Elicitation

C1: English instructions scripts

Activity {A/B} will commence now.

In this activity, you will make decisions by referring to participants' ID number. To protect your anonymity from the researcher's perspective, your decisions can't be linked to your name, but only to your ID number. <Introduce ID number to the subjects>

On your desk, there is a booklet {A/B}. Check that this booklet has 5 pages. You will find that each page has a picture of a ladder. You are required to mark these pictures of ladders with a pencil.

If you have any question regarding the rules of this activity at any time, please raised your hands. The RAs will assist you.

*Open the first page. This is page **RE1**.*

I will explain to you how to mark this picture of a ladder. I will read a statement and you will respond to the statement by marking the ladder. There is no correct or wrong order of number to be placed on each rung.

This is the first statement;

> *Think of the ladder in front of you as representing where participants seated in this room stand in this group. At the top of the ladder is the **participant with the most outgoing personality in this group**. At the bottom is the **participant with the least outgoing personality in this group**. All participants in the room should be placed on the ladder. Place **X** on the rung you think you stand on. For each other participants put their ID on the rung you think they stand on in terms of how outgoing they are.*

Your answer should reflect your opinion and this will never been shared with other participants in the room. A rung should have only ONE number. After you are done, RA1, RA2 or RA3 will look at your sheet to ensure you understand this task.

<RA1 will look at sheets from ID1-ID3, RA2 will look at sheets from ID4 – ID6, and RA3 will look at sheets from ID7 to ID9. Wait for signals from the RAs to ensure that subjects understand the task>

You have completed the first sheet successfully. Well done. You will fill in the subsequent pages in the same manner. I will read a statement and you will mark the page based on it. The RAs will not see your answers from this point on.

*Turn to page **RE2**.*

> *Think of the ladder in front of you as representing where participants seated in this room stand in this group. At the top of the ladder is the **participant that is most physically active in this group.** At the bottom is the **participant that is least physically active in this group.** All participants in the room should be placed on the ladder. Place **X** on the rung you think you stand on. For each other participants put their ID on the rung you think they stand on in terms of how physical active they are.*

<Wait for 2 minutes or after everyone stops writing>

*Turn to page **RE3.***

> *Think of the ladder in front of you as representing where participants seated in this room stand in this group. At the top of the ladder is the **most-educated participant in this group.** At the bottom is the **least-educated participant in this group**. All participants in the room should be placed on the ladder. Place **X** on the rung you think you stand on. For each other participants put their ID on the rung you think they stand on in terms of how well educated they are.*

<Wait for 2 minutes or after everyone stops writing>

*Turn to page **RE4.***

> *Think of the ladder in front of you as representing where participants seated in this room stand in this group. At the top of the ladder is the participant with **the most wealth in this group**. At the bottom is the participant with **the least wealth in this group**. All participants in the room should be placed on the ladder. Place **X** on the rung you think you stand on. For each other participants put their ID on the rung you think they stand on in terms of wealth.*

<Wait for 2 minutes or after everyone stops writing>

*Turn to page **RE5.***

> *Think of the ladder in front of you as representing where participants seated in this room stand in this group. At the top of the ladder is the participant who is **the most successful in this group**. At the bottom is*

*the participant who is **the least successful in this group**. All participants in the room should be placed on the ladder. Place **X** on the rung you think you stand on. For each other participants put their ID on the rung you think they stand on in terms of success.*

<Wait for 2 minutes or after everyone stops writing>

We have finished Activity A/B. Please wait for a few minutes while the RAs collect Booklet A/B from you.

<RA1 will collect Booklet {A/B} from ID1 –ID3, RA2 will collect Booklet {A/B} from ID4-ID6, RA3 will collect Booklet {A/B} from ID7-ID9>

--- End of Instruction --

C2: Malay-language instruction scripts

Aktiviti {A/B} akan mula sekarang.

Dalam aktiviti ini, anda akan membuat keputusan dengan merujuk kepada ID peserta lain. Untuk menjaga maklumat peribadi anda dari pengetahuan penyelidik, keputusan anda tak akan di kaitkan dengan nama anda, tapi akan dikaitkan dengan nombor ID anda. <Introduce ID number to the subjects>

Di atas meja anda, ada risalah {A/B}. 'Check' risalah ini ada 5 muka surat dan anda tengok yang setiap muka surat ada gambar satu tangga. Anda perlu menanda gambar-gambar tangga dengan pensel.

Kalau anda ada apa-apa soalan mengenai peraturan aktiviti ini pada bila-bila masa, sila angkat tangan. RA akan membantu anda.

*Buka muka surat pertama. Ini adalah muka surat **RE1**.*

Saya akan terangkan macam mana untuk tanda gambar tangga ini. Saya akan baca satu kenyataan (ayat) dan anda akan memberi respons kepada kenyataan (ayat) tersebut dan tanda tangga ini. Tak ada jawapan yang betul atau salah untuk meletak nombor pada anak tangga.

Ini adalah kenyataan(ayat) pertama;

*Anggap tangga ini mewakili susun atur 9 peserta di dalam bilik ini. Anak tangga teratas adalah peserta yang **paling peramah dalam kumpulan ini**. Anak tangga terbawah adalah peserta yang **paling tidak ramah dalam kumpulan ini.** Semua peserta patut di letakkan pada tangga ini. Tanda **X** untuk anak tangga yang anda gambarkan anda berada.*

Untuk peserta lain letakkan ID mereka pada anak tangga yang anda rasa mereka berada dari segi keramahan.

Jawapan anda patut tunjukkan pendapat anda dan ianya tidak akan dikongsi dengan peserta lain. Setiap anak tangga patut ada SATU nombor. Selepas anda selesai dengan tugas ini, RA1, RA2 or RA3 akan tengok muka surat RE1 untuk pastikan anda faham tugas ini.

<RA1 will look at sheets from ID1-ID3, RA2 will look at sheets from ID4 – ID6, and RA3 will look at sheets from ID7 to ID9. Wait for signals from the RAs to ensure that subjects understand the task>

Anda telah selesaikan muka surat pertama dengan jayanya. Tahniah. Anda isi muka surat seterusnya dengan cara yang sama.Saya akan baca satu kenyataan (ayat) dan anda akan tanda muka surat berdasarkan kenyataan. RA tak akan tengok jawapan anda lepas ini.

*Buka muka surat **RE2**.*

*Anggap tangga ini mewakili susun atur 9 peserta di dalam bilik ini. Anak tangga teratas adalah peserta yang mempunyai **kecergasan fizikal yang terbaik dalam kumpulan ini.** Anak tangga terbawah adalah peserta yang mempunyai **kecergasan fizikal yang paling tidak baik dalam kumpulan ini**. Semua peserta patut di letakkan pada tangga ini. Tanda **X** untuk anak tangga yang anda gambarkan anda berada. Untuk peserta lain letakkan ID mereka pada anak tangga yang anda rasa mereka berada dari segi kecergasan fizikal mereka.*

<Wait for 2 minutes or after everyone stops writing>

*Buka mukasurat **RE3**.*

*Anggap tangga ini mewakili susun atur 9 peserta di dalam bilik ini. Anak tangga teratas adalah peserta yang **paling terpelajar dalam kumpulan ini**. Anak tangga terbawah adalah peserta yang **paling tak terpelajar dalam kumpulan ini**. Semua peserta patut di letakkan pada tangga ini. Tanda **X** untuk anak tangga yang anda gambarkan anda berada. Untuk peserta lain letakkan ID mereka pada anak tangga yang anda rasa mereka berada dari segi pelajaran mereka.*

<Wait for 2 minutes or after everyone stops writing>

*Buka muka surat **RE4**.*

> *Anggap tangga ini mewakili susun atur 9 peserta di dalam bilik ini. Anak tangga teratas adalah **peserta yang paling kaya dalam kumpulan ini**. Anak tangga terbawah adalah **peserta yang paling tidak kaya dalam kumpulan ini**. Semua peserta patut di letakkan pada tangga ini. Tanda **X** untuk anak tangga yang anda gambarkan anda berada. Untuk peserta lain letakkan ID mereka*
>
> *pada anak tangga yang anda rasa mereka berada dari segi kekayaan.*

<Wait for 2 minutes or after everyone stops writing>

*Buka muka surat **RE5**.*

> *Anggap tangga ini mewakili susun atur 9 peserta di dalam bilik ini. Anak tangga teratas adalah **peserta yang paling berjaya dalam kumpulan ini**. Anak tangga terbawah adalah peserta yang **paling tidak berjaya dalam kumpulan ini**. Semua peserta patut di letakkan pada tangga ini. Tanda **X** untuk anak tangga yang anda gambarkan anda berada. Untuk peserta lain letakkan ID mereka pada anak tangga yang anda rasa mereka berada dari segi kejayaan.*

<Wait for 2 minutes or after everyone stops writing>

Kita dah habiskan Aktiviti {A/B}. Sila tunggu beberapa minit untuk RA kutip risalah {A/B} dari anda.

<RA1 will collect Booklet {A/B} from ID1 –ID3, RA2 will collect Booklet {A/B} from ID4-ID6, RA3 will collect Booklet {A/B} from ID7-ID9>

Figure 2.6A Sample of a ladder used for the social status elicitation task

Tangga 1 ID: 1, 2, 3, 4, 5, 6, 7, 8, 9

RE1

Appendix D: Instructions for social relationship closeness elicitation

D1: English instructions script

Activity A/B will commence now.

In this activity, you will make decisions by referring to participants' ID number. To protect your anonymity from the researcher's perspective, your decisions can't be linked to your name, but only to your ID number. <<u>Introduce ID number to the subjects</u>>

On your desk, there is a booklet {A/B}. Check that this booklet has 9 sheets. You will find that 8 pages will have diagrams of double circles and 1 page will be empty. You are required to mark on a number on each page with a pencil.

If you have any question regarding the rules of this activity at any time or feel that you are not able to complete this task, please raised your hands. The Ras will assist you.

Open the first page of Booklet {A/B}. The first page is ***RC1****. Participants with ID2 to ID9 will find there are sets of circles. Participant ID1 will find that his/her* ***RC1*** *page is empty.*

As every page corresponds to a person's ID number, a page on your Booklet {A/B} will be empty. Participant with ID 1 will find that the page ***RC1*** *in his/her booklet is empty. Do not worry as this has been designed for a purpose. When I read the statement below, everyone will understand why page* ***RC1*** *of participant ID1 is empty. Participant ID1, just relax for now. Every time that I ask you to turn a page and you find that a page is empty, it will mean that you don't have to do anything.*

I will explain to you how to mark this set of circles. I will read a statement and you will respond to the statement by marking 'X' on a number, 1, 2, 3, 4, 5, 6, or 7 on each sheet. There is no correct number to mark on each sheet. This is based on your opinion.

After that you need to indicate your relationship with the participants in this room. Mark X on any that you think relevant to describe your relationship with a certain participant. A if that participant is your aunt/uncle/brother/sister/parent/cousin/grandfather/grandmother or other close family member. B if that participant is your block neighbour. C if that participant is working with you in the same field/business/office. D if that participant is your close friend. E if that participant is a casual friend. F if you know that participant only as a resident of this village. You can mark more than 1 answer if it is true.

Do you have any questions?

This is the statement for page RC1;

> <u>*In front of you, there are 7 diagrams of circles. Consider which of these pairs of circles best describes your relationship with participant ID1. Please indicate the extent that you and participant ID1 are connected.*</u>

Then mark the relationship that you have with participant ID1 in the space below.

<Wait for 2 minutes or after everyone stops writing>

Turn to page ***RC2****.*

In front of you, there are 7 diagrams of circles. Consider which of these pairs of circles best describes your relationship with participant ID2. Please indicate the extent that you and participant ID2 are connected. Then mark the relationship that you have with participant ID2 in the space below.

Turn to page ***RC3****.*

In front of you, there are 7 diagrams of circles. Consider which of these pairs of circles best describes your relationship with participant ID3. Please indicate the extent that you and participant ID3 are connected. Then mark the relationship that you have with participant ID3 in the space below.

Turn to page ***RC4****.*

In front of you, there are 7 diagrams of circles. Consider which of these pairs of circles best describes your relationship with participant ID4. Please indicate the extent that you and participant ID4 are connected. Then mark the relationship that you have with participant ID4 in the space below.

Turn to page ***RC5****.*

In front of you, there are 7 diagrams of circles. Consider which of these pairs of circles best describes your relationship with participant ID5. Please indicate the extent that you and participant ID5 are connected. Then mark the relationship that you have with participant ID5 in the space below.

Turn to page ***RC6.***

In front of you, there are 7 diagrams of circles. Consider which of these pairs of circles best describes your relationship with participant ID6. Please indicate the extent that you and participant ID6 are connected. Then mark the relationship that you have with participant ID6 in the space below.

Turn to page ***RC7****.*

In front of you, there are 7 diagrams of circles. Consider which of these pairs of circles best describes your relationship with participant ID7. Please indicate the extent that you and participant ID7 are connected. Then mark the relationship that you have with participant ID7 in the space below.

Turn to page ***RC8****.*

In front of you, there are 7 diagrams of circles. Consider which of these pairs of circles best describes your relationship with participant ID8. Please indicate the extent that you and participant ID8 are connected. Then mark the relationship that you have with participant ID8 in the space below.

Turn to page ***RC9****.*

In front of you, there are 7 diagrams of circles. Consider which of these pairs of circles best describes your relationship with participant ID9. Please indicate the extent that you and participant ID9 are connected. Then mark the relationship that you have with participant ID9 in the space below.

<Wait for 2 minutes or after everyone stops writing>

We have finished Activity {A/B}. Please wait for a few minutes while the Ras collect Booklet {A/B} from you.

<RA1 will collect Booklet {A/B} from ID1 –ID3, RA2 will collect Booklet {A/B} from ID4-ID6, RA3 will collect Booklet {A/B} from ID7-ID9>

--- End of Instruction –

D2: Malay-language instructions scripts

Aktiviti A/B akan bermula sekarang.

Dalam aktiviti ini, anda akan membuat keputusan dengan merujuk kepada ID peserta lain. Untuk menjaga maklumat peribadi anda dari pengetahuan penyelidik, keputusan anda tak akan di kaitkan dengan nama anda, tapi akan dikaitkan dengan nombor ID anda. <Introduce ID number to the subjects>

Di atas meja anda, ada Risalah {A/B}. Sila semak risalah ini mengandungi 9 muka surat. Anda akan lihat yang 8 muka surat ada diagram bulatan dan satu muka surat akan kosong. Anda perlu tanda gambar tangga dengan pensel.

Buka mukasurat pertama Risalah {A/B}. Muka surat pertama adalah ***RC1****. Peserta dengan ID2 hingga ID9 akan tengok 7 set bulatan. Peserta ID1 akan mendapati muka surat* ***RC1*** *adalah kosong.*

Kalau anda ada apa-apa soalan mengenai aturan aktiviti ini atau rasakan anda tidak dapat buat aktiviti ini, sila angkat tangan. RA akan tolong anda.

Kerana setiap muka surat 'matching' dengan number ID peserta, satu muka surat dalam Risalah {A/B} akan kosong. Peserta dengan ID 1 akan tengok muka surat ***RC1*** *dalam risalahnya kosong. Jangan bimbang kerana ini telah diatur. Bila saya membaca kenyataan, setiap peserta akan faham kenapa* ***RC1*** *untuk peserta ID 1 kosong. Peserta ID 1, boleh 'relax' sebentar. Tiap kali saya minta anda membuka muka surat baru dan apabila anda mendapat muka surat tersebut kosong, ianya bermaksud anda tak payah membuat apa-apa.*

Saya akan terangkan kepada anda macam mana untuk tanda set gambar ini. Saya akan membaca satu kenyataan dan anda akan respons dengan tanda 'X' pada salah satu nombor 1, 2, 3, 4, 5, 6 atau 7 pada setiap helaian. Tak da nombor yang betul untuk di tanda. Ini ikut pendapat anda.

Lepas tu anda kena tandakan hubungan anda dengan peserta dalam bilik ni. Tanda X di mana yang anda rasa hubungan anda dengan peserta ID1. A 117alua peserta itu ibubapa/makcik/pakcik/sepupu/atuk/nenek atau mana-mana saudara terdekat. B 117alua peserta itu jiran blok anda. C 117alua peserta itu bekerja sama-sama dengan anda di kebun /'business'/ pejabat yang sama. D 117alua peserta tu kawan rapat anda. E 117alua peserta itu kawan biasa anda. F 117alua anda hanya tahu dia orang kampong anda. Anda boleh tanda lebih dari satu jawapan 117alua anda rasa jawapan anda betul.

Anda apa-apa soalan?

Ini adalah kenyataan untuk muka surat ***RC1****.*

> *Dihadapan anda ada 7 pasang bulatan. Anggap salah satu pasangan bulatan paling sesuai untuk merujuk hubungan anda dengan Peserta ID1. Sila tandakan bagaimana anda dan Peserta ID1 berkait. Kemudian tandakan jenis perhubungan anda dengan Peserta ID1 di ruang dibawah.*

<Wait for 2 minutes or after everyone stops writing>

Buka muka surat ***RC2****.*

> *Dihadapan anda ada 7 pasang bulatan. Anggap salah satu pasangan bulatan paling sesuai untuk merujuk hubungan anda dengan Peserta ID2. Sila tandakan bagaimana anda dan Peserta ID2 berkait. Kemudian tandakan jenis perhubungan anda dengan Peserta ID2 di ruang dibawah..*

Buka muka surat ***RC3****.*

> *Dihadapan anda ada 7 pasang bulatan. Anggap salah satu pasangan bulatan paling sesuai untuk merujuk hubungan anda dengan Peserta ID3. Sila tandakan bagaimana anda dan Peserta ID3 berkait. Kemudian tandakan jenis perhubungan anda dengan Peserta ID3 di ruang dibawah..*

Buka muka surat ***RC4****.*

Dihadapan anda ada 7 pasang bulatan. Anggap salah satu pasangan bulatan paling sesuai untuk merujuk hubungan anda dengan Peserta ID4. Sila tandakan bagaimana anda dan Peserta ID4 berkait. Kemudian tandakan jenis perhubungan anda dengan Peserta ID4 di ruang dibawah.

*Buka muka surat **RC5**.*

Dihadapan anda ada 7 pasang bulatan. Anggap salah satu pasangan bulatan paling sesuai untuk merujuk hubungan anda dengan Peserta ID5. Sila tandakan bagaimana anda dan Peserta ID5 berkait. Kemudian tandakan jenis perhubungan anda dengan Peserta ID5 di ruang dibawah..

*Buka muka surat **RC6**.*

Dihadapan anda ada 7 pasang bulatan. Anggap salah satu pasangan bulatan paling sesuai untuk merujuk hubungan anda dengan Peserta ID6. Sila tandakan bagaimana anda dan Peserta ID6 berkait. Kemudian tandakan jenis perhubungan anda dengan Peserta ID6 di ruang dibawah.

*Buka muka surat **RC7**.*

Dihadapan anda ada 7 pasang bulatan. Anggap salah satu pasangan bulatan paling sesuai untuk merujuk hubungan anda dengan Peserta ID7. Sila tandakan bagaimana anda dan Peserta ID7 berkait. Kemudian tandakan jenis perhubungan anda dengan Peserta ID7 di ruang dibawah..

*Buka muka surat **RC8**.*

Dihadapan anda ada 7 pasang bulatan. Anggap salah satu pasangan bulatan paling sesuai untuk merujuk hubungan anda dengan Peserta ID8. Sila tandakan bagaimana anda dan Peserta ID8 berkait. Kemudian tandakan jenis perhubungan anda dengan Peserta ID8 di ruang dibawah.

*Buka muka surat **RC9***

Dihadapan anda ada 7 pasang bulatan. Anggap salah satu pasangan bulatan paling sesuai untuk merujuk hubungan anda dengan Peserta ID9. Sila tandakan bagaimana anda dan Peserta ID9 berkait. Kemudian tandakan jenis perhubungan anda dengan Peserta ID9 di ruang dibawah..

<Wait for 2 minutes or after everyone stops writing>

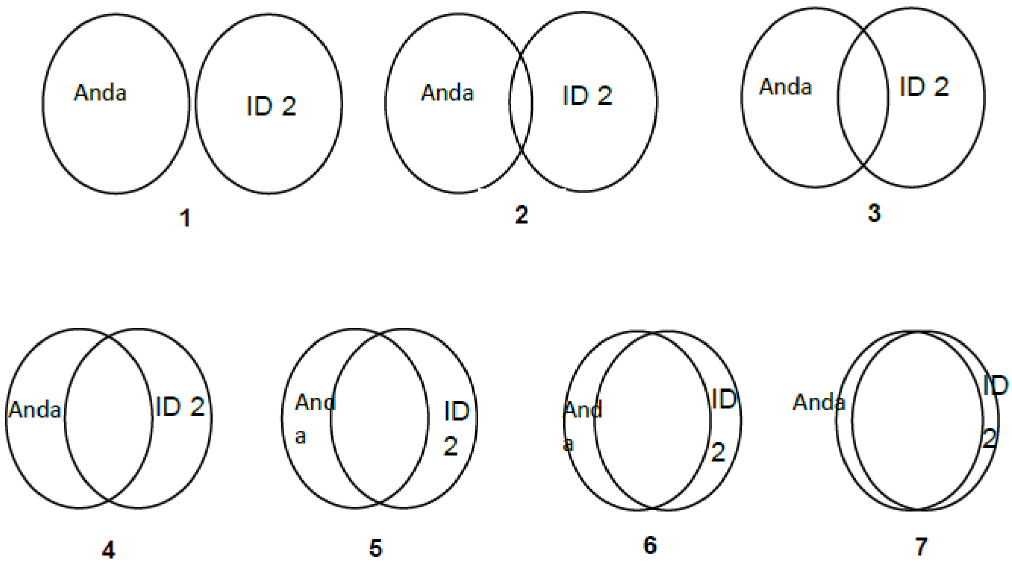
Kita dah habiskan Aktiviti {A/B}. Sila tunggu beberapa minit untuk RA kutip risalah {A/B} dari anda.

<RA1 will collect Booklet {A/B} from ID1 –ID3, RA2 will collect Booklet {A/B} from ID4-ID6, RA3 will collect Booklet {A/B} from ID7-ID9>

--- End of Instruction ---

Figure 2.17A. Sample of IoS sheet for social closeness elicitation task (from Villager ID1 to Villager ID2)

<u>ID 2</u>



Hubungan Anda dengan Peserta ini (tanda **A**, **B**, **C**, **D**, **E**, dan **F** kalau betul)

A *ID2 adalah ibubapa/makcik/pakcik/abang/kakak/adik/sepupu/ atuk/ nenek / mertua atau sedara rapat yang lain.*

B *ID2 adalah duduk satu blok dengan anda.*

C *ID2 kerja sama-sama dengan anda di kebun / 'business' / pejabat.*

D *ID2 adalah kawan karib / rapat.*

E *ID2 adalah kawan biasa.*

F *ID2 adalah orang kampong ni. Saya tak da hubungan lain dengan peserta ID2*

Figure 2.18A. Example of a village's architecture

Figure 2.19A. Set-up for a session

Figure 2.20A. A session in motion

Chapter 3

Social Status and Public Spiritedness in Representation: Experimental Evidence from Borneo

3.1 Introduction

A representative exists within a group to improve its social outcome. A common function of a representative, be it a policymaker, a head of an academic department, or a village leader, is to make a recommendation to their respective group members. Typically, the representative possesses private information on the implications of her/his recommendation even though the implementation process is carried out by the group members. A trusted representative possesses agency or recognition to have her/his recommendation implemented by the group members. For example, a trade union leader has held a meeting with the employer to settle an industrial dispute. A trusted trade union leader would return from the meeting with a recommendation that protects the group members' interest. A recommendation from a trusted trade union leader will be accepted and implemented by the union members.

In this chapter, we explore the context in which the representative and her/his group members are aware of the conflict of interest in the recommendation's outcome. The representative-group members' relationship here features a principal-agent problem modelled using a sender-receiver game mechanism. A representative acts as an agent for the group members, whose action increases or reduces the group members' payoffs through her/his recommendation. The conflict of interest arises due to the nature of the content of the recommendation. A representative is presented with two types of content. The first type is welfare-maximising for the group at a cost to the representative while the second type only maximises the representative's payoff. The decision-making rights belong to the group members as the content of the representative's recommendation is cheap talk. Group members could choose to implement the representative's recommendation or opt for an outside option. By implementing the recommendation, group members recognize the agency of the representative.

During the decision-making process, we place no requirement for the representative and the group members to decide as a group. A social welfare-maximizing representative acts in the interest of the group and, conditional on her/him being trusted by the group members, her/his recommendation is implemented by the group members. Group members' expectations about the representative are crucial in recognizing the representative's agency. It is possible that a representative who is expected to be trustworthy by group members may make a recommendation based on self-interest.

The modified sender-receiver game in this Chapter deviates from the original sender-receiver game of Gneezy (2005) and Sutter (2009) in two ways. First, the payoff vectors of the two conflicting parties, sender and receiver, are common knowledge, while their conflict of interests are preserved. Second, there are two receivers that will have to decide whether the sender's recommendation improves group welfare. The requirement of two receivers deciding together in this version of sender-receiver is designed to reflect how most representation and agency happens in groups. As representation has traditionally been carried out by higher status individuals in feudal and pre-modern societies, we investigate the relationship between social status and representation. The norm of *noblesse oblige* prescribed that it was the moral obligation of the nobles/elites to show responsibility to those of less privilege. Scott (1976) described that it was through this norm that the peasants obtained their right to subsistence, in which the landowners provided assistance in cash and kind to the peasant during bad seasons. The main objective of this chapter is to investigate whether the norm of *noblesse oblige* is translated into representation by high status individuals. To achieve this, we recruited Kayan villagers in Sarawak (Borneo), Malaysia. It is an accepted norm for village leaders, usually selected from aristocracy strata, to represent the interest of villagers when interacting with relevant parties outside the village, for example, government officers, companies and non-governmental organizations.

We implemented a lab-in-the-field experiment in villages that have pre-existing social hierarchies. Villagers played a modified version of the sender-receiver game designed to tease out public-spirited and trusted representation. Before villagers were assigned into their roles as sender or receiver, we elicited the social status and social closeness characteristics of the villagers. The roles of sender and receiver were assigned randomly, and subjects were aware of the identity of their matched sender/receivers.

We incorporated social status measures to answer the following questions: i) whether higher status villagers were more likely to act as public-spirited senders and ii) whether receivers were more likely to trust recommendations made by higher status senders.

Our experimental design would be able to address local-level representation issues in developing countries. Many development interventions happen with the presence of a middleman between villagers and outside parties. Examples of villagers' concerns that a village's representative could help address include: which development project should be prioritized, which political party/candidate to vote for, which produce buyer is trusted to give a fair price or which company should be trusted to harvest logs from the communal land. Apart from streamlining villagers' policy options, a representative also aids villagers who have constraints in time and expertise in comprehending their decisions.

The presence of a representative creates opportunity for rent-seeking, especially when the right to represent is attached to institutional status. Consider a context where a village head decides on the outcome of a development project that the village will receive. She/he could recommend a socially sub-optimal proposal to the villagers to rent-seek from her/his position. For example, a village head proposes to the villagers to accept a proposal made by a plantation company to utilise the communal land. The village head could in private collude with the company to recommend a project that benefited the head at the cost of the villagers.

With the exposure of traditional villages, in Sarawak and other parts of the world, to modern institutions, social status in these villages has become more fluid and individuals coming from lower strata are able to obtain social status through wealth and human and social capital accumulation. In some villages, individuals self-appoint themselves to speak on behalf of the village over issues like vote-buying or channelling group-level benefits from NGOs or other interested parties to the village. This creates tensions within the village as the pre-existing leaders see the self-appointed representative as a leadership challenge. While the competition between institutional leader and self-appointed representatives could promote effective representation, it is also a concern to the policymakers that the actions by these representatives are recognized as agency. For example, a low-status individual might able to provide representation but the lack of recognition from group members could affect the policy implementation process. By understanding who best provide representation within a community, our findings appeal to policymakers who seek to reduce rent-seeking behaviour by incorporating status differences within a community.

The rest of this chapter is organized as follows. Section 2 discusses the relevant literature on strategic interactions in sender-receiver games. In Section 3, we formally describe the sender-receiver agency game. Section 4 connects representation with social status by outlining a number of hypotheses about the effects of status. Section 5 contains the description of experimental procedure on how social status is integrated in our experimental design. Findings for this experiment can be found in Section 6. We conclude in Section 7.

3.2 Related Literature

3.2.1 Sender-Receiver Game

Crawford & Sobel (1982) introduced a model of strategic information transmission in which a Sender transmits a message to a Receiver and the Receiver's reaction to that message dictates the consequences for both players. As the interests of Sender and Receiver are not fully aligned, the information content of the message is under the strategic consideration of the Sender. A rational and strategic Sender will bundle a noisy signal within the transmitted message, hence obscuring the true state of the world to the Receiver. The Bayesian-Nash equilibrium of the Sender-Receiver game consists of the strategic action of the Sender transmitting a message with noisy signal and the Receiver's belief function that the probability of Sender's message is true.

The earliest attempt to use Crawford & Sobel (1982) in behavioural economics, specifically in exploring issues on deception, lying and truth-telling behaviour, was done by Gneezy (2005), through the Sender-Receiver deception game. Here, a Sender that has private information on the state of the world could send a deceptive message about an action the Receiver should take. The consequences of the Receiver's action will affect the Sender and Receiver's payoffs, in which an accepted deceptive message will result in the Sender profiting at the expense of the Receiver. The Sender would receive a relatively smaller payoff in comparison to the Receiver should she/he decide to tell the truth and the Receiver accepts the message. The experiment varied the gains from deceptive behaviour between treatments to examine deception sensitivity to price changes. Results from this experiment showed that the fraction of Senders that deceive the Receiver increases when the gain from deception increases. When the gain from deception is small, i.e. US$1, the rate of deception is 17%. On the other hand, when the gain from deception is high, i.e. US$10, the rate of deception increases to 52%. Subsequent replication by Leibbrandt et al. (2018) among villagers in Bangladesh also found similar pattern, i.e. when the stake from deceiving increases, rate of the deception increases, in this case from 34% to 47%. The same pattern could also be observed in treatments by Sutter (2009).

A consistent finding from the studies above is that a high number of Senders knowingly convey the true message and do not lie to the Receiver despite the economic cost to them. Gneezy (2005) concluded that these Senders exhibit aversion to lying for personal economic gain. While works by Gneezy (2005), Leibbrant et al. (2018) and Sutter (2009) seemed to indicate that the deception rate has a positive relationship with gains from deception, this might not be true for all deception games. In a game that examined white lies, Erat & Gneezy (2012) found that a substantial proportion of Senders were willing to deceive Receivers in treatments where lying produced the highest return to Receivers, even if lying was slightly costly to the Sender. The evidence from Sender-Receiver deception literature indicates that social preferences towards the Receiver, preferences for truth-telling or aversion to lying are present among Senders who choose to send truthful messages to Receivers. In order to remove strategic considerations and social preferences towards the Receiver, Fischbacher & Follmi-Heusi (2013) introduced a die-rolling experiment to measure preferences for truth-telling or aversion to lying. In a meta-study of experimental model testing on non-strategic honest reporting, Abeler et al. (2019) shows that are indeed preferences for truth-telling.

Another consistent finding from sender-receiver deception games is the high rate of message acceptance by Receivers, i.e. a Receiver trusts the Sender's message despite being unaware of the payoff distribution and consequences from accepting or rejecting the Sender's recommendation[19]. Essentially, the Receiver has no reason to suspect that the Sender is deceptive. In Gneezy (2005), on average 80% of Receivers choose to

[19] In Gneezy (2005), the message options for the Sender are: a) Message 1: "Option A will earn you more money than option B", and b) Message 2: "Option B will earn you more money than option A." The Receiver is aware of both massages but not the real state of Option A and Option B. The Receiver has to make a choice between Option A and Option B.

accept the Sender's recommendation. Among subjects in Sutter (2009), the average rate of message acceptance is 72%. Similarly, in van de Ven & Villeval (2015), the average rate of accepting the Sender's message is 76.54%. The exception to high rate of message acceptance is a replication in Bangladesh villages, where there was a 56% acceptance rate for a medium-stake treatment and 43% for a high-stake treatment (Leibbrandt, et al., 2018). Works by Irlenbusch & Meer (2013) and Bond & DePaulo (2008) seek to provide explanation on Receiver's trust in Sender's honesty. Irlenbusch & Meer (2013) incorporated a cheap talk element into a public good game and conclude that credulity among subjects can be explained by a false consensus effect, in which subjects who have made true reports believe the reported contributions as they believe that other group members would be reporting their actual contribution values, as they have done. In a review of deception judging in psychological literature, Bond & DePaulo (2008) find that the success of a liar's deceptiveness is due to the liar's credibility rather than to individual differences between Receivers. Therefore, Receivers' characteristics are not reliable indicators of their ability to detect lies.

This chapter also contribute to the literature on strategic information decisions and group identity. The only work that have linked induced identity with deception in is by Rong et al. (2016). Treatments in this study involved players telling the truth to those in different group and trusting message from the out-group. In these treatments, asymmetric identity reduces the rate of transmission of true messages and the rate of subjects' trust in the messages they received.

Focusing solely on the mechanics of strategic information transmission, Farrell & Gibbons(1989) expanded the Sender-Receiver game by increasing the number of Receivers and allowing the Sender to adopt different communication strategies to address the Receivers. Battaglini & Makarov (2014) produce the first study that empirically tests the communication between one Sender and multiple Receivers as proposed by Farrell & Gibbons (1989). Here Sender varies her/his public communication strategies when there is an additional Receiver in the game. For each Receiver, her/his individual payoff depends on the state of the world and their own decision, while the Sender's payoff is determined by the summation of outcomes from both Receivers' decisions. Similarly, Agranov & Schotter (2013) incorporate more than one Receiver in their Sender-Receiver game. Here, the Sender announces a value from a continous state space to the Receivers. This design creates an additional dilemma for the Receivers in trying to coordinate with each other after receiving the Sender's message. We contribute to this literature by changing the strategic consideration of our Sender while increasing the number of Receivers in each group.

3.2.2 Social Status and Representation

This chapter continues the discussion of social status in representation that began in the previous chapter. Here the discussion will focus more on the relationship of individuals with social status and their function as a trusted representative to the rest.

The notion that a group of selected people representing and guiding the masses towards socially optimal outcomes has been discussed and examined by moral philosophers and academicians. Jefferson (1813) for example, stressed the role of a natural aristocracy, grounded in virtues and talents, to provide instructions, trust and governance to a society. He added that aristrocracy that stemmed only from wealth and birth, but without virtue or talent, was artificial. Effort must be made to find worthy and smart individuals and educate them to sideline the artificial aristocracts in the battle for public trust. The selection of a group of representatives to determine citizens' policy interest has been traditionally examined in political economy. Apart from selecting a representative to implement the citizens' preferred policies, citizens also are found to care about the representative's good character and principles since this signals accountability in the future (Besley, 2006; Besley & Coate, 1997). It is well documented that, in most societies, those with influence over the policy-making process possess privileged status. They have more wealth and higher educational attainment, are better-connected to influential and reliable social networks, and receive more exposure in mass media (DiCaprio, 2012; Carnes, 2018). These groups of people are not restricted to parliamentarians and cabinet members but also include civil servants, grassroot leaders and academics (DiCaprio, 2012).

In modern and democratic societies, the public has the ability to legitimately select the elites to represent their interest; but there are contexts where the emergence of representation is highly influenced by cultural, social and institutional norms and 'the represented/citizens' are not able to signal their preferences. For example, a paramount chief in Sierra Leone needs to be elected by votes of the members of the Tribal Authority rather than those of the people he serves (Acemoglu, et al., 2014); the appointment of a village chief in Sarawak requires state approval; the appointment of an academic department head is often done by the dean's office. In these contexts, leaders are not explicitly selected by group members to represent their interest.

Within traditional communities like the Kayan of Sarawak, protecting the interest of villagers is treated as a moral obligation. The nobility ethos of *noblesse oblige* documented by Geertz (1963), Scott (1976) and Fontaine (2014) in pre-modern Southeast Asia and Europe shows that local-level elites provided assistance to the low-status peasants to meet their subsistence level of livelihood. In Scott (1976), the moral idea of reciprocity, mutual benefits and obligations between peasants and local elites in Southeast Asia saw the peasants providing social standing to the elites and in return the elites have obligations to protect the subsistence rights of the peasants. In Fontaine (2014), these subsistence rights includes credit extension for the peasants. In the context of pre-modern rural Borneo, a village leader protected her/his tribe members by being a skillful warrior and forming strategic alliances with neighbouring villages or colonial powers. Hence, high status individuals provided the villagers and vassals with the rights of subsistence and representation and in return received privileged positions in the economy. This is consistent with Fontaine's (2014) conclusion that in an aristocractic economy, all exchanges have to bear the mark of nobility, i.e. the high-status individuals are doing a favor for the low status groups.

However with colonization, the rise of modern governance structures, and increasing migration to the cities, the bond between local-level elites and the peasants weakened, and these elites increasingly relied on state governance structures to maintain their privilege in their locality. With modern states and their development policies, particularly after World War II, the role of elites in ensuring subsistence rights have diminished and eventually these elites took an administrative role, being the middle-person that connects the government programmes/interventions to the villagers. Essentially, the elites now deliver the rights of representation, rather than ensuring the basic subsistences to the lower status groups.

The right to represent the lower status groups enabled the high status individuals/elites to maintain their positions in their locality. At times, this happens at the cost of the group. There are some ways in which maintaining the link between high status and representation produces negative impacts on the welfare of the lower status group. First, this is through local-level elite capture that is pervasive in rural development. Here, local elites use their local knowledge to promote development projects that match their preferences rather than the preferences of the villagers. For example, a local elite could arrange for a development intervention/programme to be implemented using their resources on their own terms. Platteau, et al., (2014) modelled this behavior theoretically through the relationships of donors (NGOs) and local elites in community-driven development projects where the elites distort information about the preferences of the grassroots to receive aid from donor agencies. The assumption here is that local elites have power over the grassroots to enable rent-seeking behavior. Anectdocal rent-seeking behaviour is documented in Platteau & Gaspart (2003), in which rent-seeking is tolerated by the grassroots and it is treated as a way to compensate the village's elites for their involvement in a project. Second, maintaining representation by high status individuals has effects on legislation and policy outcomes. For example, the policies drafted are used to reinforce status positions in the society (Carnes, 2018). Using 13 pieces of legislation bills from 2010 to 2012 sponsored by members of the United States House of Representatives, Kraus & Callaghan (2014) found that high status members of Congress, classified by average wealth, gender and race, are more likely to sponsor bills that support economic inequality in the US. This work used bills that promoted or reduced economic inequality and linked it to Congress members' support for the elite's status quo position in the society. For example, bills that grant tax holidays on profits or eliminate estate tax are classified as legistlations that support inequality, while bills categorised as inequality reducing included increasing tax rates for individuals with excess earnings, or increasing protection of the rights of tenants facing foreclosure. The evidence from local-level elite capture and promotion of inequality-endorsing policies in the highest decision-making process, shows that lower-status groups' rights of representation by the elites do not necessarily translate to welfare enchancement for low-status groups.

A way to improve the quality of representation by the elite and to benefit the lower status groups is to introduce political competition among the elites. Acemoglu et al. (2014) uses evidence from tribal chiefs in Sierra Leone to examine political competition where representation is embedded with cultural norms, i.e. ruling tribal chiefs are appointed but not selected by the general public. They hypothesised that political competition among the ruling families will constrain the power of a ruling chief as he needs to satisfy many interest groups, hence discipling the chief to govern better by restraining them from distorting economic activities, for example through control of land or taxation. The research found evidence that citizens from areas that have less political competition among the ruling families experienced worse development outcomes compared to those coming from areas with greater political competition.

This chapter contributes to the discussion on whether representation done by those with higher status provides welfare enhancement for other members of the group. The acquisition of human, social and political capital among the general population of Kayan over the last decades enables certain individuals to compete for the rights to represent the group. The *noblesse oblige* norm, as documented in Chapter 2, suggests that higher-status individuals might supply a higher quality of representation. Our experiment tests this hypothesis. This chapter differs from the previous chapter as the function of representative here is to decide in private on a proposal for the distribution of payoffs within her/his group; this decision is effective only if the group members accept it without knowing the content. In contrast, the representative in Chapter 2 only performs her/his role after seeing the extent to which the rest of the group have committed their resources to the public good; the role of the representation is then to increase the return on the public good investment made by group members.

3.3 Sender-Receiver Agency Game

Following an example from Section 1, a village head proposes to the villagers to accept a proposal made by a plantation company to utilise the village's communal land. Let's assume the profit-sharing ratio between the village and the company is contingent on the village's head prior agreement with the company and that the outcome of this agreement is private information for the village's head. The village head could, i) request monetary compensation for her/himself as a compensation for convincing the villagers to accept her/his proposal, which would result in lower profit for the village, or ii) propose the company to the villagers while refraining from rent-seeking so the village would receive higher profit. On the other hand, villagers have the right to reject the village head's proposal and choose to organize themselves to work on the communal land. The villagers are aware that if they decide on this option, the return from this would be lower since they don't have the capital and manpower to scale the operation. The best option for the village is to accept the village head's proposal, conditional on the village head not having engaged in rent-seeking. However, if village head had engaged in rent-seeking, the best option for the village would be for the villagers to work on the land themselves.

The sender-receiver agency game described below is intended to represent a stylized description of representation in which there is a conflict of interest between the representative and group members and the conflict of interest is common knowledge. As we seek to understand the role of real social status in the representative relationship, the game described below maintains credible deniability even if the experiment is implemented in a non-anonymous setting. This element enables a Sender to choose a bad outcome for the group without being singled out as a 'bad' Sender by Receivers and at the same time prevents 'untrusting' Receivers from being exposed to the Sender.

A feature of this game is the presence of outside option for the Receivers. In the Sender-Receiver deception game designed by Gneezy (2005), the Sender is presented with two messages about two potential payoffs and chooses one message which is communicated to the Receiver. Should the Receiver choose not to follow the message from the Sender, both players receive payoffs based on the Receiver's choice, i.e. the message that the Sender did not communicate. The presence of an outside option indirectly allows us to address the concern raised in Sutter (2009) about the definition of deception used by Gneezy(2005). Deception is not only purposely sending a recommendation that is costly to the Receiver, but it must include the intention to deceive. In the case discussed by Sutter (2009), a Sender or *sophisticated truth-teller* transmits a true message with the expectation that it will be disregarded by the Receiver, with the result that the Sender receives a higher payoff than the Receiver The designs used by both Gneezy (2005) and Sutter (2009) incentivizes sophisticated truth-telling, as the Sender's unwanted message is still a part of both parties' payoff in the case that the Receiver does not believe the truth of the message transmitted to her/him. In our design, the unwanted outcome is no longer present as group's potential outcome should the Receivers choose to reject the Sender's recommendation, i.e. the effect of disbelief in the Sender's message is the same whether the Sender recommends the socially optimal or self-interested outcomes, therefore recommending the self-interested outcome is the dominant strategy for Sender. Another feature of this game is the incorporation of an additional Receiver, so that the decision-making process emulates similar processes in villages and other organizational units.

We begin the game with three players, the Sender (S) and two Receivers, $R_i (i \in \{1,2\})$. The outcome from this game is presented as a vector consisting of payoffs for the Sender and the two Receivers. The summation of payoffs within each vector is the *social welfare* value. The payoff values in every vector and the corresponding social welfare value are common knowledge to all players.

The Sender controls the nature of her/his recommendation and it can take form of either of two vectors, *X* or *Y*, in which:

$$X = (x_s, x_{R1}, x_{R2}), \text{ and}$$

$$Y = (y_s, y_{R1}, y_{R2}).$$

For the Sender, $y_s > x_s$, while for any Receiver, R_i, $x_{Ri} > y_{Ri}$, where $x_{Ri} = x_{R1} = x_{R2}$ and $y_{Ri} = y_{R1} = y_{R2}$.

The social welfare values for the two vectors are:

$$v(X) = x_s + x_{R1} + x_{R2}, \text{ and}$$

$$v(Y) = y_s + y_{R1} + y_{R2}$$

In which:

$$x_s + x_{R1} + x_{R2} > y_s + y_{R1} + y_{R2}\text{ ; or } v(X) > v(Y)$$

We incorporated conflict of interest between the Sender and individual Receiver, where $x_s < y_S$ for Sender and $x_{Ri} > y_{Ri}$ for Receiver and this was made salient to both parties. *X* will generate the higher social welfare since *v*(*X*) > *v*(*Y*), but in *X* the Sender receives a smaller personal payoff than an individual Receiver as $x_s < x_{Ri}$. On the other hand, *Y* is sub-optimal for the group but produces a higher personal payoff for the Sender compared to an individual Receiver as $y_S > y_{Ri}$. The value of *v*(*Y*) has been set to create a principal-agent problem. There is a conflict of interest between Sender and Receivers as, if *Y* is chosen, the Sender is able to earn higher payoff at the expense of the group and its members. At the same time, the value of *v*(*X*) represents a social optimal outcome for the group at the expense of the Sender.

The Sender's recommendation will be presented as a *group project*, GP_S, to the Receivers. The Sender privately chooses one of two vectors available, *X* or *Y*, to be the most probable state of GP_S. There is a probability of p that any outcome chosen as a recommendation will be affected by noise and the GP_S will yield the non-recommended outcome, i.e. if the Sender recommended X as GP_S, the non-recommended outcome is *Y*, and vice versa. The probability p can be used to transform the vectors X and Y into vectors of expected payoff values. Thus, X is transformed into the corresponding *noisy* vector X', where $X' = (x'_S, x'_{R1}, x'_{R2})$, and Y is transformed into the noisy vector $Y' = (y'_S, y'_{R1}, y'_{R2})$. After incorporating the probability, the payoffs from noisy vector X' are as follow;

$$x'_S = (1-p)x_S + py_S \text{ for Sender, and}$$

$$x'_{Ri} = (1-p)x_{Ri} + py_{Ri} \text{ for a Receiver.}$$

For payoffs in vector Y',

$$y'_S = (1-p)y_S + px_S \text{ for Sender, and}$$

$$y'_{Ri} = (1-p)y_{Ri} + px_{Ri} \text{ for a Receiver.}$$

In terms of the social welfare value, incorporating the noise p transforms $v(X)$ to $v(X')$, in which $v(X') = (1-p)v(X) + pv(Y)$. For $v(Y)$ it is now $v(Y')$, in which $v(Y') = (1-p)v(Y) + pv(X)$. We assume $p < 0.5$ to maintain the conditions that $y'_S > x'_S$, $x'_{Ri} > y'_{Ri}$ and $v(X') > v(Y')$. The probability value of p is common knowledge to all players.

Getting Y' over X' is personally beneficial for the Sender since $px_S + (1-p)y_S > py_s + (1-p)x_S$. If Receivers did not know the Sender's decision but were willing to trust the Sender, recommending Y' rather than X' would be privately optimal for the Sender.

The role of Receivers in this game is to implement a group project, and it can be in a form of GP_S, recommended by the Sender, or the GP_O. GP_O is a group project set as an outside option to GP_S and the Sender has no control over its nature. Individual Receivers' decision preferences were recorded in the experiment but only the consensus decision of both Receivers was incentivized. In the absence of noise (explained later) GP_O will produce a vector Z to players on condition it is jointly picked by both Receivers. The content of Z is:

$$Z = (z_S, z_{R1}, z_{R2})$$

In relation to $v(X)$ and $v(Y)$,

$$v(X) > v(Z) > v(Y)$$

In relation to Sender's payoff:

$$y_S > z_S = x_S$$

In relation to an individual Receiver's payoff:

$$x_{Ri} > z_{Ri} > y_{Ri}$$

Implementation of GP_O is also affected by noise with probability of p. The value of p is the same as the value used in GP_S. There is probability p that the GP_O will produce vector Y. Therefore, the content of GP_O is transformed to Z′ with $Z' = (z'_S, z'_{R1}, z'_{R2})$ and the social welfare of Z is transformed to v(Z′). For the Sender, vector Z′ will produce a payoff of $z'_S = (1-p)z_S + py_S$ and for a Receiver it will produce $z'_{Ri} = (1-p)z_{Ri} + py_{Ri}$. The social welfare of the noisy vector Z' is given by $v(Z') = (1-p)v(Z) + pv(Y)$.

The social welfare values $v(X') > v(Z')$ ensure that the greatest social gain from the Sender's and Receivers' relationship comes from the Sender being trustworthy and public-spirited as the group's representative and from the Receivers trusting her/him to behave in this way. Concurrently the social welfare value of $v(Z') > v(Y')$ provides Receivers with an option to avoid a Sender that has been suspected to recommend Y as GP_S behind the Receivers' backs. Receivers are not able to maximize social welfare if: i) they decide to trust and untrustwort*hy Sender, expecting she/he has recommended X when she/he has recommended* Y, or ii) they decide to not trust a trustworthy Sender.

Z served 3 purposes in this game. From the Receivers' viewpoint, collectively choosing GP_O allows them to avoid GP_S endorsed by the Sender. If either of the Receivers suspects that Y' is the recommended outcome in GP_S, selecting GP_O in the presence of a self-interested Sender reduces individual losses for both Receivers as $z'_{Ri} > y'_{Ri}$ and 'punishes' the Sender since $y'_S > z'_S$. Another purpose of Z is to protect 'good' or public-spirited Senders who have recommended X' from any ‘untrusting’ Receiver, as $z_S = x_S$. Since $x'_{Ri} > z'_{Ri}$, it is salient to a Receiver that ‘trusting’ the Sender is a rewarding action if the Sender is trustworthy. The final purpose of Z is to provide credible deniability for both Receivers when they have selected GP_O over GP_S. At the end of the experiment, every player will only learn about her/his own payoff. Whether GP_S or GP_O has been selected by Receivers as a consensus was not revealed to the Sender. Therefore, a Sender cannot infer the Receivers decision.

Table 3.1 shows the possible actual outcomes that the two types of players can receive from their actions in this game. It shows that by choosing the Sender’s recommendation in GP_S, a Receiver could only receive x_{Ri} *or* y_{Ri} but opting for GP_O could result in z_{Ri} *or* x_{Ri}. Because x_{Ri} and y_{Ri} are possible outcomes of GP_S irrespective of the Sender’s recommendation, Receivers cannot infer the Sender’s decision. On the other hand, a Sender could only receive x_S *or* y_S as payoff regardless of Receivers’ decisions since $z_S = x_S$.

Table 3.1. Possible actual outcomes available to the Sender and both Receivers

Sender recommends to GP_S	*Receivers choose*	*Sender’s Payoff*	*Receiver’s Payoff*
X	GP_S	x_S or y_S	x_{Ri} or y_{Ri}
	GP_O	$z_S = x_S$ or y_S	z_{Ri} or x_{Ri}
Y	GP_S	y_S or x_S	y_{Ri} or x_{Ri}
	GP_O	$z_S = x_S$ or y_S	z_{Ri} or x_{Ri}

Table 3.2 expands on Table 1 by showing the expected payoffs to the Sender conditional on the Receivers’ consensus decision. If the Sender expects that the Receivers will not form a consensus on GP_S and opt for GP_O, the Sender is indifferent as the payoff from recommending *X* or *Y* is the same. On the other hand, should a Sender expect the Receivers to accept GP_S, the presence of noise p provides plausible deniability for ‘self-interested’ Senders if they intentionally choose *Y'* over X'. It is a rent-seeking opportunity that can’t be detected by the Receivers as each Receiver only receives her/his payment but will never learn the Sender’s decision.

Table 3.2. Expected payoffs available to the Sender

	Consensus select GP_O	Consensus select GP_S
Sender recommends *X* to GP_S	$(z_s, 1-p; y_s, p)$	$(x_s, 1-p; y_s, p)$
Sender recommends *Y* to GP_S	$(z_s, 1-p; y_s, p)$	$(y_s, 1-p; x_s, p)$

Table 3.3 shows the expected payoffs a Receiver could receive after forming a consensus with the co-Receiver and conditional on the Sender's recommendation to GP_S.

Table 3.3. Expected payoffs available to a Receiver as an individual

	Consensus select GP_O	Consensus select GP_S
Sender recommends *X* to GP_S	$(z_{Ri}, 1-p; y_{Ri}, p)$	$(x_{Ri}, 1-p; y_{Ri}, p)$
Sender recommends *Y* to GP_S	$(z_{Ri}, 1-p; y_{Ri}, p)$	$(y_{Ri}, 1-p; x_{Ri}, p)$

Whether Receivers select GP_S (accept Sender's recommendation) or select GP_O (reject Sender's recommendation) depends on their beliefs about the Sender's action. If both Receivers believe that the Sender is public-spirited, they are more likely to form a consensus on GP_S. GP_O is more likely to be selected if both Receivers believe the Sender is self-interested. In order to determine the likelihood of Receivers selecting GP_S over GP_O, a critical value of r is used. r is the probability that a Sender will recommend vector X over vector Y to GP_S. Its critical value is derived by equalizing a Receiver's expected payoff from accepting GP_S and the expected payoff from rejecting GP_S (or selecting GP_O):

$$r[(1-p)x_{Ri} + py_{Ri}] + (1-r)[(1-p)y_{Ri} + px_{Ri}] = (1-p)z_{Ri} + py_{Ri}$$

The critical value of r is defined by the following condition;

$$r = \frac{(1-p)(z_{Ri} - y_{Ri}) + p(y_{Ri} - x_{Ri})}{(1-p)(x_{Ri} - y_{Ri}) + p(y_{Ri} - x_{Ri})}$$

Since $p < 0.5$, the denominator is strictly positive, and strictly greater than the numerator, so $r < 1$. For the critical value to be meaningful (i.e. for there to be an interior solution), it is necessary that $r > 0$, which holds if $p < (z_{Ri} - y_{Ri})/(x_{Ri} + y_{Ri} -$

$2y_{Ri}$). If this condition is satisfied, a Receiver who believes that the Sender is public-spirited with a probability of r or above, will select GP_S. We assume that the Receiver is risk neutral.

Whether a Sender should recommend vector X or Y for GP_S depends on her/his belief probability, b, that both Receivers will jointly select GP_S. If b = 0, the Sender is indifferent between X and Y content in GP_S. When $b > 0$ and $p < 0.5$, it is optimal for the Sender to place vector Y in GP_S. Thus, it is a weakly dominant strategy for Sender to choose vector Y over X. If the Sender selects the weakly dominant strategy, it is best for the Receivers to implement GP_O. Under Nash-Bayesian equilibrium, the Sender will not expect Receivers to implement his project, GP_S, and there is no reason for the Sender to be trustworthy or public-spirited. Since there is no conflict of interest among the two Receivers, their decisions to coordinate on a consensus reflect their beliefs on what the Sender will recommend.

Table 3.4. Potential payoffs for a group of three

		Receivers Consensus	
		GP-S	GP-O
Vector selected by Sender for GP-S	X	$(v(X),1-p;v(Y),p)$	$(v(Z),1-p;v(Y),p)$
	Y	$(v(Y),1-p;v(X),p)$	$(v(Z),1-p;v(Y),p)$

In summary:

a) Since the social welfare value of $v(X') > v(Z') > v(Y')$, it is best for everyone to act as a group. However, to achieve $v(X')$, it is necessary for the Sender to recommend X rather than Y in GP_S and for the Receivers to form a consensus on GP_S over GP_O.

b) It is best for the Sender to set GP_S content to be Y rather than X since this is a weakly dominant strategy for her/him. A public-spirited Sender would recommend X and her/his payoff would be independent of Receivers' decision since $z'_S = x'_S$. Should the Sender believe that the Receivers will implement GP_S with a non-zero probability, he/she would receive x'_S as payoff. If the Receivers opted for GP_O, Sender's decision is irrelevant, and she/he will receive z'_S. Since $z'_S = x'_S$, a public-spirited Sender payoff is maintained but a self-interested Sender will be punished since $y'_S > z'_S$.

c) What is best for an individual Receiver depends on her/his belief about the Sender's action. If the Receiver believes that the Sender has recommended *X* in GP_S with a probability greater than *r*, it is strictly optimal to accept GP_S. On the other hand, if the probability of the Sender recommending *X* is lower than *r*, it is strictly optimal for a Receiver to select GP_O. Trusting is optimal when Sender is public-spirited while not trusting is optimal when Sender is self-interested.

d) The presence of probability *p* in both GP_S and GP_O establishes credible deniability for Sender and Receivers.

In relation to the Sender-Receiver deception game discussed by Gneezy (2005) and Sutter (2009), our design focuses on the agency role of the Sender. Here, because of the outside option, what it is rational for the Sender to do depends only on what happens if her/his recommendation is accepted. There is no need for the Sender to think strategically about whether her/his recommendation will be accepted. Credible deniability by the Sender in the agency role requires that, conditional on her/his recommendation being accepted, the outcome for Receivers could be X when Y has been recommended and vice versa. Provided that $p < 0.5$, it is still the case that the Sender's best strategy is *Y*, irrespective of what Receivers will do.

The payoff values in this game are parameterized according to Malaysian Ringgit (MYR). The social welfare value of $v(X)$ is set at MYR70, $v(Y)$ is MYR55 and $v(Z)$ is MYR56[20]; to maintain $v(X) > v(Z) > v(Y)$. The payoff content of each vector without noise is shown in Table 3.5.

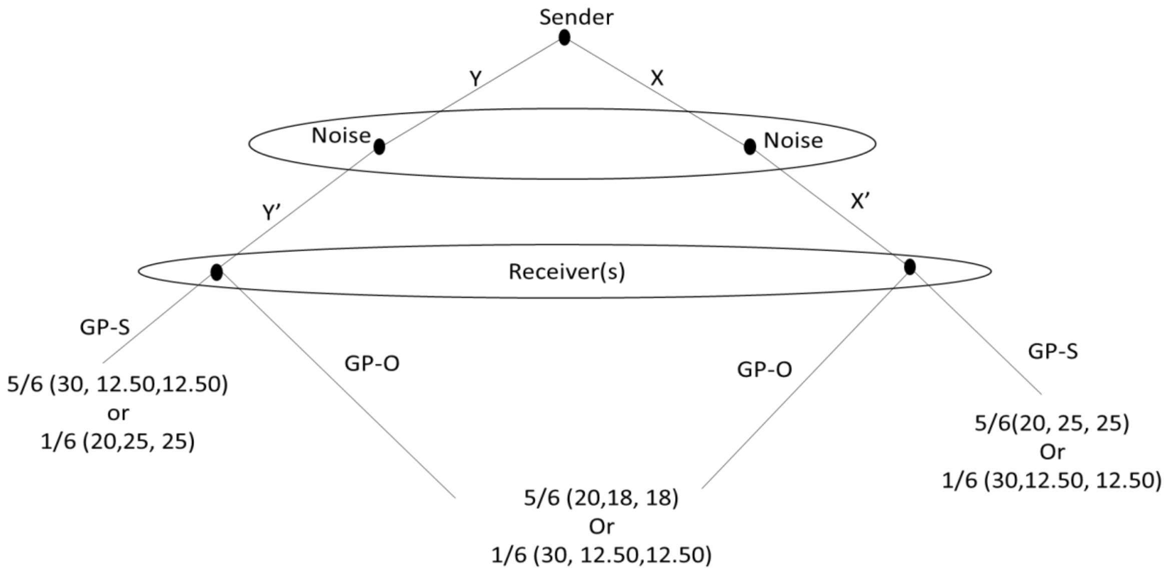
Table 3.5. Potential payoffs for Sender, Receivers and the group

Vector	Payoffs (in Malaysian Ringgit)			Social Value (S + R1 +R2)	
	Sender (S)	Receiver 1 (R1)	Receiver 2 (R2)		
X	20	25	25	v(X)	70
Y	30	12.50	12.50	v(Y)	55
Z	20	18	18	v(Z)	56

[20] MYR70 is equivalent to £13.10, MYR55 is equivalent to £10.30, and MYR56 is equivalent to £10.50.

During the experiment, the value of p is 1/6 for it to align with the outcome of a dice roll, an instrument used to facilitate illustration of probability p to the subjects. Figure 3.1 shows the game tree along with the possible payments that every player will receive.

Figure 3.1. Game Tree of the Sender-Receiver agency game



From the parameterized values selected, the calculated critical value r is 0.3. This indicates that as long as a Receiver trusts the Sender to be public-spirited with a probability of 0.3 or above, a Receiver should implement GP_S.

3.4 Hypotheses

Since the emancipation of slaves in 1950s and growing connection of the Kayan tribe to modern institutions (Ibuh, 2014), modern forms of status, such as education attainment and wealth, are as important as hereditary status. Outside of the formal administration of villages, development programs and local enterprises are increasingly being spearheaded by individuals coming from the non-ruling families. In some villages, individuals armed with education qualifications, political connections and wealth from non-ruling aristocrat and non-aristocrat families are challenging the traditional structure of ruling and administration. With this new environment, there is the possibility that the norm of *noblesse oblige* that shaped representation in the villages in the past could change. Members of the aristoracy might no longer be expected to represent the village better than non-aristocrat villagers.

Under Hypothesis 1, high-status villagers that have been assigned as the Sender will be more likely than the low-status villagers to select vector X as the content of GP_S. One interest of this research is to examine whether public-spirited behaviour is more characteristic of high-status Senders when status is as defined by the cultural norms, i.e. belonging to an aristocracy family, or when it is defined by the esteem held by villagers. *Noblesse oblige* possessed by Senders' in higher status will make them feel stronger obligation to behave pro-socially, and in this case public-spiritedly.

HYPOTHESIS 1: High-status villagers assigned as Sender will be more likely to select X as the content of GP_S .

Payoff differences in each vector makes conflict of interest between Sender and Receivers salient and a self-interested Receiver who expects the Sender to be self-interested will not trust the Sender to place *X* as the content of GP_S. Evidence from Kuang, et al.(2007) pointed out that advice and recommendation from an interested party will not be effective compared to a third party recommendation. However, with the presence of *noblesse oblige* norms, Receivers may be more likely to trust a high-status Sender. There is the possibility that Receivers are more likely to reinforce the *noblesse oblige* norms by relying on a high-status Sender to provide representation to them by selecting *X* as the content of GP_S. This is expected since the traditional norm prescribed that high-status individuals have the duty and the ability to provide protection, subsistence and representation to lower status villagers. We hypothesised that Receivers will be more likely to ignore the conflict of interest and trust the high-status Sender to willingly accept lower personal payoff or be public-spirited to increase the payoff of Receivers.

HYPOTHESIS 2: A Receiver will be more likely to select GP_S when it is recommended by a high-status Sender.

(Mis)trust towards the Sender is a component that could influence the outcome of this game. Another important component that could determine the game's outcome is the formation of consensus between the Receivers. Enforcement of a norm like *noblesse oblige* carries the expectation that it will be followed by every group member. So even if a Receiver personally does not believe that the Sender is trustworthy, if she/he expects the co-Receiver will enforce the norm that high-status individuals are expected to be public-spirited, then there is a possibility that the consensus will favour trusting a high-status Sender.

The role of high-status individuals in setting a norm for effective coordination has been documented in laboratory and lab-in-the-field experiments. In a public good game experiment involving subjects with real world status, d'Adda (2017) found that lower status individuals will conform to the donation levels set by higher status individuals. Concurrently, individuals with high status will donate more by not conforming with the donation level made by lower status partners. A similar study in Bolivia found that status along with legitimate leadership status enabled the leader to set a better example in public good contribution (Jack & Recalde, 2015). In a laboratory experiment involving coordinating between payoff or risk dominant equlibria, Eckel & Wilson (2007) observed that high status players facilitate coordination towards efficient equilibrium as low-status players learn from the signal of high-status players. When the two Receivers meet to form a consensus, we hypothesise that the Receiver with higher status will be more influential in determining the direction of the consensus.

HYPOTHESIS 3: The consensus is positively biased towards the private preference of the higher status Receiver.

Based on the high level of message acceptance in Sender-Receiver deception and communication games, we hypothesise that there are Receivers who form consensus towards accepting GP_S without being affected by social status differences among group members. Given the non-anonymous setting of the experiment, the consensus decisions may reveal another social norm. If there is a social norm of not being untrusting towards co-villagers, the consensus decision will gravitate towards accepting GP_S as selecting GP_O is violating a norm by mistrusting another villager. A Receiver could as an individual state her/his private decision to select GP_O, i.e. not trusting the Sender, but the same Receiver with the co-Receiver could form consensus on GP_S.

HYPOTHESIS 4: Relative to individual decisions, the consensus decision is positively biased towards GP_S.

The *noblesse oblige* norm hypothesised in this Chapter is driven from the conjecture that higher-status individuals feel a stronger obligation to behave pro-socially since they possessed the rights to represent the interest of individuals with lower status. While anthropological work by Geertz (1963) and Scott (1976) discussed the reciprocal relationship between high and low status individuals in a traditional economy, all the hypotheses stated above only discussed pro-social behaviours originating from the norm of *noblesse oblige*. Here, *noblesse oblige* is a general hypothesis about positive correlation between social status and pro-sociality. It does not discriminate between alternative explanations of pro-social behaviour; whether it is because of altruism, reciprocity or guilt aversion. We acknowledge the possiblity that these explanations are present among the subjects during the experiment and in their daily life.

3.5 Experimental Design

The experimental sessions were conducted in 17 close-knit rural Kayan villages in Sarawak. The experiments reported in Chapters 2 and 3 were implemented in the same villages but a villager could only participate in one session. A villager that had participated in a session of the experiment reported in Chapter 2 was prevented from participating in this experiment. Members of the same household may participate in different sessions but not in the same one. The order of this chapter and Chapter 2's experimental sessions was randomized, i.e. subjects that were scheduled for a session in the afternoon have no idea whether the session she/he participated is the same with the morning session. However due to practical reason, there is no restriction on communication between sessions, especially when sessions have to be conducted on the second day in a particular village[21].

Each session required the involvement of 9 villagers. Experimental sessions lasted approximately two hours and were conducted in each village in a closed venue[22]. The description of the Kayan tribe and their social stratification nature was discussed in Chapter 2.

Each session consisted of 4 parts. Activities 1 and 2 are for social status and social closeness elicitations. Social status is elicited by asking villagers to privately rank others in the session and it is based on 5 status dimensions: success, wealth, education, physical

[21] To mitigate the possibility that information and solution on this particular experiment from being discussed by subjects that participated a day before, I randomized the color of the GP_S. On some day, it is red and on some it is blue. A village at most hold 3 experimental sessions for both experiment and there are villages with just 1 session for both experiments. Research team tried their best to wrap all experimental session within a day, but it is impossible for some villages.
[22] Locations used included village's meeting rooms, village homestay and chief's residences.

fitness and extraversion (outgoingness). In the social closeness elicitation task, each subject picked one of seven diagrams that best described her/his social closeness with each of the other 8 subjects in the session. Details on the implementation methodology is in Chapter 2 as Activities 1 and 2 of this chapter's experimental design are identical to its Activities 1 and 2. The Sender-Receiver Agency Game was implemented as Activity 3. In Activity 4, villagers answered questions about themselves in private with an enumerator. Participants were consistently reminded that their actions, decisions and answers would be private and would not be disclosed to other villagers[23].

Table 3.6 below provides an overview of the session structure.

Table 3.6. Overview of experimental design

Activity 1	Social closeness & social status elicitation *(randomized order)*
Activity 2	
Activity 3	One-shot Sender-Receiver agency game with disclosure of villagers' roles and identities
Activity 4	Socio-economic survey

After completing Activities 1 and 2, participants were randomly allocated in a group of three. Within each group, they received their role assignment at random. Each group consisted of a Sender and two Receivers. Instructions for Activities 1 and 2 are identical to instructions of Activities 1 and 2 for Chapter 2. Instruction for social closeness can be found on page 103 under Chapter 2's Appendix C while instructions for social relationship closeness is in Appendix D of Chapter 2 on page 109.

Subjects were then told that the villager in the role of the Sender will receive two cards, one showing the parameterized value of '*X*' above and the other one showing the value of '*Y*'. The Sender will be told to pick *X* or *Y* for a 'Blue Project', i.e. GP_S from above is labelled as 'Blue Project' during implementation. The relevant materials for the Sender can be found in the Appendix as Figures 3.8 to 3.17. Before the Sender decides,

[23] Participants' names were only used in recruitment process, consent form and payment receipts. The documents with participants names were not linked to participants numerical identifier in the session.

both Sender and Receivers were informed that the Sender's decisions would be processed and there is a probability p that the Sender's selection could be swapped with the other option when the Blue Project is being processed.

Behind a private partition, the Sender is provided with two opaque envelopes. Each card needs to be placed in an envelope. Once the Sender is ready, the experimenter will approach the Sender with two large envelopes. One large envelope will have a big blue star on it and the other envelope will have a big blue pentagon on it. The Sender is then requested to place the opaque envelope containing the outcome that she/he wants for the group into the envelope with the large blue star. The envelope with the unwanted outcome is going to be placed in the envelope with the large blue pentagon. After that, both big envelopes were handed to the experimenter. Before the Sender leaves the partition, he/she answers questions related to her/his expectations on the Receivers' actions. He/she is asked which project the Receivers will pick as a consensus and which one will be preferred by Receiver 1 and by Receiver 2.

Standing in front of all subjects in the session, the experimenter sets the 'Red Project'. Red Project is the label used for GP_O during the experiment's implementation. First, the experimenter takes a card that represents the parameterized value of vector Z and places it in an opaque envelope. Second, the envelope is then placed into a big envelope that has a big red star on it. Then the same procedure is repeated but a card that represents the parameterized value of Y goes into a big envelope with a big red pentagon. The payoff from vector Z is illustrated in the booklet and it is Figure 3.12.

X or Y selected by the Sender is in the blue star envelope while Z is in the red star envelope. Subjects had already been told that both Blue and Red Projects need to be processed; from the game description, this is where the noise was incorporated. Processing will happen through a dice roll. A random receiver from each group was asked to throw a dice and then inform everyone of the roll's outcome. The experimenter then will roll a dice in private. If the outcome from the experimenter's roll is the same as the receiver's roll, then the content in the blue star envelope will be swapped with the content of the blue pentagon envelope. On the other hand, if the outcome from experimenter's roll is different from the receiver's roll, the content of the blue star envelope will remain as it was. The same procedure is repeated for the red project. From this randomization process, there is 1/6 chance that the contents of the envelope with the blue star will be swapped with the contents of the envelope with the blue pentagon. There is also 1/6 chance that the content of the envelope with the red star will be swapped with the content of the envelope with the red pentagon. Subjects will be told that Receivers have an option of selecting the blue star or the red star envelope[24]. The blue star envelope contained the X' or Y' while the red star enveloped contained Z'.

Individual Receivers, in turn, will be asked to go to the private partition to indicate their preferences to implement GP_S or GP_O. At the decision partition, each Receiver states the Group Project she/he prefers to be implemented. After that each Receiver will be asked to state her/his belief with respect to the content of the envelope with the blue star, i.e. their belief whether the Sender recommends vector X or Y to GP_S. The Receiver will also be asked to state her/his expectation about the co-Receiver's preference. After the preferences and expectations of both Receivers have been elicited separately, both Receivers were called to the private partition. Here they were told to form a consensus on either the Blue Project or the Red Project. Subjects' payoffs depended on the content of the envelope selected. The instruction, its local language translation and illustration given to the villagers in the experiment can be found in Appendix B.

Both Receivers held discussion to reach a joint decision or a consensus. All pairs of Receivers arrived at a consensus after a few minutes of discussion. Eliciting expectations from each Receiver during their individual decision-making stage helped to make a pair of Receivers arrive at their consensus decisions quickly[25]. Making a pair of Receivers agree on a decision did not cause any problem as all of them arrived at their decision quickly. There is the possibility that the non-anonymous setting facilitates this process.

We recruited 324 villagers at random consisting of 108 as Senders and 216 as Receivers. An average Sender earned MYR23.10 (£ 4.43) while an average Receiver earned MYR18.92 (£3.63). 36 experimental sessions were conducted from December

[24] We randomized the GP-S and GP-O labelling of blue and red according to session. For example, in some sessions, GP-S is identified as the red project. This is to rule out any possibility that one colour is systematically preferred over the other. A statistical test found that Receivers selected blue or red projects based on the possible content, and not colour.

[25] We did not time the duration of discussion by a pair of Receivers given the logistics of handling three different timers for three different groups at the same time.

2016 to February 2017. Table 7 below contains the summary statistics of villagers that participated as subjects in this experiment.

Table 3.7. Summary statistics of subjects' characteristics

Personal Characteristics	Mean	Min	Max
Age (years)	44.12	18	90
Male	0.413		
Years in Education (years)	7.53	0	17
Cash crop	0.546		
Aristocracy strata	0.101		
Former slave strata	0.157		
Village council	0.241		
Migrant to the village	0.247		
Observations	**324**		

Note: Variables in Table 3.7 were elicited in Part 4 after the sender-receiver agency game was concluded. Age refers to the age of the subjects. Variable male takes a value of 1 if the subject is a male, if the subject is a female that variable will take a value of 0. Years in education is the number of years a subject received formal schooling. Before 2015, the compulsory years of schooling in Malaysia was 6. Variable cash crop takes a value of 1 if the output from subjects' agricultural activities are commodities like palm oil or rubber. Aristocracy strata takes a value of 1 if a subject reported she/he is a *maren* (a member of aristocracy households), non-*maren* subjects are identified as 0 in aristocracy strata. Variable village council takes a value of 1 if the subject is a member of village community council. Those in the slave strata were prevented from migrating in the past. Migration to a village only happened with permission from the village's head. If a villager is an adult migrant, variable migrant to the village takes a value of 1, otherwise it is 0. Only variable 'former slave strata' was not elicited directly from the subjects. The mean for variables male, cash crops, aristocracy strata, former slave strata, village council, and migrant to the village reports the share of the subjects that reports they have the variable's characteristics. For example, the share of aristocracy in sampled subjects are 0.101.

As such, there is similar concern on subjects' education levels in enabling them to understand this experiment's instructions. Table 3.7 shows that villagers recruited for the experiment had an average of 7.53 years of education. This is above minimum years of schooling of 6 years under the Malaysian education policy. Regardless, there are subjects recruited that did not finished a year of school. To mitigate this heterogeneity in subjects' education levels, everyone had to answer two control questions before deciding. Control questions posed to the villagers playing in the role of Sender can be found in Appendix B3 and Appendix

B4, while Appendices B5 and B6 have the control questions for those in the Receivers' role. Scripts for control questions start on page 212. Subjects were allowed three trials and could ask clarifying questions before deciding. 65% of the subjects answered the control questions correctly in the first try while the instructions for the game had to be explained in full for 28 subjects (8.7% of the total)[26]. Full explanation was be given to subjects who failed to answer the control questions three times in a row or if the subjects asked for it, even in their first try. The ratio of default against requested explanations is 9:5. The breakdown of subjects' responses to the control questions is in Table 3.1A of this chapter's Appendix.

3.6 Results and Findings

3.6.1 Social status and closeness elicitation behaviour

Descriptions of social status index, *Z*-index, the gap between self-perceived index and social status index have been discussed in detail in Chapter 2 under Section 2.5.1 on page 35. The results in this section only cover the villagers that took part in the experiment reported in this chapter.

Table 3.8 below contains the summary statistics on social status index, *Z*-index, by dimension obtained before the Sender-Receiver game was implemented[27].

Table 3.8. Summary statistics on social status index, Z-index and its correlations

	Summary Statistics				Correlation				
Z-index	Mean	SD	Min	Max	Success	Wealth	Edu	Fitness	Extra
Success	0.50	0.21	0.016	0.969					
Wealth	0.52	0.23	0.031	1	0.79***				
Education	0.50	0.24	0	1	0.26***	0.18***			
Fitness	0.50	0.20	0	0.984	0.29***	0.26***	0.54***		
Extraversion	0.49	0.18	0.031	0.984	0.45***	0.46***	0.17***	0.39***	
Composite Status	0.50	0.15	0.063	0.968	0.79***	0.76***	0.62***	0.68***	0.65***

Note: *Z*-index takes a value from 0 to 1. SD stands for standard deviation. Correlation columns report the correlation between one status dimension with another. *** Significant at 1 percent; ** significant at 5 percent; * significant at 10 percent.

[26] Observations for 4 subjects are missing.

[27] Similar to villagers in Chapter 2, some villagers did make mistakes in the social status elicitation task. The adjustment for the formula for social status index is the same as in Chapter 2. 119 mistakes were detected from 14,580 elicitations, making the rate of mistake to be 0.8%.

In wealth and education status, there are some groups of 9 in which everyone has privately ranked a villager in their group as the wealthiest or the most educated. On the other hand, the zero value in the minimum column shows that in at least one group, everyone privately acknowledged that a person belonged to the bottom of the education or physical fitness ranking. The mean columns in Table 3.8 serve as an indirect measure of villagers' tendency to self-enhance or self-efface themselves in the elicitation task. A mean of 0.5 would indicate that an average villager receives the average value of the *Z*-index, i.e. 0.5. However, for wealth and extraversion, the mean of *Z*-index is either more or less than 0.5. For wealth status there is an indication that most villagers self-efface themselves but placed their position lower on the ladder since the mean is above 0.5, while villagers tend to self-enhance themselves in extraversion status.

The correlation test of Z-index for each status dimension shows that there are correlations between dimensions. Villagers that have been conferred by others to be high-status in one social dimension are more likely to be of high-status in another dimension. The strongest correlation can be found between success and wealth dimensions. As with Chapter 2, the main social status indicator that will be used in here is the composite social status index, that is derived by taking an average from the five status dimensions index. The last row of Table 3.8 shows that the composite status index in general is highly correlated with the status index from the five dimensions elicited.

The villagers' perceptions of their own status are also measured in the same way as in Chapter 2. We first calculate the self-perceived index in each dimension. The graphical illustration that established the relationship between self-perceived status and social status assigned by others can be found in Figures 3.3A to 3.7A of this chapter's Appendix. Further statistical tests comparing self-perceived status and social status conferred by co-villagers can be found in Table 3.2A of Appendix.

To control the effect on self-perceived status on decision-making, we incorporated differences between conferred social status and self-perceived status. The interpretation of this gap is the same as in Chapter 2. When the gap is zero, this indicates that there are agreements between social status conferred by villagers and self-perceived position. When the gap yields a negative value, it means that the villager self-effaced her/himself by perceiving she/he belonged in a lower status that other villagers perceived they should be. Conversely, a positive gap indicates that a group member self-enhanced their position by ranking themselves higher than the status conferred by other villagers.

Table 3.9. Summary statistics on self-perceived status index and its correlation across dimensions

	Summary Statistics		Correlations across self-perceived dimensions				
	Mean	SD	Success	Wealth	Edu	Fit	Extra
Success	0.488	0.33					
Wealth	0.374	0.33	0.43***				
Education	0.522	0.35	0.32***	0.20***			
Fitness	0.524	0.34	0.29***	0.27***	0.31***		
Extraversion	0.579	0.34	0.23***	0.19***	0.24***	0.34***	
Composite	0.497	0.23	0.69***	0.62***	0.57***	0.69***	0.62****

Note: Self-perceived index takes a value from 0 to 1. SD stands for standard deviation. Figures in correlation columns report the correlation between one status dimension with another. *** Significant at 1 percent; ** significant at 5 percent; * significant at 10 percent.

Table 3.9 shows the summary statistics on self-perceived status. A villager that assigned her/himself in the middle rung would have earned a score of 0.55. The mean in Table 3.9 shows the tendency of villagers' self-perception. Mean values that are below 0.55 indicate the tendencies that villagers in general self-effaced themselves by ranking themselves at the lower rungs in the elicitation sheet. Subjects self-effaced themselves mainly in wealth and success. On the other hand, subjects have tendencies to self-enhance themselves in the extraversion dimension. Self- perceived dimensions are weakly correlated to each other as villagers did not place themselves in the same rungs in every dimension. This indicates that villagers took the status elicitation task seriously and filled in the sheet based on the experimenter's prompt.

Table 3.10. Summary statistics on differences between Z-index and self-perceived status

Group – Self Status Gap	Summary Statistics	
	Mean	SD
Success	-0.01	0.32
Wealth	-0.14	0.32
Education	0.02	0.26
Fitness	0.03	0.32
Extraversion	0.09	0.34
Composite	-0.004	0.21

Note: Group-self status gap takes a value from -1 to 1. SD stands for standard deviation

Table 3.10 reports the group-self status gap. With the exception of wealth, other status dimensions show low or non-existent gaps between group and self-ranked status. This indicates that the self-perception of these villagers is similar to their co-villagers' perceptions on them. The composite group-self status gap also reports non-existence of a gap between self-perception and status conferred by group members.

Results from the *Z*-index were compared with the villager's strata to validate the social status elicitation task with traditional social stratification. Table 3.11 reports the correlation between social status index, *Z*-index with the traditional strata.

Table 3.11. Correlations between traditional strata and Z-index, by dimensions

	Success	Wealth	Education	Fitness	Extraversion	Composite
Aristocrats	0.0846	0.0733	0.0569	-0.0194	0.0305	0.0616
Proxy Slaves	0.0914	0.1360**	-0.0631	0.0404	0.0461	0.0712

Note: *** Significant at 1 percent; ** significant at 5 percent; * significant at 10 percent.

Being a member of an aristocrat family does not have a statistically significant correlation with obtaining high *Z*-index values in any status dimensions according to Table 3.11. On the other hand, there is a weak positive statistical relationship between wealth and belonging in the slave strata. A potential explanation of the absence of a statistical relationship between the *Z*-index and traditional strata could stem from a non-random distribution of villagers' strata within sessions. For example, in a session composed entirely of aristocrat villagers, the mean composite Z-index will be close to 0.5; the same will be true in a session composed entirely on non-aristocrats. As identification of traditional status only happened at the end of the experiment, it is was not possible to detect in advance whether a session had a skewed representation of traditional strata.

The second type of social elicitation that happened in each session is the elicitation of social relationship closeness using the IOS scale. A more detailed discussion on IOS scale can be found in Chapter 2. Each villager would receive a score valued from 1 to 7 from other co-villagers in a session and these scores would then be averaged. An average villager received an average score of 4.56 from other co-villagers, indicating that in general there are fairly strong pre-existing social relationships among villagers. The lowest average score a villager received in a session was 1.38 and the highest average score was 6.75.

Table 3.12 reports the correlations between villagers' IOS scores and their social status index in each dimension. Recapitulating from Chapter 2, a villager could receive a maximum total score of 56 if every co-villager in the same session felt that this villager had a close and deep social relationship with them. The lowest total score a villager could receive is 8, i.e. everyone perceived this villager had no social relationship with them. The average total score a villager received in this experiment is 36.2, establishing that a typical sampled villager had some strong pre-existing social relationship other participants in his/her session, outside the experimental setting.

Table 3.12. Correlations between awarded IOS Z-index, by dimensions

	Success	*Wealth*	*Education*	*Fitness*	*Extraversion*
Total IOS scores	0.147***	0.1164**	0.049	0.083	0.162***

Note: *** Significant at 1 percent; ** significant at 5 percent; * significant at 10 percent.

Figures in Table 3.12 show there are weak positive correlations between relationship closeness and success, wealth and extraversion dimensions, i.e. a villager with high total IOS scores also has high social status, as measured by the *Z*-index. On the other hand, relationship closeness is not linked to education and fitness status. Despite weak correlations, figures in Table 3.12 show that meaningful social relationship is usually targeted towards those that have high success, wealth and extraversion status.

Relationship closeness towards a villager from the aristocrat strata ranges from a minimum total score of 21 and a maximum total score of 54. An aristocrat on average receives a total score of 38.2 or an average score of 4.78, which is slightly higher than the scores received by an average villager. There is a small indication that social hierarchy has an influence on relationship closeness as subjects who self-identified as aristocrat recorded statistically significant differences in relationship closeness directed to them compared to other non-aristocrats in the village (*Mann-Whitney (M-W) stats for aristocracy = 1.687, p-value = 0.0917*).

On the other hand, for villagers from the former slave strata, the mean value of the total score was 36.7 (the mean value of the average score was 4.59). This is also slightly higher than the population average. There are no statistical differences in total or average IOS scores received by members of aristocrat strata and members of former slave strata. This could indicate that relationship closeness between those from former slave strata is built over social interactions, and not driven by hierarchy (*M-W stats for former slave strata = 0.4800, p-value = 0.6891)*. Unlike villagers recruited in Chapter 2, in this Chapter we find weak evidence that villagers in general stated stronger social relationship closeness with those belonging to aristocrat members.

Table 3.13 shows the summary statistics of subjects based on the roles assigned to them. This table shows that despite our best to randomise villagers into the role of Sender or Receivers, there are more male Receivers compared to Sender and there are more Senders than Receivers that engaged in cash crop production. They will be incorporated as control variables in the subsequent analysis section.

Table 3.13. Balance: Demographic, social and economic background of Sender and Receivers

	Sender	Receivers	Difference
Personal Characteristics	Mean	Mean	
Age (years)	44.11	44.12	0.0074 [0.9941]
Male	0.34	0.45	-1.838* [0.0669]
Years in Education (years)	7.75	7.42	0.6894 [0.4911]
Engaged in cash crop	0.62	0.51	1.8984* [0.0585]
Aristocracy strata	0.14	0.08	1.5596 [0.1198]
Former slave strata	0.16	0.16	0.0000 [1.0000]
Village council	0.23	0.25	-2.748 [0.7836]
Observations	**108**	**216**	

Note: Explanation of the means of age, and years in education can be found in Note for Table 3.7.The means for variables male, cash crops, aristocracy strata, former slave strata, and village council report the share of the subjects that report they have the variable's characteristics. For example, the share of aristocracy in sampled subjects assigned as representatives is 0.06. Difference is calculated using two independent samples t-test. *** significant at 1 percent level, ** significant at 5 percent level, * significant at 10 percent level.

Table 3.14. Balance: Elicited indices and IOS of sender and receivers

	Sender	Receivers	Difference
	Mean	Mean	
Z-Index			
Success	0.509	0.498	0.4422 [0.6586]
Wealth	0.518	0.516	0.0824 [0.9343]
Education	0.491	0.500	0.3474 [0.7285]
Physical Fitness	0.511	0.491	0.8885 [0.3749]
Extraversion	0.500	0.486	0.7006] 0.4840
Composite	0.506	0.498	0.4361 [0.6631]
Self-Perceived Index			
Success	0.474	0.495	-0.5214 [0.6024]
Wealth	0.387	0.368	0.4786 [0.6325]
Education	0.554	0.505	1.1938 [0.2335]
Physical Fitness	0.509	0.531	-0.5361 [0.5923]
Extraversion	0.602	0.567	0.8594 [0.3907]
Composite	0.505	0.493	0.4581 [0.6472]
IOS			
Total score received	36.2	36.2	0.000 [1.000]
Observation	**108**	**216**	

Difference is calculated using two independent sample t-test to detect differences in variables' averages between sender and receivers. *** significant at 1 percent level, ** significant at 5 percent level, * significant at 10 percent level

Table 3.14 reports the average scores received by Sender and Receivers through the elicitation part of the experiment. These data show that there are no statistically differences in characteristics between subjects assigned as Senders or Receivers.

3.6.2 Sender's recommendation

In this one-shot sender-receiver agency game, a Sender could place either vector *X* or vector *Y* as a recommendation for a group project, GP_S. Figure 3.2 shows the distribution of the decisions made by Senders in this experiment. From 108 Senders' decision, 94 or 87% of selected vector remained as GP_S after the randomization process. This is slightly higher than the expected 5/6 or 83% that could occur from the dice rolling outcome. The non-parametric test finds that there is no statistical difference between the expected outcome from the randomization process and the actual outcome from Sender's decision (*Z-score = 0.7661, p-value = 0.4413*). This would mean that the randomization mechanism, i.e. a dice roll, did not statistically affect the outcome of the Sender's decisions.

Figure 3.2. Outcome of GP_S assigned by Senders

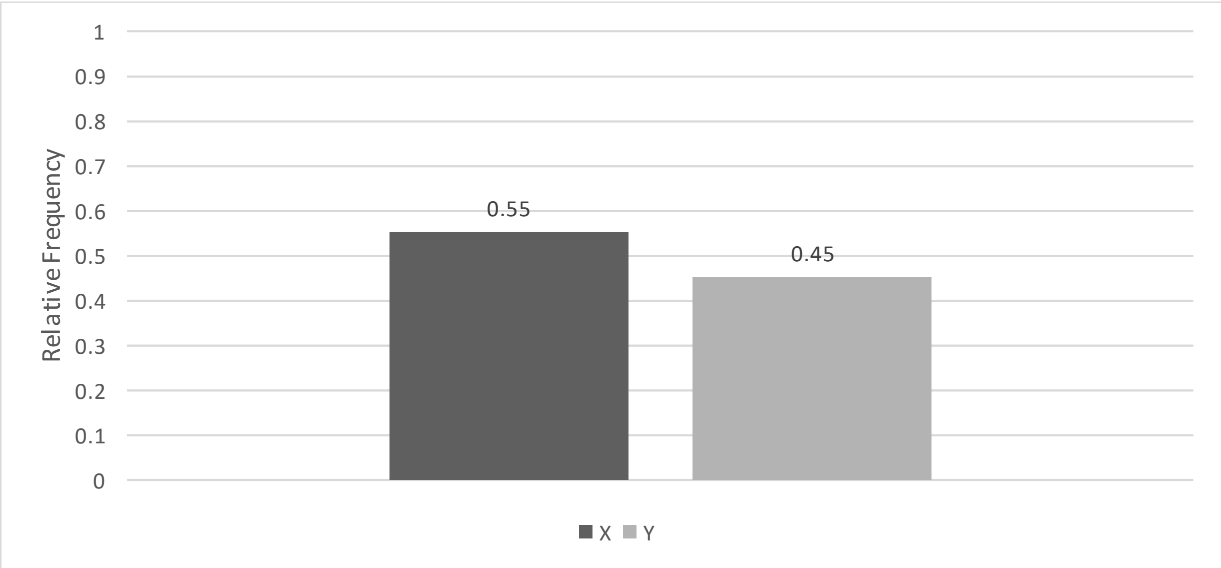


Figure 3.2 shows that the public-spirited vector X was chosen more frequently than the self-interested one, Y. 55% or 59 Senders choose to recommend vector X in GP_S and the remaining 45% or 49 Senders choose vector Y.

Hypothesis 1 proposes that there is a positive relationship between Sender's public spiritedness and high social status. This will be tested in two stages, first through non-parametric testing and then with regression analysis.

Table 3.15. Relationship between assigning X to the group and social status

Social status indicator		*Observation*	*Z-Index Spearman correlation [p-value]*	*Self-Rank Spearman in group of 9 correlation [p-value]*
Ladder Elicitation	*Success*	*108*	*-0.0248 [0.7991]*	*0.1394 [0.1501]*
	Wealth	*108*	*0.0275 [0.7779]*	*0.0259 [0.7901]*
	Education	*108*	*-0.0373 [0.7016]*	*0.0442 [0.6497]*
	Physical fitness	*108*	*-0.1596* [0.0989]*	*-0.0599 [0.5383]*
	Outgoingness	*108*	*-0.2233** [0.0202]*	*-0.938** [0.0444]*
	Composite	*108*	*-0.1151 [0.2354]*	
Traditional strata	*Aristocrat*	*108*	*0.1509 [0.1191]*	
	Proxy slave	*108*	*0.0364 [0.7083]*	

Notes: *** significant at 1 percent level, ** significant at 5 percent level, * significant at 10 percent level.

Hypothesis 1 proposes that Senders from higher status background, identified through the elicitation exercises and through the traditional strata to which they belong, will be more likely to select vector *X* as the content of GP_S. Table 3.15 examines the correlations between choice of the public-spirited option and social status. From Table 3.15, we find that public-spiritedness has no clear overall relationship with social status. When a person's status is assigned by other villagers, the only statistically significant results are negative relationships between public-spiritedness and status for physical fitness and outgoingness. When a person's status is self-assigned, the only statistically significant result is again negative (for outgoingness). There is the possibility that Sender's public-spiritedness (or lack of it) is influenced by the status of their matched Receivers. To account for this possibility, robustness checks on Sender's public spiritedness decision and Receivers' social status are in Table 3.2A of this chapter's Appendix. From Table 3.2A, there is some indication that Senders take self-interested decisions when they are paired with wealthy Receivers within the same session. Senders' preferences to opt for public-spirited vector is not related to the status of the Receiver she/he was paired with.

Similar to the experiment in Chapter 2, this experiment also took place in a non-anonymous setting with most of the relationship data elicited before the decision-making stage. Therefore, the non-parametric results above do not account for: i) the possibility that status of Sender and Receivers interacting with each other, ii) unobservable characteristics of Sender and Receivers, and, iii) village-level heterogeneity. To address this concern, I will turn to regression analysis.

Through econometric analysis, I've incorporated elicited status of Sender and Receivers along other characteristics to explain Senders' decisions to be public-spirited. I estimated the economic equations below using probit regression. There will be 5 regression specifications. Regression (1) will only examine Sender's status-based variables. The specification is as follows;

$$X_S = \alpha_1 GS_S + \alpha_2 TS_S + \varepsilon_S$$

Recommending X to GPS is the dependent variable, GS_S is the composite group status index given by co-villagers in a session to the Sender, TS_S is the sender's traditional status, either as a member of an aristocrat family or a former slave strata. GS_S is constructed using the value of five Z-index elicited through the social status elicitation.

Regression (2) extended specification (1) by incorporating the social status variables related to group members as well as the influence of social relationship closeness between Sender and Receivers. The specification for model (2) will be;

$$X_S = \alpha_1 GS_S + \alpha_2 TS_S + \alpha_3 GS_{\bar{R}} + \alpha_4 TS_{\bar{R}} + \alpha_5 IOS_{\bar{R}} + \varepsilon_S ,$$

in which $GS_{\bar{R}}$ is the average value of composite z-index for the two Receivers matched with the Sender, $TS_{\bar{R}}$ is the belonging to one or both Receivers to the traditional strata, and $IOS_{\bar{R}}$ is the dispersion in IOS scores given by Sender to both matched Receivers.

Specification for Regression (3) is a replication of Model (2) but with the incorporation of village-level effect to account for heterogeneity between villages. Regression (3) combines the explanatory variables in Regression (1) and (2) and it can be represented as;

$$X_S = \alpha_{1v} + \alpha_2 GS_S + \alpha_3 TS_S + \alpha_4 GS_{\bar{R}} + \alpha_5 TS_{\bar{R}} + \alpha_6 IOS_{\bar{R}} + \varepsilon_S ,$$

Specifications (4) and (5) extends the specification in model (3) by including control variables for Sender and Receivers. They are gender, age, memberships in the village council and a villager's status as a migrant. Regressions (4) and (5) look at Sender's status for the elicited task and as reported by villagers during the socio-economic survey. Table 3.16 contains the results for regression specifications (1) tot (5).

Table 3.16. Determinants of Sender's decisions

	No controls	Receivers' status	Village level effect	Sender's control	Receivers' control
VARIABLES	(1)	(2)	(3)	(4)	(5)
Composite z-index	-0.909	-1.273	-1.207	-1.251	-1.245
	(0.744)	(0.790)	(0.973)	(0.998)	(1.023)
Aristocrat	0.645	0.515	0.787*	1.374**	1.544***
	(0.482)	(0.523)	(0.453)	(0.564)	(0.554)
Proxy slave	0.255	0.468	0.457	0.790*	0.671
	(0.325)	(0.410)	(0.424)	(0.463)	(0.477)
Status index control				0.243	0.0192
(self-perceived index)				(0.699)	(0.703)
Receivers' status					
Receivers' z -index		-1.854	-1.870	-2.626*	-2.599
		(1.437)	(1.466)	(1.580)	(1.804)
Aristocrat		0.0309	0.0328	-0.211	-0.0140
		(0.320)	(0.387)	(0.448)	(0.441)
Proxy slave		-0.155	-0.221	-0.115	-0.0295
		(0.312)	(0.364)	(0.357)	(0.360)
Dispersion in IOS score		0.0413	0.0283	-0.0332	-0.0540
		(0.0894)	(0.0893)	(0.0946)	(0.0941)
Constant	0.453	1.524*	0.928	1.639	2.791
	(0.371)	(0.885)	(1.148)	(1.507)	(1.730)
Sender's controls	No	No	No	Yes	Yes
Receivers' controls	No	No	No	No	Yes
Village fixed effect	No	No	Yes	Yes	Yes
Observations	108	108	108	106	106
Pseudo R-squared	0.0290	0.0481	0.1388	0.1763	0.2023
χ^2 Test	3.26	5.43	8.80	17.08	22.05

Note: Probit regressions. Dependent variable takes on a value of 1 if the Sender assigns X to the GP_S and 0 if she/he assigns Y. Table reports coefficients with clustered standard errors on session in parentheses. Variables derived from indices take any value from 0 to 1. The aristocrat variable takes a value of 1 if the Sender reports that she/he a member of aristocrat family at the end of the experiment, and 0 otherwise. Former slave strata take the value of 1 if the Sender is inferred to belong formerly in the slave strata, and 0 otherwise. Status index control is derived from self-perceived and *z*-index of Senders. Composite *z-index* of Receivers takes a value from 0 to 1 and is the average of the status indexes of the group members in the same group. Dispersion in IOS score measures the difference in IOS score assigned by Sender to both Receivers and it takes a value between 0 and 6. The value of 0 would means that the Sender views both Receivers equally in terms of social relationship closeness. On the other hand, any value that is above 0 would mean that the Sender values her/his relationship closeness with one Receiver over the other Receiver. Variables used as controlled in the specifications above are, i) age, ii) gender, iii) membership in village council and iv) being a migrant in the village. *** Significant at 1 percent; ** significant at 5 percent; * significant at 10 percent.

Hypothesis 1 stated that Senders with high-status, either by elicitation or traditional strata, will be more likely to assign vector X as the content to GP_S. Without incorporating village-level heterogeneity, status-relevant variables are statistically insignificant. The aristocrat effect only emerges after the inclusion of village-level effect, in which Senders from aristocrat background are found to be more public-spirited than the non-aristocrats. The aristocrat willingness to recommend X could reflect the norm of *noblesse oblige* these villages.

Results from other status-related and control variables are less consistent in all specification used. For example, Control variable of Sender's migration status only matters in specification (4) but not (5). A consistency with specifications (1) to (5) in Table 3.16 is that none of the chi-square χ^2 test for independence return statistically significant results. This would means that there is no significant association between Senders' likelihood to recommend X as outcome of GP_S and variables used to identify status differences and control variables if these specifications are jointly tested.

Hence, Hypothesis 1 that stated high-status Senders are more likely to be public-spirited can be partially accepted.

Result 1: There is an indication that Sender's status as an aristocrat resulted in public-spirited decision, there is inconclusive evidence that high-status Senders in general are more likely to be public-spirited.

Table 3.4A to Table 3.8A in this chapter's appendix contains additional regression outputs as robustness checks to specification in Table 3.16. These tables test the regression specification based on each of the elicited status dimensions. Aristocracy variable remains statistically significant in every robustness check conducted. The regression outputs also show that Senders that have been conferred with high physical fitness and extraversion status by their co-villagers are less likely to recommend X as the outcome of GP_S. Meaningful statistical relationship could not be found for success, wealth and education statuses.

Another factor that might influence a Sender's decision is her/his expectation on Receivers' decisions. A Sender's expectations on Receivers came in two forms; i) expectation on incentivised consensus decision, and ii) expectation on each Receiver's preferred group project.

When the Sender's expectation is measured in relation to a consensus decision, 76% of the Senders expect GP_S will be selected over GP_O[28]. Table 3.17 shows Senders' decision broken down by their expectation on the consensus decision. Whether Senders recommend X or Y, a large majority of them (75% of Senders who recommend X and 78% of Senders who recommend Y) expect that their decisions will be implemented. This indicates that a majority of Senders, regardless of their decisions, deliberately decide as an agent for the Receivers.

Table 3.17. Senders' decision and expectations on consensus decision, in percentage

No		Relative Frequency [N = 108]
1.	Assign X to GP_S and Expect Implementation of GP_S	0.41 (44)
2.	Assign X to GP_S and Expect No Implementation of GP_S	0.14 (15)
3.	Assign Y to GP_S and Expect Implementation of GP_S	0.35 (38)
4.	Assign Y to GP_S and Expect No Implementation of GP_S	0.10 (11)

Note: Figures in parentheses are the number of the decisions.

Since the experiment happened in a non-anonymous setting, Senders also report their expectations on each of the two Receivers in their respective group. When Senders' expectations are measured as expectations on both Receivers corresponding as individuals, the percentage of Senders' expecting GP_S implementation reduces to 47% and for implementing GP_O, it is at 14%. The remaining 39% of Senders expects that the Receivers in their group will implement different decisions if they were to decide as single Receivers. A potential explanation to these differences in expectation is that a proportion of Senders is engaged in a hedging strategy, i.e. expecting each Receiver in the group to select an opposing group project. By comparing Senders'

[2828] This rate is close to the Senders' prediction rates that Receiver will follow Sender's message reported in the literature of sender-receiver deception games. 72.3% of Senders in Sutter (2009) predicted that their Receivers will follow their messages, while 73.4% expected the same in Innes & Mitra (2013).

expectations on the first Receiver (labelled B1 in experiment) and the second Receiver (labelled B2 in experiment), we found there is no systematic differences in Senders' expectation, i.e. there is no evidence that Senders' expectations were influenced by this labelling (χ^2 = 2.58, p = 0.108). Table 3.18 shows the breakdown of Senders' decision and their expectations about Receivers' individual decision. 88% of public-spirited Senders and 84% of self-interested Senders expected that at least one Receiver would implement GP_S. Senders' decisions were independent of whether she/he expected both or one of the Receivers to accept her/his recommendation in GP_S (χ^2 = 0.8313, p = 0.6598).

Table 3.18. Senders' decision and expectations on individual Receivers' decision

No		Relative Frequency [N = 108]
1.	Assign X to GP_S and Expect Implementation of GP_S by Both Receivers	0.28 (30)
2.	Assign X to GP_S and Expect Implementation of GP_S by at least one Receiver	0.20 (22)
3.	Assign X to GP_S and Expect No Implementation of GP_S by Both Receivers	0.06 (7)
4.	Assign Y to GP_S and Expect Implementation of GP_S by Both Receivers	0.19 (21)
5.	Assign Y to GP_S and Expect Implementation of GP_S by at least one Receiver	0.19 (20)
6.	Assign Y to GP_S and Expect No Implementation of GP_S by both Receiver	0.07 (8)

Note: Figures in parentheses are the number of the decisions.

Table 3.19 provides regression analysis on Senders' decisions to recommend X to GP_S with Senders' expectations of it being implemented. These results show there is no relationship between any measure of the Sender's expectation about Receivers and the decision to assign outcome X.

Table 3.19. Determinants of Sender's decision and expectations

Variables	Assign X =1		
Expecting implementation of GP_S by both Receivers privately = 1	0.340 (0.298)		
Expecting implementation of GP_S by at least one Receiver = 1		0.322 (0.397)	
Expecting implementation of GP_S as a consensus Decision = 1			0.220 (0.315)
Village Effect	Yes	Yes	Yes
Constant	-0.674*** (0.217)	-0.765* (0.397)	-0.651** (0.315)
Log likelihood	-67.633	-68.11	-68.21
Pseudo R^2	0.091	0.0845	0.0832
Observations	108	108	108
χ^2 Test	1.31	0.66	-0.651**

Note: Probit regressions. Dependent variable takes on a value of 1 if the Sender assigns X to the GPS and 0 if she/he assigns Y. Table reports coefficients with clustered standard errors by session in parentheses. *** Significant at 1 percent; ** significant at 5 percent; * significant at 10 percent.

Despite the weakness of our statistical findings, our analysis of Senders' behaviour reveals some interesting patterns. First, a majority of Senders exhibit public-spirited behaviour by recommending vector *X* to GP_S despite knowing that they would receive a higher personal payoff by recommending Y. Second, if a Sender belongs to the aristocrat strata, she/he is more likely to be public spirited. Third, a high proportion of Senders expect their recommendations to be accepted by the Receivers, but expectations about Receivers did not drive Senders public-spirited behaviour. This suggests that most Senders perceived themselves to be acting as agents to their Receivers while not perceiving public-spiritedness as an act that required reciprocal trust from Receivers.

3.6.3 Receivers' Acceptance

Each Receiver indicated her/his preference for GP_S or GP_O in private. After that, the two Receivers in each group met, held a discussion and arrived at a consensus on the group project implementation. It could be GP_S (blue project), recommended by the Sender, or the outside option, GP_O (red project). Payoffs for Receivers and the Sender were determined by the consensus decision. The act of Receivers accepting GP_S means they have recognized the Sender's agency in deciding the content of GP_S for them.

There are 108 pairs of Receivers and 76 or 70% of them decided to implement GP_S over GP_O. Hence, a majority of pairs of Receivers recognized the agency of their respective Senders. Since 55% of Senders made the public-spirited choice of X, compared with the critical value, *r*, of 30%, implementing GP_S was ex-post optimal for Receivers. Thus, the behaviour of Receivers was broadly consistent with self-interested behaviour and realistic expectations about the behaviour of Senders.

Hypothesis 2 proposes that Receivers are more likely to implement GP_S if the Sender is a person with high social status. To address this hypothesis, we will analyse the consensus decision of Receivers and then decision preferences of Receivers as individuals. We will conduct non-parametric analysis for pairs of Receivers first and then address the preferences of singular Receivers.

Table 3.20. Descriptive statistics on consensus decision due to Sender

	GP_S	**GP_O**	Mann-Whitney test [p-value]
Sender's Z-Index	Mean (SD)	Mean (SD)	
Success	0.512 (0.210)	0.504 (0.208)	0.444 [0.6568]
Wealth	0.529 (0.229)	0.493 (0.221)	0.925 [0.3548]
Education	0.509 (0.238)	0.447 (0.224)	1.235 [0.2168]
Physical Fitness	0.516 (0.200)	0.501 (0.187)	0.639 [0.5226]
Extraversion	0.507 (0.180)	0.484 (0.177)	0.747 (0.4549)
Composite	0.514 (0.159)	0.486 (0.148)	1.198 [0.2311]
Sender's Traditional Status			
Aristocrat	0.171 (0.379)	0.063 (0.246)	1.483 [0.1382]
Former slave	0.157 (0.367)	0.156 (0.368)	0.021 [0.9830]
Observation	**76**	**32**	

Difference is calculated using Mann-Whitney test to detect differences in differences between Senders who recommendations were accepted and Senders whose recommendations were rejected.. *** significant at 1 percent level, ** significant at 5 percent level, * significant at 10 percent level

Table 3.20 shows the descriptive statistics on consensus decision based on the social status of the Sender. We compared the mean and standard errors of Senders that have their recommendation accepted (GP_S) and those who did not (GP_O). In all measures of social status, there are no statistical differences detected between Senders in groups that select GP_S or GP_O as shown the Mann-Whitney test.

Table 3.21 contains non-parametric tests for consensus decisions by pairs of Receivers. It examines the relationship between accepting GP_S as consensus decision and Sender's social status.

Table 3.21. Relationship between accepting GP_S and Sender's status

Z-index	*Observations*	*Spearman correlation with Sender's z-index [p-value]*
Success	*108*	*0.0429 [0.6590]*
Wealth	*108*	*0.0895 [0.3572]*
Education	*108*	*0.1194 [0.2184]*
Physical fitness	*108*	*0.0618 [0.5251]*
Outgoingness	*108*	*0.0722 [0.4575]*
Composite	*108*	*0.1158 [0.2328]*

Notes: *** significant at 1 percent level, ** significant at 5 percent level, * significant at 10 percent level.

Based on Table 3.21, consensus behaviour has no statistical relationship with Sender's elicited social status. Similarly, decisions to accept GP_S are also not related to Sender's belonging to aristocracy (*Spearman rho = 0.1433, p-value = 0.1389)* or from former slave strata (*Spearman rho = 0.0021, p-value = 0.9831).* To address the possibility that the consensus decisions to accept GP_S is driven by Receivers' personal status, I have conducted a robustness check in Table 3.9A of this chapter's appendix. There is no relationship between consensus and Receivers' social status.

Result 2: Receivers' consensus decision to implement GP_S could not be predicted by any status indicators, either elicited from the elicitation task or real-world based status.

While only the consensus decision was incentivised, each Receiver communicated their individual preferences to implement GP_S or GP_O. Out of the 216 Receivers, 64% or 138 stated that they privately preferred to implement GP_S before discussing their decisions and forming a consensus with the other co-Receiver. Table 3.22 contains the results from the non-parametric analysis on Receivers' individual preferences to selected GP_S over GP_O in relation to the social status of Senders.

Table 3.22. Relationship between individually preferring GP_S and Sender's status

Z-index	*Observation*	*Spearman correlations with Sender's z-index [p-value]*
Success	*216*	*-0.0105 [0.8779]*
Wealth	*216*	*0.0578 [0.3977]*
Education	*216*	*-0.0199 [0.7707]*
Physical fitness	*216*	*-0.0133 [0.8459]*
Outgoingness	*216*	*-0.0198 [0.7723]*
Composite	*216*	*-0.0206 [0.7638]*

Notes: *** significant at 1 percent level, ** significant at 5 percent level, * significant at 10 percent level.

Table 3.22 shows that the elicited social status of the Sender has no relationship with each Receiver's preference on GP_S over GP_O. With respect to traditional status of Sender, there is no significant relationship for aristocracy (*Spearman = 0.0790, p-value = 0.2478)* or former slave strata (*Spearman = 0.0338, p-value = 0.6211*).

Like Sender's decisions, Receivers also stated their preferences and made decisions in non-anonymized conditions. Therefore, we will turn to regression analysis to examine how social status affected Receivers' preferences to select GP_S or GP_O.

The specification for regression (1) examines only the Sender's social status as a determinant of Receivers' preferences:

$$GP\_S_{Ri} = \alpha_1 GS_S + \alpha_2 TS_S + \varepsilon_S$$

The dependent variable GP_S_{Ri} take a value of 1 if a Receiver prefer to implement GP_S over GP_O. GS_s is the Sender's composite *z*-index, elicited from a session of 9 subjects, while TS_s is the traditional status of the Sender. Regression specification (2) expanded specification (1) by including IOS scores assigned by Receivers to their respective Sender. Regression specification (3) included several Sender's characteristics as control variables; namely age, gender, membership in village council and whether the Sender is a migrant to the village. Village-level effects are included in specification (4) to account for village-level heterogeneity. Regression (5) is an expanded version of specification (4) with the inclusion of Receivers' social status and control variables. The specification for regression (5) is:

$$GP\_S_{Ri} = \propto_{1v} + \alpha_2 GS_S + \alpha_3 TS_S + \alpha_4 IOS_S + \propto_5 GS_{Ri} + \propto_6 TS_{Ri} + \varepsilon_S$$

Since a Receiver needs to form a consensus with her/his co-Receiver afterwards, there is a possibility that a Receiver adjusts his/her preferences early on, taking account of the co-Receiver with which he/she is matched. To address this concern, specification (6) includes co-Receiver's status, closeness and other control variables that might have influenced a Receiver's preference in selecting GP_S over GP_O.

Table 3.23 contains the output of determinants of Receiver's preferences based on regression specifications (1) to (6).

Table 3.23 Determinants of Receivers' preferences

VARIABLES	Sender's status (1)	Sender's status+IOS (2)	Sender's control (3)	Village-level effect (4)	Receiver's status (5)	Co-Receiver (6)
Senders' Status						
Composite z-index	-0.114	-0.161	-0.473	-0.504	-0.470	-0.486
	(0.631)	(0.633)	(0.720)	(0.730)	(0.773)	(0.775)
Aristocrat	0.340	0.291	0.243	-0.183	-0.269	0.0199
	(0.268)	(0.268)	(0.312)	(0.388)	(0.368)	(0.314)
Proxy slave	0.176	0.178	0.288	0.688**	0.693**	0.620*
	(0.254)	(0.253)	(0.255)	(0.341)	(0.343)	(0.328)
IOS score		0.0374	0.0583	0.114**	0.125**	0.116**
		(0.0574)	(0.0566)	(0.0555)	(0.0554)	(0.0583)
Receiver's status						
Composite z-index					-0.0975	0.337
					(0.693)	(0.820)
Aristocrat					0.510	0.524
					(0.451)	(0.526)
Proxy slave					-0.499	-0.552
					(0.360)	(0.363)
Status index control					-0.0600	-0.106
(self-perceived index)					(0.473)	(0.512)
Constant	0.341	0.190	0.496	1.172*	1.105	1.225
	(0.329)	(0.384)	(0.552)	(0.638)	(0.824)	(1.101)
Sender's controls	No	No	Yes	Yes	Yes	Yes
Receiver's controls	No	No	No	No	Yes	Yes
Co-Receiver's controls	No	No	No	No	No	Yes
Village fixed effect	No	No	No	Yes	Yes	Yes
Observations	216	214	214	214	214	214
R-squared	0.0069	0.0088	0.0325	0.1621	0.1861	0.2241
χ^2 Test	2.08	2.14	5.91	10.47	20.44	42.92***

Note: Probit regressions. Dependent variable takes on a value of 1 if the Receiver privately prefers to implement GP_S, and 0 if she/he prefers GP_O. Table reports coefficients with clustered standard errors by session in parentheses. Variables derived from social status indices take any value from 0 to 1. The aristocrat variable takes a value of 1 if the Receiver/assigned Sender/assigned co-Receiver reports that she/he a member of aristocrat family at the end of the experiment, and 0 otherwise. Former slave strata variable takes the value of 1 if the Receiver/assigned Sender/assigned co-Receiver is inferred to belong formerly in the slave strata, and 0 otherwise. Control variables for Senders and Receivers are: age, gender, membership in village council and being a migrant to the village. Control variables for co-Receivers are composite *z*-index for co-Receiver, her/his aristocracy or slave status along with the same control variables of Sender and Receiver. *** Significant at 1 percent; ** significant at 5 percent; * significant at 10 percent.

Regression specifications (1) to (4) examine the relationship between Receivers' preferences and the Sender's characteristics. Only after incorporating village-level effect, the specification (4) yielded statistically significant effects. Specifications (4) to (6) show that a Receiver matched with a Sender from the lowest strata and/or a Sender with whom the Receiver has a strong social relationship is more likely to accept GP_S from Sender.

Statistical outputs in Tables 3.20 to 3.23 show that higher status Senders did not have an influence on Receivers' willingness to implement GP_S over GP_O. Hence, Hypothesis 2 could not be accepted. For regression models and specifications that incorporate separate social status indexes for each elicited status dimension, refer to Tables 3.10A to 3.14A in the Appendix.

Result 3: A Receiver is more likely to prefer GP_S over GP_O if they have a close relationship with the Sender. High status of the Sender did not influence the Receiver's likelihood to prefer GP_S over GP_O.

As this game is implemented in a non-anonymized setting, Receiver's and co-Receiver's characteristics could have influenced Receivers' preferences. The regression specification in column (6) of Table 3.23 included co-Receiver's status and other potentially relevant characteristics of the co-Receiver as control variables. The only variable that produced a statistically significant effect is co-Receiver's membership in the village council: a Receiver is less likely to prefer GP_S if she/he is matched with a co-Receiver who serves as a member of village's council. Members of a village council typically have a good relationship with the village's head and are involved in the execution and implementation of village-level policy. This is parallel to the role of middle managers in modern organizations. Receivers preference due to her/his partnered co-Receiver's council membership suggests that Receivers prefer to consult someone with administrative status in the village before recognizing the agency from the Sender.

While Hypothesis 2 cannot be accepted, the strong effect of co-Receivers' membership in the village council indicates that co-Receivers play an important role in shaping Receivers willingness to recognize Senders' agency. This finding strengthens the suspicion that consensus decisions will have an element of conformity driven by Receiver-to-Receiver relationships.

Table 3.24 shows the descriptive statistics on a Receiver's social status relative to their co-Receiver. Entries in this table show the means of the higher and lower ranked status of Receivers for each group and the statistical differences between groups that chooses GP_S or GP_O.

Table 3.24 Descriptive statistics on consensus decision due to co-Receiver

	Consensus GP_S		Consensus GP_O		Mann-Whitney statistics [p-value]	
	Low mean (sd)	High mean (sd)	Low mean (sd)	High mean (sd)	GP_O low vs GP_S low	GP_O high vs GP_S high
Co-Receiver's Z-Index						
Success	0.357 (0.170)	0.624 (0.022)	0.411 (0.155)	0.618 (0.030)	1.316 [0.1882]	-0.172 [0.8637]
Wealth	0.361 (0.177)	0.652 (0.212)	0.416 (0.152)	0.662 (0.203)	1.828* [0.0676]	0.121 [0.9036]
Education	0.369 (0.201)	0.646 (0.198)	0.346 (0.197)	0.620 (0.222)	-0.562 [0.5741]	-0.454 [0.6495]
Physical	0.354 (0.144)	0.617 (0.157)	0.371 (0.162)	0.633 (0.153)	0.428 [0.6689]	0.313 [0.7542]
Outgoingness	0.372 (0.140)	0.586 (0.146)	0.403 (0.118)	0.598 (0.154)	1.269 [0.2043]	-0.040 [0.9678]
Composite	0.399 (0.118)	0.589 (0.125)	0.435 (0.101)	0.580 (0.136)	1.369 [0.1709]	-0.676 [0.4989]
Observation	76	76	32	32	108	108

Difference is calculated using Mann-Whitney test detect differences in variables' averages between accepting and rejecting Sender's recommendation.*** significant at 1 percent level, ** significant at 5 percent level, * significant at 10 percent level

Table 3.24 compared the means of z-index for each status dimensions by the relative status of both Receivers within a group. Table 3.24 examined the differences among low status Receivers and high-status Receivers and their consensus. Among low-status Receivers, only the wealth dimension shows statistically significant effects in which the low-status Receivers that picked GP_O have higher status than the low-status Receivers that select GP_S. No other statistically significant differences can be detected among the high-status Receivers that agreed on GP_O or GP_S as consensus.

Groups that have selected GP_S have lower means for its lower status Receivers in all status dimensions with the exception of education status.

The 64% preferences towards GP_S translated to 70% of implementation under consensus decision. 36 groups reported contradicting preferences; i.e. in a pair of Receivers, one Receiver preferred to implement GP_S while the other Receiver preferred GP_O. However not every pair has Receivers with unequal status. For example, a village council member is present in 13 out of 36 pairs.

Once a pair of Receivers must decide on a consensus, 23 or 64% of them chose to implement GP_S. A further line of inquiry is to test how Receivers resolved contradictions in private preference to arrive at the consensus decision.

Hypothesis 3 predicts that consensus decisions will be positively biased towards the preferences of the higher status co-Receivers. For example, if a high-status co-Receiver privately prefers GP_O, the consensus will form around GP_O due to conformity from lower status Receivers. Analysis to determine the validity of Hypothesis 3 could only involve pairs of Receivers that reported contradicting private preferences before they proceed to discuss with each other to form a consensus. Table 3.25 contains the relevant statistics and tests for Hypothesis 3.

Table 3.25. Direction of consensus according to status

Status	Sample Size	Ratio Favouring High Status Decision	Proportion that favour high status decisions	p-value (binomial two-tailed test)
Composite Status	36	16: 20	0.44	0.618
Success Status	36	21: 15	0.58	0.405
Wealth Status	36	17: 19	0.47	0.868
Education Status	36	16: 20	0.44	0.618
Physical Status	36	12: 26	0.33	0.065*
Extraversion Status	36	18: 18	0.50	1.0
Village Council	13	8: 5	0.62	0.581
Male	19	6: 13	0.32	0.167
Aristocrat	18	5: 13	0.28	0.096*
Proxy slave	21	9: 12	0.43	0.663

*** Significant at 1 percent; ** significant at 5 percent; * significant at 10 percent.

I identified the proportion of consensus decision that is identical to the higher status Receiver's private preference within each group. From the binomial tests conducted, there was no evidence that consensus decisions were positively biased towards the preferences of the co-Receiver with higher status. Instead, there was marginally significant positive bias towards the preferences of co-Receivers with lower physical status and from non-aristocrat strata. Therefore, Hypothesis 3 could not be accepted as there is no indication that the private preferences of higher status co-Receivers are translated into consensus decisions. However, these tests have low power because of the small number of groups with conflicting preferences and status differences between co-Receivers.

Result 4: There is no evidence that consensus decisions are positively biased towards the preferences of the higher status Receiver.

Another possible explanation of how consensus is reached is stated in Hypothesis 4: the consensus decision is positively biased towards GP_S. From the 36 groups that have contradicting preferences, 23 groups ended up forming consensus on GP_S. The statistical test on this found that there is a marginally statistically significant drift towards accepting GP_S (binomial test, *p*-value: 0.066, one-tail). Therefore, Hypothesis 4 would be accepted.

Result 5: When there is a contradiction in a pair of Receivers' preferences, they solve this by forming consensus towards GP_S.

There are three potential explanations that could explain why contradictions in private preferences are solved by drifting towards implementing GP_S.

First, one of the Receivers might privately prefer GP_O based on factors like mistrust towards the Sender, spite for not being selected as the Sender or inability to comprehend the game. Switching from GP_O to GP_S could also be motivated by reputation-maintenance. A Receiver could potentially want to avoid signalling her/his distrust towards a co-villager (the Sender) to another Receiver, therefore agreeing to jointly implement GP_S. In villages that have strong norm of trusting villagers over outsiders, signalling preferences towards GP_O would be a violation of this norm.

Second, it is possible that there is social desirability bias. Concurrently, the social desirability bias could relate to an experimenter demand effect, in which decisions made were motivated to project social cohesion or cooperation within the village to an outsider (Zizzo, 2010). Out of 108 groups, there are only 4 in which both Receivers change their private preferences from GP_O to GP_S as the consensus. An experimenter demand effect could be detected if there were a big share of Receivers switching their preferences from GP_O to GP_S in the consensus, however its share is marginal. Therefore, inconsistency in private preferences and consensus decision reflects Receiver-to-Receiver interactions, as intended in the research design, and not towards projecting village-level cohesion or cooperation to the experimenter.

Third, accepting GP_S is the rational decision. After the discussion stage, both Receivers may discuss their beliefs on the outcome of GP_S. Since the actual proportion of public-spirited Senders was much higher than the critical value *r*, i.e. 55% vs 30%, implementing GP_s was the 'correct' decision for most groups. Therefore, one possibility is that rational discussion would tend to produce a consensus on GP_S.

There is the possibility that expectations play a role in the likelihood of GP_S being privately preferred by the Receivers. Overall, 59% of Receivers expect their respective Senders to recommend vector *X* or the public-spirited outcome to GP_S. Table 3.26 shows the breakdown of Receivers' decisions and their expectations about their Senders' public-spiritedness.

Table 3.26. Receiver's private preferences and expectations

No		Relative Frequency [N = 216]
1.	Prefers GP_S with expectation of recommendation *X*	0.43 (92)
2.	Prefers GP_S with expectation of recommendation *Y*	0.21 (46)
3.	Prefers GP_O with expectation of recommendation *X*	0.16 (34)
4.	Prefers GP_O with expectation of recommendation *Y*	0.20 (44)

Note: Figures in parentheses are the number of the decisions.

If Receivers' private preferences were independent of their expectations about Senders' decisions, the expected number of Receivers preferring GP_S conditional on the Sender being expected to be public-spirited would be 81. However, the observed number is 91. There is highly significant positive correlation between Receivers' expectations of public-spiritedness and preferring GP_S ($\chi^2 = 10.92$, $p < 0.005$). This indicates that the Receivers' preferences are based on rational self-interest but at the same time this rational self-interest is not harming the Sender.

As Receivers also stated their expectations about their co-Receivers' preferences, Table 3.27 contains the regression models that test the likelihood to prefer GP_S due Receivers' expectations toward members of her/his group.

Table 3.27. Receiver's expectations and decision

Variables	Prefers GP_S =1 (1)	(2)	(3)
Expect Senders to Recommend *X* = 1	0.522*** (0.186)		0.593*** (0.206)
Expect co-Receivers to prefer GP_S = 1		1.038*** (0.254)	1.087*** (0.267)
Village Effect	Yes	Yes	Yes
Constant	0.647 (0.174)	0.272 (0.180)	-0.150 (.314)
Log likelihood	-120.668	-112.753	-108.425
R^2	0.1459	0.2019	0.2325
Observations	216	216	216
χ^2 Test (value in parentheses is probability)	7.89*** (0.0050)	16.67*** (0.0000)	23.57*** (0.0000)

Note: Probit regressions. Dependent variable takes on a value of 1 if the Receiver prefers to implement GP_S if she/he was to make the decision alone and in private, and 0 if she/he prefers GP_O. Table reports coefficients with clustered standard errors by session in parentheses.*** Significant at 1 percent; ** significant at 5 percent; * significant at 10 percent.

Output (1) confirms non-parametric results above that preferring GP_S is positively related to the expectation that Sender has recommended *X*. Output (2) shows that expecting that the co-Receiver privately prefers GP_S also increase the likelihood of a Receiver's preferring GP_S. This result could be the result of a false consensus effect, i.e Receivers derived their expectations on co-Receivers as a projection of their own preferences. Once both types of expectations are factored in, Receivers' likelihood to prefer GP_S are conditional on expectations.

3.6.4 Decisions and Village-Level Effect

More than half of the Senders in our sample are public-spirited, however the only status variable that could explain public-spiritedness is belonging to an aristocrat family. There was no evidence of status-driven differences among non-aristocrats that could explain public-spiritedness. Given the heterogeneity of villages involved in this study, we extended the analysis by examining the relationship between placing *X* to the GP_S and village-level characteristics. The village-level characteristics will be examined in the following categorization: i) being led by a female leader (now or in the past), ii) involvement with the dam resettlement programme, iii) having Borneo Evangelical church as the dominant religion, iv) having access to electricity (a proxy for development), v) number of housing blocks in the villages and vi) number of household in the village.

5 out 17 villages involved are currently or recently led by a female leader and 33 groups came from these villages. Vector *X* has been assigned to GP_S 21 out 33 times in these villages. Using Fisher exact test and Pearson χ^2, we found no evidence that the gender of the village leaders affects Senders' recommendations (Pearson χ^2 =1.56, *p-value = 0.211;* two-tailed Fisher exact test, *p-value* = 0.294).

Huge development programmes, like dam resettlement, that rely on a leader's ability to negotiate with government could also influence village-level public-spiritedness. In villages that have been plagued with mistrust towards their traditional leaders in the negotiation process, the outcomes of the Sender's decision might skew towards assigning *Y* to GP_S. On the other hand, communal shocks could have increased prosocial behaviour and induced public-spiritedness among experimental subjects. Dam resettlement program impacted 7 villages or 45 groups of 3 in our sample population. By comparing the decisions to assign *X* or *Y* to GP_S, we cannot establish any relationship between Senders' decisions and the dam resettlement programme (Pearson χ^2 =0.72, *p-value* = 0.396*;* two-tailed Fisher exact test, *p-value* = 0.438).

Further non-parametric statistical test aimed at establishing links between Senders' recommendations in GP_S and village-level characteristics produced no statistically significant results. Irrespective of village-level characteristics like dominance of the evangelical church (Pearson χ^2 = 0.23, *p-value* = 0.6315; two-tailed Fisher exact test, *p-value* =0.6991), access to electricity (Pearson χ^2 = 0.23, *p-value* = 0.6315; two-tailed Fisher exact test, *p-value* = 0.6991), number of blocks (Pearson χ^2 =1.8, *p-value* = 0.1797; two-tailed Fisher exact test, *p-value* = 0.2456), and number of households in the village (Pearson χ^2 =0.4347, *p-value* = 0. 0.932) could not explain Senders' public-spiritedness. Results from this section further strengthen findings that Senders' decisions are not influenced by any village-level norm.

3.7 Discussion and conclusion

This chapter has investigated the role of social status and social closeness in shaping representation when the representative possesses private information that could affect social welfare. It is well established in organizations that individuals possessing rights to represent others have relatively higher social status than the ordinary group members they represent. We introduced a Sender-Receiver agency game where: i) the Sender could recommend a vector of outcomes for her/himself and the Receivers, ii) and the Sender is only recognized as a representative when the Receivers implement the Sender's recommendation as a consensus. By implementing the game as a lab-in-the-field experiment, we were able to incorporate real-world social status from members of the Kayan tribe of Sarawak.

The experiment found that more Senders were willing to engage in public-spirited representation than behaved self-interestedly. Apart from belonging to an aristocrat family, no other social status characteristics, including the elicited social status, could explain variation in Senders' public-spiritedness. A significant proportion of Receivers chose to implement the recommendations from their respective Senders as a consensus, hence recognizing the Sender's agency in deciding the payoff of everyone in the group. Private preferences of each Receiver reported lower acceptance of the Sender's recommendation compared to the consensus decision, but in general Receivers privately preferred to accept the Sender's recommendation. Social status characteristics of the Senders did not influence Receivers' consensus while Receivers' private preferences to accept or reject Senders' recommendations were not driven by the social status of the partnered co-Receivers.

Whether a Sender chose to be public-spirited or self-interested, she/he did not condition it based on her/his expectations about the Receivers' decision. This is rational for Senders who have chosen the public-spirited outcome; rejection from Receivers would mean that the Sender still preserved her/his public-spirited payoff. On the other hand, Receivers conditioned their decisions based on their expectation of Senders' behaviour. This would mean that expectation and conditionality play a big role in recognizing agency to represent a group of people. In contrast, the experiment found no evidence that a would-be representative/Sender pays attention to the group of people they seek to represent.

Public-spirited Senders behaved similarly with public-spirited representatives in Chapter 2. Both types of representatives are willing to accept lower payoffs in order to represent and increase the welfare outcome of their group. This includes the willingness to not their representation not being conditioned by expectations on Receivers. On the other hand, the frequency of public-spirited behaviour by representatives was lower in the Sender-Receiver game than in the Public Good game, and social status characteristics were not able to explain variation in Senders' public-spiritedness.

A potential explanation of the differences between the effects of status on the behaviour of representatives in the Public Good game and the Sender-Receiver game is a difference between the mechanisms of representation. In the Sender-Receiver game, representation happens through a private recommendation about a potential outcome for the group while in the Public Good game it happens by complementing group members' contributions. In the Sender-Receiver game, the representative's role involves the arrangement of payoff distributions between the representative and group members with a salient conflict of interest. On the other hand, the status and *noblesse oblige* effect in the Public Good game of Chapter 2 emerged in a setting in which the representative was able to increase the value of a collective project which benefitted all group members. This is in sync with the traditional role of representative in traditional societies. In the Public Good game, the requirement on the representative to take responsibility to expand everyone's payoff is stronger, particularly since the representatives have seen group members' willingness to trust them. The *noblesse oblige* effect in Sender-Receiver game is driven by those that belong to the aristocrat families as they act public-spiritedly by taking on the responsibility or agency to decide on behalf of the group as expected by the norm.

While the game introduced in this chapter captured the representation context for a small organization, its framework is could be examined much further given the pervasive agency and representation function in many organizations. Even modern organizations like parliament, government and firms engage in situations similar to the model of agency described above; an individual or several individuals usually possess private information on the real outcome of decisions taken on behalf of others. But the realization of the outcome from the representative(s) action comes only with the implementation or acceptance of the decision taken by other group members.

Appendix A: Robustness checks and further testing

Table 3.1A. Breakdown on control questions comprehension by subjects (percentage of total subjects)

	Number of trials on Question 2			
Number of trials on Question 1	*1*	*2*	*3*	*Total*
1	207	12	1	220
2	41	27	1	69
3	8	5	18	31
Total	256	44	20	320

Observations from 4 subjects are missing. If a subject failed to correctly answer a control question in three tries, the research assistant assigned to them will explain the entire game.

Table 3.2A. Wilcoxon signed ranks test on self-perceived statuses

Dimensions	Signed ranks test
Success = Wealth	6.091***
Success = Education	-2.509**
Success = Fitness	-1.709*
Success = Extraversion	-4.274***
Wealth = Education	-6.399***
Wealth = Fitness	-6.514***
Wealth = Extraversion	-8.304***
Education = Fitness	0.324
Education = Extraversion	-2.126**
Fitness = Extraversion	-2.932***

Interpretation for Table 3.2A: Positive test values indicate that the self-perceived status dimension on the left are ranked higher than the self-perceived status dimension on the right. Negative test values indicate the the self-perceived status dimension on the left is ranked lower than the self-perceived status dimension on the right. For example, success = wealth yields a value of 6.091, meaning that in general villagers tend to perceive their own success at higher rank than their own wealth. Similarly, in education = extraversion that yields a value of -2.932 indicates that in general villagers tend toperceived their own education at lower rank than their extraversion rank. *** Significant at 1 percent; ** significant at 5 percent; * significant at 10 percent.

Figure 3.1A. Success dimension dispersion: Self-rank vs group-rank

Correlation: 0.38*** z= -7.05

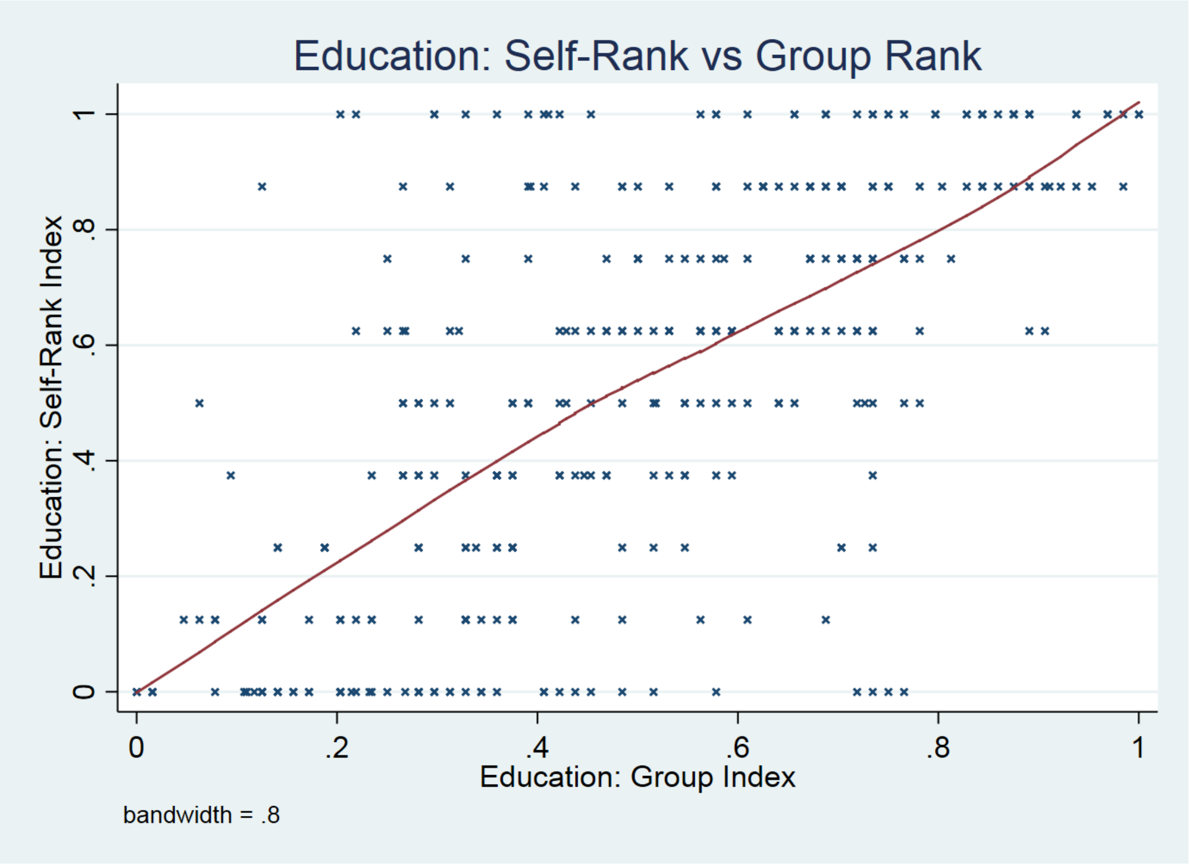
Interpretation of Figure 3.3: The fitted line indicates that there is weak positive correlation between self-perceived rank in success dimension with the success status assigned by the 8 villagers in a session. The scatter points at the bottom of the graph indicate that there are villagers the perceived themselves as the least successful villager among the 9 villagers but the other 8 villagers place this villager at higher status ranking. The scatter points at the top of the graph shows the villagers that perceived themselves as the most successful villagers among the 9 villagers. The scatter points tend to populate the bottom half of the fitted line indicating that villagers are more likely to self-efface the status of their success. The negative Wilcoxon signed ranks value indicates that in general villagers self-effaced themselves, but its value is not statistically significant.

Figure 3.2A. Wealth dimension dispersion: Self-rank vs group-rank

Correlation: 0.40*** z= -8.044***

Interpretation of Figure 3.4: The fitted line indicates that there is weak positive correlation between self-perceived rank in wealth dimension with the wealth status assigned by the 8 villagers in a session. The scatter points at the bottom of the graph indicate that there are villagers the perceived themselves as the least wealthy villager among the 9 villagers but the other 8 villagers place this villager at higher status ranking. The scatter points at the top of the graph shows the villagers that perceived themselves as the wealthiest villagers among the 9 villagers. The scatter points tend to populate the bottom half of the fitted line indicating that villagers are more likely to self-efface the status of their success. The negative Wilcoxon signed ranks value indicates that in general villagers self-efface themselves.

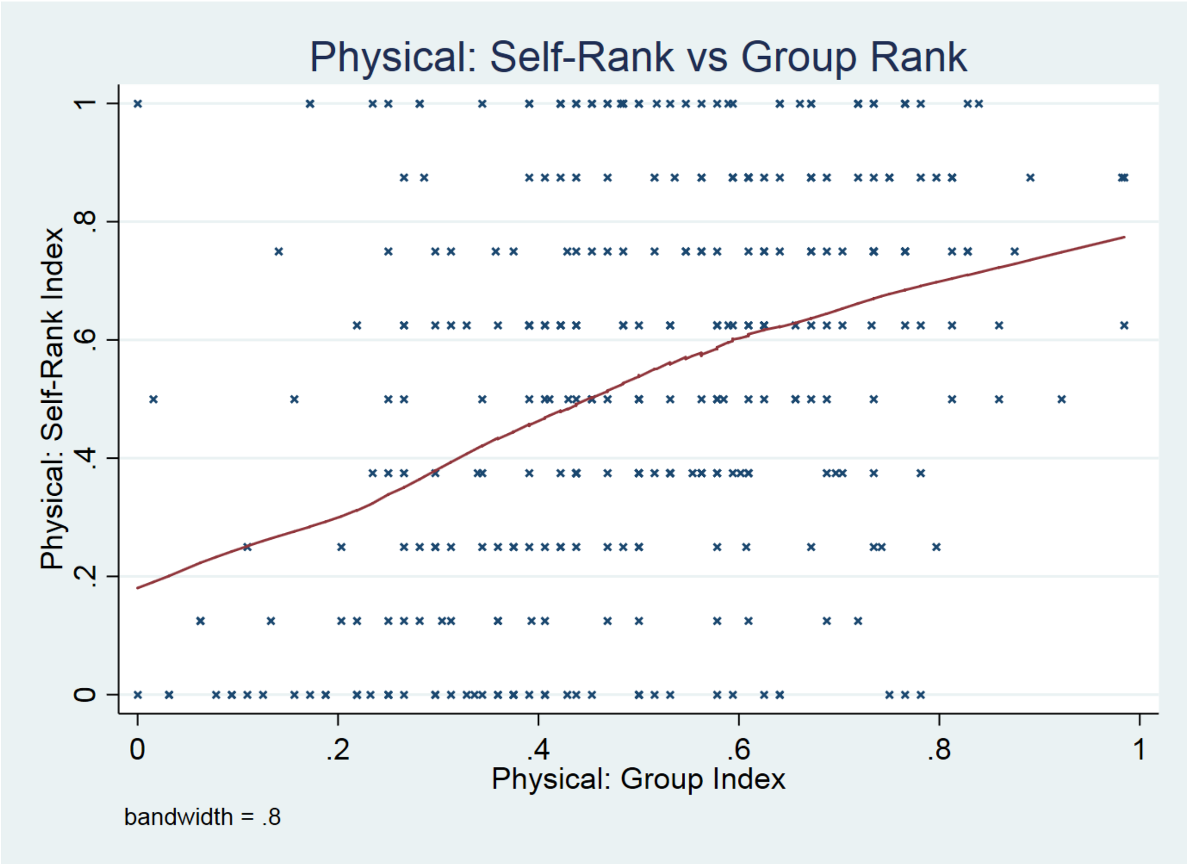
Figure 3.3A. Education dimension dispersion: Self-rank vs group-rank



Correlation: 0.65*** z= 1.544

Interpretation of Figure 3.5: The fitted line indicates that there is relatively strong positive correlation between self-perceived rank in education dimension with the education status assigned by the 8 villagers in a session. The scatter points at the bottom of the graph indicate that there are villagers the perceived themselves as the least educated villager among the 9 villagers but the other 8 villagers place this villager at higher status ranking. The scatter points at the top of the graph shows the villagers that perceived themselves as the most educated villagers among the 9 villagers. The scatter points tend to populate the top half of the fitted line indicating that villagers are more likely to self-enhance the status of their success. The positive Wilcoxon signed ranks value indicates that in general villagers self-enhanced themselves but since its value is not statistically significant, villagers' perception on their education status is similar to co-villager's perception on them.

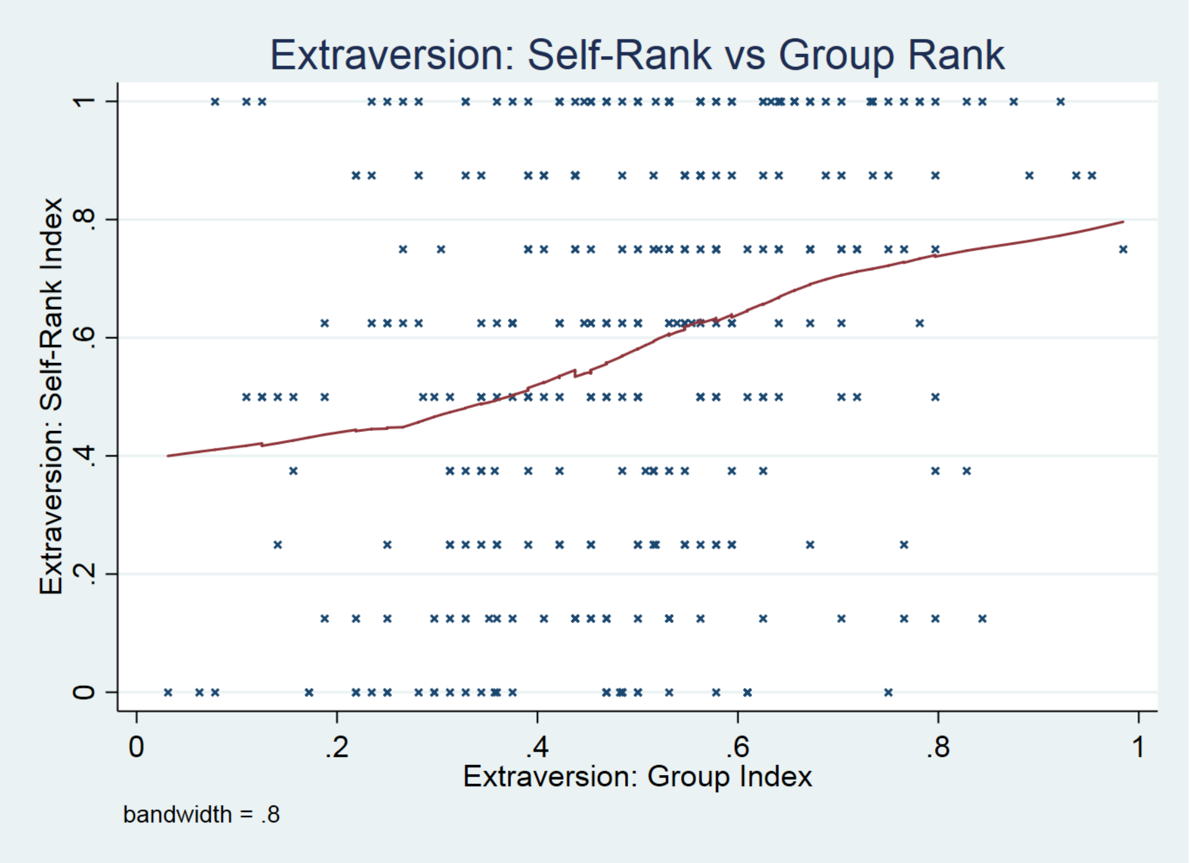
Figure 3.4A. Physical fitness dimension dispersion: Self-rank vs group-rank



Correlation: 0.37*** z= 1.145***

Interpretation of Figure 3.6: The fitted line indicates that there is weak positive correlation between self-perceived rank in physical fitness dimension with the physical fitness status assigned by the 8 villagers in a session. The scatter points at the bottom of the graph indicate that there are villagers the perceived themselves as the least physically fit villager among the 9 villagers but the other 8 villagers place this villager at higher status ranking. The scatter points at the top of the graph shows the villagers that perceived themselves as the most physically fit villagers among the 9 villagers. The scatter points tend to populated the top half of the fitted line indicating that villagers are more likely to self-enhance the status of their success. The positive Wilcoxon signed ranks value indicates that in general villagers self-enhanced themselves.

Figure 3.5A. Extraversion dimension dispersion: Self-rank vs group-rank



Correlation: 0.29*** z= 4.580***

Interpretation of Figure 3.7: The fitted line indicates that there is weak positive correlation between self-perceived rank in extraversion dimension with extraversion status assigned by the 8 villagers in a session. The scatter points at the bottom of the graph indicate that there are villagers the perceived themselves as the least extrovert fit villager among the 9 villagers but the other 8 villagers place this villager at higher status ranking. The scatter points at the top of the graph shows the villagers that perceived themselves as the most extrovert villagers among the 9 villagers. The scatter points tend to populate the top half of the fitted line indicating that villagers are more likely to self-enhance the status of their success. The positive Wilcoxon signed ranks value indicates that in general villagers self-enhanced themselves.

Table 3.3A. Relationship between selecting X to GP_S and Receivers' social status

Z-index	Observation	Correlation to highest status Receiver [p-value]	Correlation to Receiver's average status [p-value]
Success	*108*	*-0.0379 [0.6970]*	*-0.0418 [0.6678]*
Wealth	*108*	*-0.1751* [0.0698]*	*-0.1644* [0.0891]*
Education	*108*	*-0.0469 [0.6301]*	*0.0125 [0.8976]*
Physical fitness	*108*	*-0.0794 [0.4140]*	*0.0319 [0.7429]*
Outgoingness	*108*	*-0.2033** [0.0348]*	*-0.1328 [0.1707]*
Composite	*108*	*-0.0552 [0.5705]*	*-0.0910 [0.3491]*
Traditional status		*Correlation if one of the Receiver is*	
Aristocrat	*108*	*0.0582 [0.5495]*	
Proxy Slave	*108*	*-0.0550 [0.5717]*	

Notes: *** significant at 1 percent level, ** significant at 5 percent level, * significant at 10 percent level.

Table 3.4. A Robustness check for success dimension (Sender)

VARIABLES	No controls (1)	Receivers' status (2)	Village level effect (3)	Sender's control (4)	Receivers' control (5)
Composite z-index	-0.296	-0.433	-0.460	-0.0845	-0.109
	(0.466)	(0.475)	(0.673)	(0.792)	(0.812)
Aristocrat	0.636	0.597	0.890**	1.359**	1.603***
	(0.484)	(0.516)	(0.447)	(0.554)	(0.573)
Proxy slave	0.252	0.473	0.441	0.623	0.479
	(0.327)	(0.405)	(0.422)	(0.464)	(0.478)
Status index control				0.934*	0.791
(self-perceived index)				(0.532)	(0.559)
Group members' status					
Group members' z -index		-0.743	-0.721	-1.144	-0.665
		(0.896)	(0.892)	(0.959)	(1.131)
Aristocrat		-0.0249	-0.00789	-0.401	-0.212
		(0.316)	(0.394)	(0.443)	(0.437)
Proxy slave		-0.210	-0.289	-0.194	-0.111
		(0.317)	(0.359)	(0.359)	(0.365)
Dispersion in IOS score		0.0285	0.0168	-0.0637	-0.0876
		(0.0885)	(0.0883)	(0.0963)	(0.0975)
Constant	0.145	0.573	-0.0330	0.0698	0.835
	(0.243)	(0.510)	(0.848)	(1.131)	(1.278)
Representative's controls	No	No	No	Yes	Yes
Group members' controls	No	No	No	No	Yes
Village fixed effect	No	No	Yes	Yes	Yes
Observations	108	106	106	106	106
R-squared	0.0218	0.0345	0.1278	0.1789	0.1981
χ^2 Test	2.19	3.39	7.03	19.93*	20.22

Table 3.5A. Robustness check for wealth dimension (Sender)

VARIABLES	No controls (1)	Receivers' status (2)	Village level effect (3)	Sender's control (4)	Receivers' control (5)
Composite z-index	-0.0319	-0.319	-0.342	-0.279	-0.424
	(0.548)	(0.599)	(0.646)	(0.692)	(0.724)
Aristocrat	0.625	0.545	0.823*	1.506***	1.781***
	(0.478)	(0.527)	(0.448)	(0.583)	(0.555)
Proxy slave	0.227	0.417	0.400	0.715	0.613
	(0.324)	(0.400)	(0.426)	(0.468)	(0.483)
Status index control				-0.174	-0.355
(self-perceived index)				(0.551)	(0.572)
Group members' status					
Group members' z -index		-1.427	-1.469*	-1.700*	-1.229
		(0.870)	(0.876)	(0.910)	(1.034)
Aristocrat		-0.0265	-0.0246	-0.278	-0.0759
		(0.330)	(0.399)	(0.452)	(0.443)
Proxy slave		-0.159	-0.226	-0.153	-0.0995
		(0.331)	(0.367)	(0.363)	(0.371)
Dispersion in IOS score		0.0169	0.00119	-0.0585	-0.0771
		(0.0868)	(0.0865)	(0.0891)	(0.0922)
Constant	0.0157	0.906*	0.337	0.772	1.496
	(0.272)	(0.513)	(0.854)	(1.166)	(1.287)
Representative's controls	No	No	No	Yes	Yes
Group members' controls	No	No	No	No	Yes
Village fixed effect	No	No	Yes	Yes	Yes
Observations	108	106	106	106	106
R-squared	0.0202	0.0474	0.1399	0.1745	0.1963
χ^2 Test	1.90	5.31	8.84	16.10	22.75

Table 3.6A. Robustness check for education dimension (Sender)

VARIABLES	No controls (1)	Receivers' status (2)	Village level effect (3)	Sender's control (4)	Receivers' control (5)
Composite z-index	-0.0930	0.0856	0.276	0.101	0.0879
	(0.534)	(0.543)	(0.638)	(0.747)	(0.779)
Aristocrat	0.622	0.678	1.013**	1.506***	1.633***
	(0.483)	(0.489)	(0.429)	(0.522)	(0.516)
Proxy slave	0.216	0.404	0.353	0.645	0.588
	(0.313)	(0.397)	(0.427)	(0.450)	(0.476)
Status index control				0.641	0.556
(self-perceived index)				(0.577)	(0.573)
Group members' status					
Group members' z -index		0.180	0.375	0.0444	-0.784
		(0.631)	(0.775)	(0.819)	(1.029)
Aristocrat		-0.0661	-0.0645	-0.331	-0.0636
		(0.316)	(0.397)	(0.443)	(0.444)
Proxy slave		-0.219	-0.316	-0.229	-0.0978
		(0.322)	(0.367)	(0.359)	(0.373)
Dispersion in IOS score		0.0203	0.000904	-0.0463	-0.0684
		(0.0883)	(0.0893)	(0.0938)	(0.0939)
Constant	0.0470	-0.129	-0.930	-0.627	1.307
	(0.286)	(0.402)	(0.794)	(1.267)	(1.719)
Representative's controls	No	No	No	Yes	Yes
Group members' controls	No	No	No	No	Yes
Village fixed effect	No	No	Yes	Yes	Yes
Observations	108	106	106	106	106
Pseudo R-squared	0.0204	0.0276	0.1235	0.1586	0.1929
χ^2 Test	1.83	3.15	6.63	14.02	20.30

Table 3.7A. Robustness check for physical fitness dimension (Sender)

VARIABLES	No controls (1)	Reeceivers' status (2)	Village level effect (3)	Sender's control (4)	Receivers' control (5)
Composite z-index	-1.057*	-1.034*	-0.920	-1.008	-0.985
	(0.561)	(0.598)	(0.757)	(0.774)	(0.825)
Aristocrat	0.613	0.636	0.884**	1.426***	1.617***
	(0.484)	(0.504)	(0.424)	(0.532)	(0.525)
Proxy slave	0.199	0.336	0.328	0.630	0.479
	(0.331)	(0.417)	(0.428)	(0.459)	(0.471)
Status index control				0.226	-0.0332
(self-perceived index)				(0.511)	(0.532)
Group members' status					
Group members' z -index		0.0734	0.122	0.117	-0.757
		(1.126)	(1.146)	(1.205)	(1.468)
Aristocrat		-0.0284	-0.0372	-0.286	-0.0415
		(0.304)	(0.386)	(0.451)	(0.450)
Proxy slave		-0.151	-0.216	-0.123	-0.0361
		(0.310)	(0.368)	(0.364)	(0.370)
Dispersion in IOS score		0.0366	0.0229	-0.0211	-0.0454
		(0.0885)	(0.0889)	(0.0930)	(0.0937)
Constant	0.550*	0.464	-0.102	0.361	2.024
	(0.295)	(0.716)	(0.922)	(1.207)	(1.718)
Representative's controls	No	No	No	Yes	Yes
Group members' controls	No	No	No	No	Yes
Village fixed effect	No	No	Yes	Yes	Yes
Observations	108	106	106	106	106
Pseudo R-squared	0.0387	0.0447	0.1317	0.1637	0.1925
χ^2 Test	4.72	5.20	8.01	14.16	19.39

Table 3.8A Robustness check for extraversion dimension (Sender)

VARIABLES	No controls (1)	Receivers' status (2)	Village level effect (3)	Sender's control (4)	Receivers' control (5)
Composite z-index	-1.683**	-2.443***	-2.806***	-2.636***	-2.505***
	(0.679)	(0.831)	(1.011)	(0.935)	(0.934)
Aristocrat	0.690	0.634	1.030**	1.668***	1.732***
	(0.490)	(0.529)	(0.451)	(0.542)	(0.524)
Proxy slave	0.304	0.512	0.543	0.825*	0.754
	(0.327)	(0.398)	(0.444)	(0.478)	(0.498)
Status index control				-0.595	-0.634
(self-perceived index)				(0.477)	(0.490)
Group members' status					
Group members' z -index		-2.192*	-2.475**	-2.843**	-2.396*
		(1.248)	(1.229)	(1.305)	(1.417)
Aristocrat		0.178	0.262	-0.0856	0.0648
		(0.340)	(0.416)	(0.466)	(0.456)
Proxy slave		-0.106	-0.148	-0.0373	0.0242
		(0.307)	(0.366)	(0.360)	(0.369)
Dispersion in IOS score		0.0585	0.0430	-0.0150	-0.0192
		(0.0869)	(0.0920)	(0.0955)	(0.0966)
Constant	0.829**	2.180**	1.856*	2.029	2.613*
	(0.372)	(0.893)	(1.058)	(1.356)	(1.428)
Representative's controls	No	No	No	Yes	Yes
Group members' controls	No	No	No	No	Yes
Village fixed effect	No	No	Yes	Yes	Yes
Observations	108	106	106	106	106
Pseudo R-squared	0.0574	0.1025	0.2064	0.2379	0.2482
χ^2 Test	8.33*	12.27*	15.26**	24.73**	28.03**

Table 3.9A. Relationship between implementing Sender's recommendation as consensus and Receiver's social status.

Social status indicator		*Observation*	*Z-Index Spearman correlation [p-value]*	*Self-Rank Spearman in group of 9 correlation [p-value]*
Ladder Elicitation	*Success*	*216*	*-0.0479 [0.4837]*	*0.0397 [0.5625]*
	Wealth	*216*	*-0.0699 [0.3068]*	*-0.0115 [0.8670]*
	Education	*216*	*0.0459 [0.5025]*	*0.0659 [0.3359]*
	Physical fitness	*216*	*-0.0442 [0.5178]*	*0.0122 [0.8585]*
	Outgoingness	*216*	*0.0408 [0.4829]*	*0.0274 [0.6890]*
	Composite	*216*	*-0.0274 [0.6888]*	
Traditional strata	*Aristocrat*	*216*	*0.0489 [0.4745]*	
	Proxy slave	*216*	*0.0856 [0.2103]*	

Note: Even though there are 108 consensus decisions, there are 216 Receivers each with her/his own social status observations. Therefore, a consensus is treated as two separate decisions for analysis purpose.

Table 3.10A. Robustness check for success dimension (Receivers)

VARIABLES	Sender's status (1)	Sender's status+IOS (2)	Sender's control (3)	Village-level effect (4)	Receiver's status (5)	Co-Receiver (6)
Senders' Status						
Success z-index	-0.138	-0.190	-0.236	-0.345	-0.320	-0.430
	(0.534)	(0.542)	(0.558)	(0.573)	(0.585)	(0.612)
Aristocrat	0.344	0.296	0.253	-0.162	-0.213	0.241
	(0.272)	(0.273)	(0.316)	(0.394)	(0.385)	(0.355)
Proxy slave	0.186	0.191	0.294	0.699**	0.646*	0.513
	(0.263)	(0.262)	(0.264)	(0.340)	(0.345)	(0.328)
IOS score		0.0382	0.0580	0.114**	0.129**	0.132**
		(0.0579)	(0.0571)	(0.0560)	(0.0555)	(0.0546)
Receiver's status						
Success z-index					0.154	0.761
					(0.582)	(0.653)
Aristocrat					0.539	0.682
					(0.459)	(0.576)
Proxy slave					-0.519	-0.514
					(0.349)	(0.358)
Status index control					-0.223	-0.224
(self-perceived index)					(0.367)	(0.389)
Constant	0.352	0.198	0.336	1.018*	0.867	0.377
	(0.270)	(0.340)	(0.505)	(0.584)	(0.661)	(0.820)
Sender's controls	No	No	Yes	Yes	Yes	Yes
Receiver's controls	No	No	No	No	Yes	Yes
Co-Receiver's controls	No	No	No	No	No	Yes
Village fixed effect	No	No	No	Yes	Yes	Yes
Observations	216	214	214	214	213	213
R-squared	0.0071	0.0092	0.0312	0.1616	0.1898	0.2526
χ^2 Test	2.05	2.12	5.88	10.77	23.67*	65.30***

Table 3.11A. Robustness check for wealth dimension (Receivers)

VARIABLES	Sender's status (1)	Sender's status+IOS (2)	Sender's control (3)	Village-level effect (4)	Receiver's status (5)	Co-Receiver (6)
Senders' Status						
Wealth z-index	0.215	0.190	0.210	0.255	0.294	0.164
	(0.472)	(0.477)	(0.497)	(0.529)	(0.539)	(0.548)
Aristocrat	0.327	0.280	0.240	-0.188	-0.269	0.114
	(0.266)	(0.266)	(0.308)	(0.395)	(0.395)	(0.378)
Proxy slave	0.152	0.155	0.252	0.628*	0.628*	0.605*
	(0.261)	(0.259)	(0.263)	(0.342)	(0.335)	(0.322)
IOS score		0.0364	0.0559	0.112**	0.119**	0.117**
		(0.0578)	(0.0567)	(0.0561)	(0.0572)	(0.0577)
Receiver's status						
Wealth z-index					-0.0680	0.242
					(0.623)	(0.646)
Aristocrat					0.493	0.514
					(0.482)	(0.569)
Proxy slave					-0.524	-0.558
					(0.354)	(0.360)
Status index control					-0.0218	-0.0495
(self-perceived index)					(0.379)	(0.383)
Constant	0.178	0.0197	0.218	0.856	0.793	0.640
	(0.257)	(0.331)	(0.495)	(0.573)	(0.739)	(0.980)
Sender's controls	No	No	Yes	Yes	Yes	Yes
Receiver's controls	No	No	No	No	Yes	Yes
Co-Receiver's controls	No	No	No	No	No	Yes
Village fixed effect	No	No	No	Yes	Yes	Yes
Observations	216	214	214	214	213	213
R-squared	0.0078	0.0093	0.0311	0.1611	0.1847	0.2271
χ^2 Test	2.47	2.56	6.34	10.59	17.51	53.62***

Table 3.12A. Robustness check for education dimension (Receivers)

VARIABLES	Sender's status (1)	Sender's status+IOS (2)	Sender's control (3)	Village-level effect (4)	Receiver's status (5)	Co-Receiver (6)
Senders' Status						
Education z-index	-0.0881	-0.0739	-0.541	-0.305	-0.329	-0.598
	(0.415)	(0.413)	(0.456)	(0.442)	(0.498)	(0.570)
Aristocrat	0.337	0.288	0.247	-0.158	-0.296	-0.127
	(0.265)	(0.266)	(0.324)	(0.407)	(0.412)	(0.376)
Proxy slave	0.166	0.168	0.244	0.648*	0.687**	0.685**
	(0.252)	(0.250)	(0.251)	(0.344)	(0.336)	(0.344)
IOS score		0.0368	0.0593	0.112**	0.129**	0.119*
		(0.0570)	(0.0555)	(0.0549)	(0.0580)	(0.0650)
Receiver's status						
Education z-index					-0.354	-0.422
					(0.366)	(0.456)
Aristocrat					0.441	0.476
					(0.464)	(0.533)
Proxy slave					-0.595*	-0.626*
					(0.347)	(0.368)
Status index control					0.796**	0.905**
(self-perceived index)					(0.389)	(0.420)
Constant	0.329	0.149	0.690	1.188*	1.326*	2.172**
	(0.244)	(0.324)	(0.541)	(0.618)	(0.729)	(0.971)
Sender's controls	No	No	Yes	Yes	Yes	Yes
Receiver's controls	No	No	No	No	Yes	Yes
Co-Receiver's controls	No	No	No	No	No	Yes
Village fixed effect	No	No	No	Yes	Yes	Yes
Observations	216	214	214	214	213	213
R-squared	0.0069	0.0086	0.0359	0.1613	0.2002	0.2470
χ^2 Test	2.06	2.14	6.93	10.39	28.62**	57.28***

Table 3.13A. Robustness check for physical fitness dimension (Receivers)

VARIABLES	Sender's status (1)	Sender's status+IOS (2)	Sender's control (3)	Village-level effect (4)	Receiver's status (5)	Co-Receiver (6)
Senders' Status						
Education z-index	-0.150	-0.173	-0.501	-0.612	-0.553	-0.594
	(0.426)	(0.428)	(0.496)	(0.539)	(0.577)	(0.698)
Aristocrat	0.334	0.283	0.214	-0.269	-0.349	-0.199
	(0.263)	(0.264)	(0.296)	(0.352)	(0.340)	(0.308)
Proxy slave	0.169	0.169	0.265	0.670**	0.677**	0.638*
	(0.250)	(0.249)	(0.244)	(0.336)	(0.333)	(0.350)
IOS score		0.0366	0.0556	0.114**	0.124**	0.117*
		(0.0569)	(0.0558)	(0.0557)	(0.0566)	(0.0622)
Receiver's status						
Education z-index					-0.208	-0.638
					(0.574)	(0.677)
Aristocrat					0.465	0.451
					(0.443)	(0.484)
Proxy slave					-0.496	-0.559
					(0.345)	(0.341)
Status index control					-0.132	-0.178
(self-perceived index)					(0.306)	(0.336)
Constant	0.362	0.202	0.639	1.401**	1.310*	2.495**
	(0.245)	(0.364)	(0.553)	(0.655)	(0.764)	(1.150)
Sender's controls	No	No	Yes	Yes	Yes	Yes
Receiver's controls	No	No	No	No	Yes	Yes
Co-Receiver's controls	No	No	No	No	No	Yes
Village fixed effect	No	No	No	Yes	Yes	Yes
Observations	216	214	214	214	214	214
R-squared	0.0071	0.0090	0.0340	0.1645	0.1886	0.2458
χ^2 Test	2.09	2.21	6.46	12.61	24.89*	50.55***

Table 3.14A. Robustness check for extraversion dimension (Receivers)

VARIABLES	Sender's status (1)	Sender's status+IOS (2)	Sender's control (3)	Village-level effect (4)	Receiver's status (5)	Co-Receiver (6)
Senders' Status						
Extraversion z-index	-0.254	-0.328	-0.432	-0.786	-0.714	-0.754
	(0.594)	(0.598)	(0.666)	(0.791)	(0.799)	(0.844)
Aristocrat	0.343	0.292	0.229	-0.228	-0.285	-0.0388
	(0.270)	(0.272)	(0.305)	(0.373)	(0.354)	(0.299)
Proxy slave	0.183	0.186	0.288	0.708**	0.724**	0.659**
	(0.255)	(0.255)	(0.259)	(0.355)	(0.342)	(0.333)
IOS score		0.0401	0.0603	0.119**	0.129**	0.128**
		(0.0576)	(0.0577)	(0.0566)	(0.0568)	(0.0612)
Receiver's status						
Extraversion z-index					0.423	0.718
					(0.496)	(0.518)
Aristocrat					0.548	0.574
					(0.450)	(0.551)
Proxy slave					-0.496	-0.511
					(0.353)	(0.350)
Status index control (self-perceived index)					-0.175	-0.207
					(0.301)	(0.283)
Constant	0.409	0.258	0.429	1.204**	0.944	1.164
	(0.322)	(0.399)	(0.527)	(0.567)	(0.660)	(0.782)
Sender's controls	No	No	Yes	Yes	Yes	Yes
Receiver's controls	No	No	No	No	Yes	Yes
Co-Receiver's controls	No	No	No	No	No	Yes
Village fixed effect	No	No	No	Yes	Yes	Yes
Observations	216	214	214	214	214	214
R-squared	0.0077	0.0100	0.0326	0.1662	0.1931	0.2342
χ^2 Test	2.09	2.29	5.71	10.21	20.17	74.06***

Appendix B: Instructions for the Sender-Receiver Game

B1. English Instruction Scripts

This Activity C. You have the chance to increase your earnings in this Activity.

You will make a decision as a member of a group. You are a member of one of the following groups of 3 individuals: Circle, Triangle, or Square.

<Point to the tag and desks>

The identities of the members of your group are known to you but the information about your personal/individual decisions in this activity will be kept private from the other members of your group. When two members of the group make a joint decision, information about that decision will be kept private from the third member.

*Your turn to decide and your task will be determined by the role assigned to you. Your role is one of the following: **Member A, Member B1** or **Member B2**. Member A will make his/her decision first. Member B1 and Member B2 will make their decisions after Member A.*

After I have read the instructions for this activity, you will be told your role.

*In this activity, two projects, **Project Blue** and **Project Red**, will be set up for your group. Member A in your group will be responsible for setting up Project Blue in a form that he/she can recommend to your group as a whole. I will set up Project Red. Project Red will be common for all three groups. Members B1 and B2 will then choose which of the two projects the group will carry out.*

*This sequence of decisions by Member A and later Members B1 and B2 will lead to one of three possible **outcomes** for your group: **Outcome X, Outcome Y,** or **Outcome Z**.*

*To see how each outcome would impact on you, other members of your group and the group as a whole, turn to page **RS1**.*

*Page **SR1** explains **Outcome X:** If the project you choose has Outcome X, Member A will earn RM 20. Members B1 and B2 will earn RM 25 each. The total value of the project for your group will be the sum of the earnings of Members A, B1 and B2, which is RM 70.*

*Turn to page **SR2**.*

*Page **SR2** explains **Outcome Y:** If the project you choose has Outcome Y, Member A will earn RM 30. Members B1 and B2 will earn RM 12.50 each. The total value of the project for your group will be the sum of the earnings of Members A, B1 and B2, which is RM 55.*

*Turn to page **SR3**.*

*Page **SR3** explains **Outcome Z:** If the project you choose has Outcome Z, Member A will earn RM 20. Members B1 and B2 will earn RM 18 each. The total value of the* *project for your group will be the sum of the earnings of Members A, B1 and B2, which is RM 56.*

*As you can see, Outcome X gives Members B1 and B2 the **highest** earnings that are possible for them (RM 25 each), and also has the **highest** total value. However, it gives Member A the **lowest** earnings that are possible for him/her (RM 20).*

*Outcome Y gives Members B1 and B2 the **lowest** earnings that are possible for them (RM 12.50 each), and also has the **lowest** total value. However, it gives Member A the **highest** earnings that are possible for him/her (RM 30).*

Any question on how your earnings are determined in this activity?

<Pause>

*Turn to page **SR4** to see how Project Blue and Project Red are linked to Outcomes X, Y and Z.*

In the first stage of the activity, Member A will privately choose a set-up for Project Blue that he/she can recommend to the group as a whole. He/she will be able to choose one of two possible set-ups. With one of these set-ups, the outcome is very likely to be Outcome X, but there is a small chance that it will be Outcome Y instead. With the other set-up, the outcome is very likely to be Outcome Y, but there is a small chance that it will be Outcome X instead.

Members B1 and B2 will not know how Member A has set up Project Blue.

The other project, Project Red, will be set up by me, as part of the research team. It will be set up so that its outcome is very likely to be Outcome Z, but there is a small chance that it will be Outcome Y instead.

In the second stage of the activity, Members B1 and B2 will decide jointly which of the two projects will be carried out. Member A will not be in the room at the time, and will not know what decision has been made by Members B1 and B2.

*Notice that **if Member A has set up Project Blue so that Outcome X is more likely**, Members B1 and B2 are very likely to receive higher earnings from Project Blue than from Project Red (RM 25 rather than RM 18), and Member A is very likely to receive the same earnings whichever project (Blue or Red) is carried out (RM 20).*

*However, **if Member A has set up Project Blue so that Outcome Y is more likely,** Members B1 and B2 are very likely to receive higher earnings from Project Red than from Project Blue (RM 18 rather than RM 12.50), while Member A is very likely to receive higher earnings from Project Blue than from Project Red (RM 30 rather than RM 20).*

At the end of the session, and if this acitivity is picked as the one for which you will be paid, each member of the group will be paid according to the outcome of whichever project was chosen jointly by Members B1 and B2. However, no one will be told whether that outcome was X, Y or Z. Because of this, even after everyone has been paid, no one will be able to work out what decisions were made by other members of the group.

*For example, suppose that Member A sets up Project Blue so that it is very likely to produce Outcome Y, and Members B1 and B2 decide to carry out that project. Suppose then that Project Blue **does** produce Outcome Y, and so Members B1 and B2 are paid only RM 12.50. Remember that even if Member A had set up Project Blue so that it was very likely to produce Outcome X, Outcome Y might still have occurred (explained below). So Members B1 and B2 cannot know what Member A did.*

*Another example: suppose that Member A sets up Project Blue so that is very likely to produce Outcome X, but Members B1 and B2 decide to carry out Project Red instead. Project Red is very likely to produce Outcome Z. Suppose this outcome **does** occur. Member A will be paid RM 20, which is what he/she would most likely have been paid if Project Blue had been carried out. So Member A cannot know what Members B1 and B2 did.*

Do you have any questions?

<Pause>

We will now start the activity.

Role Assignment

<All RAs will approach each subject to pick an envelope from the bag in their hands>

Pick a card from the bag in front of you.

*The card you have is labelled **Player A, Player B1** or **Player B2.** This is your role in this activity.*

Place this card in the card holder. You can see the roles of the other members of your group by looking at their card holders. Look, this is this is Member A from {Circle/Triangle/Square}. She/he will make her/his decision first in her/his group based on her/his role. <point> *After she/he made her decision, Members B1* <point> *and B2* <point> *from the same group will make their decisions. The same will also happen in Group {Circle/Triangle/Square}*. <point to a group and its members as an example>.

<RAs will place A4-label that have group and role identification in front of each subject's desk>

Set-up of Project Red

*I will now set up **Project Red**. The set-up of Project Red will be the same for all three groups (Circle, Triangle and Square).*

Remember that Project Red is very likely to produce Outcome Z, but there is a small chance that it will produce Outcome Y.

Here are two cards, one labelled '**Outcome Z'** <show this> *and one labelled* **'Outcome Y'** <show this>.

First, I take the Outcome Z card, insert it into a small envelope, and seal it. <Do this>

I now insert the small envelope into a larger envelope marked with a red star, and close the envelope. <Do this, showing the envelope and star> *The star shows that the Outcome Z card has been put in this envelope. The star is red to show that the envelope contains a possible outcome for Project Red.*

Now I take the Outcome Y card, insert it into a small envelope, and seal it. <Do this>

I now insert the small envelope into a larger envelope marked with a red pentagon, and close the envelope. <Do this, showing the envelope and pentagon> *The pentagon shows that the Outcome Y card has been put in this envelope. The pentagon is red to show that the envelope contains a possible outcome for Project Red.*

Project Red needs to be processed for it to be eligible as a choice for Member B1 and Member B2. Project Red will now be processed so that there is a small chance that the contents of the red star and red pentagon envelopes are swapped.

I will ask one of you to volunteer and roll a die. Then she/he will circle the roll outcome on a piece of paper provided to her/him. He/she will pass this piece of the paper to an RA. I will then roll another die behind this screen, but will not tell you what number comes up. If the numbers from the two dice rolls are different, the contents of the envelopes will stay as they are. If the numbers are the same, the contents will be swapped. So there is a 1 in 6 chance (or 17%) that the contents will be swapped.

I will do this swapping behind this screen. Even if the two dice numbers are different, I will take the small envelopes out of the red star and red pentagon envelopes and then put them back again. So you will not know whether the contents of the red star and the red pentagon envelopes have been swapped. ***You will notice that there are movements behind this screen but this does not mean that the contents of the envelopes have been swapped or that it will be returned to the original envelopes.*** *I will then seal both envelopes*.

<RA gives die and a paper with 1 to 6 to one subject, who rolls the die and circle a number on the paper. RA will collect that paper>

Now I am rolling the die. <Do this>

Now, if the two numbers are the same, I am swapping the contents of the envelopes. <Do this>

Project Red has now been processed. Whatever is now in the red star envelope will be the outcome of Project Red. There is a 5 in 6 chance (or 83%) that this is Outcome Z. Otherwise, it is Outcome Y.

Task of Member A

Shortly, each Member A will be invited to the Group desk for his/her group. Privately, Member A will set up Project Blue in a form that he/she can recommend to the group. Remember that there are two different ways in which this Project can be set up. It can be set up so that it is very likely to produce Outcome X, or it can be set up so that it is very likely to produce Outcome Y. Member A has to choose one of these set-ups.

Each Member A will receive two cards and two small envelopes. One of the cards is labelled 'Outcome X'. The other card is labelled 'Outcome Y'. <Show these>

The pages in the booklet showing the implications of each outcome to the group members will be available on the desk.

Member A will insert each card into a small envelope, and seal each envelope. He/she will need to remember which card was put into each envelope.

Next, Member A will signal the RA to come to the Group Desk. The RA will bring two large envelopes. One is marked with a blue star. The other is marked wih a blue pentagon. <Show these>

Member A will first be handed the large envelope marked with the blue star. If Member A has decided to set up the project so that it is most likely to produce Outcome X, he/she will put the small envelope containing the 'Outcome X' card into the large blue-star envelope. If Member A has decided to set up the project so that it is most likely to produce Outcome Y, he/she will put the small envelope containing the 'Outcome Y' card into the large blue-star envelope. So, the contents of the blue-star envelope will describe Project Blue in the form that Member A is recommending to the group.

Member A will then be handed the large envelope marked with the blue pentagon. He/she will put the small envelope containing the other card into the large blue-pentagon envelope. So, the contents of the blue-pentagon envelope will describe the form of Project Blue that Member A is NOT recommending to the group.

Finally, each Member A will be asked to say privately whether he/she expects that the joint decision of Members B1 and B2 in his/her group will be to carry out Project Blue or Project Red.

After Member A has completed this task, Project Blue needs to be processed just like Project Red. Project Blue will only be eligible as a choice after it has been processed. Project Blue will be processed in the same way as Project Red was processed.

< RA will place 1 card labelled Y, 1 card labelled X, 2 small envelopes on each group's decision desk, 2 stickers, Page **SR2** and **SR3** that contain the payoffs for **Outcome X, Outcome Z** and **Outcome Y.**>

If you are a Member A, please go to your Group Desk.

<RA will ask the control questions. Then leave the Member A to make the decision.>

<After the decision has been made, place intended small envelopes into the larger envelopes with blue star or blue pentagon. Verbally conduct Member A additional questions and record his/her responses. Dismiss Member A to his/her seat>

Project Blue will now be processed so that there is a small chance that the contents of the blue star and blue pentagon envelopes are swapped. We will process Project Blue for Group Circle, then Group Triangle and lastly Group Square.

I will ask for a volunteer from each group to roll a die and to circle the outcome from the roll on a piece of paper provided to him/her. An RA will collect this paper. The RA will then roll another die behind this screen, but but will not annouce what number *comes up. If the numbers rolled on the two dice are different, the contents of the envelopes will stay as they are. If the numbers are the same, the contents will be swapped. So there is a 1 in 6 chance (or 17%) that the contents will be swapped.*

The RA will do this swapping behind this screen. Even if the two dice numbers are different, the RA will take the small envelopes out of the red star and red pentagon envelopes and then put them back again. So you will not know whether the contents of the red star and the red pentagon envelopes have been swapped. The RA will then seal both envelopes. ***You will notice that there are movement behind this screen but this does not mean that the contents of the envelopes have been swapped or that it will be returned to the original envelopes.***

<Each RA gives a die to B1 in their group and a piece of paper. B1 rolls the dice and circle a number>

<Each RA will collect the piece of paper>

RA for Group Circle will roll the die now. <Do this. Make sure the die roll can be heard by everyone.>

RA for Group Triangle will roll the die now. <Do this. Make sure the die roll can be heard by everyone.>

RA for Group Square will roll the die now. <Do this. Make sure the die roll can be heard by everyone.>

The Circle group's Project Blue has now been processed. Whatever is now in the blue star envelope will be the outcome of the Circle group's Project Blue. There is a 5 in 6 chance (or 83%) that this is whichever of Outcomes X and Y was recommended by the Circle group's Member A. Otherwise, it is the outcome that he/she did NOT recommend.

The participation of the three Member As in this activity has now ended. To ensure that the Member Bs have privacy to make their joint decisions, Member As need to leave the room.

<RA1 will lead Members A to leave the room. RA1 will wait for signal from the room to bring Members A back in>

Tasks of Members B1 and B2

It is now time for Members B1 and B2 to decide which project will be carried out by the group, Project Blue or Project Red.

First, each Member B1 will be asked to say privately which Project he/she thinks should be carried out by his/her group. He/she will also be asked to answer a small number of other questions. Answers to all these questions will be kept private from Members B2 and A.

Next, each Member B2 will be asked the same questions.

Finally, Members B1 and B2 from each group will make a joint decision about which project is to be carried out by the group, Project Blue or Project Red. They will discuss this problem together and agree on a decision.

Remember that each member of the group will be paid according to the outcome of whichever project Members B1 and B2 jointly chose to carry out.

Members B Private Decision

Player B1 from Group {Circle/Triangle/Square} please approach the {Circle/Triangle/Square} Desk.

<RA2 and RA3 will administer the control question and then wait for Player B1 from Group {Circle/Triangle/Square} to make her decision. Session Leader will take over RA1 in administering the control questions. Verbally conduct Member B additional questions and record his/her responses. RA will instruct Player B1 to return to the seat and will record the decision. >

Player B2 from Group {Circle/Triangle/Square} please approach the {Circle/Triangle/Square} Desk.

Players B Joint Decision

We will now move to the joint decision.

When I call you, both Players B1 and B2 will approach the Group desk.

You must reach a joint decision about which of the two projects to carry out. I will give you a few minutes to discuss your decision.

On the Group Desk, there will be two large sealed envelopes, an envelope with a blue star and an envelope with a red star. The blue star envelope contains the outcome of Project BLUE, the project that was set up by Member A and then processed. The red star envelope represents Project RED, the project that was set up by me and then processed. You must not open either of the envelopes.

Once you have agreed on a joint decision, signal the RA. Give the envelope for the project that you want to be carried out to the RA behind the screen.

Players B1 & B2 please approach the Group Desk.

<Players make their decision then return to their seat. RA2 will call RA1 to bring Members A to the room>

-- End of English Instructions –

B2. Malay-language Instruction Script

Ini Aktiviti C. Anda ada peluang untuk tambah pendapatan anda dalam Aktiviti ini.

Anda akan membuat satu keputusan sebagai seorang ahli kumpulan. Anda adalah ahli kepada salah satu kumpulan yang mempunyai 3 ahli, iaitu; Kumpulan Bulat, Segitiga atau Segiempat.

<Point to the tag and desks>

Anda tahu identity ahli kumpulan anda tetapi maklumat tentang keputusan anda akan dirahsiakan dari ahli kumpulan anda.Jadi ahli kumpulan anda tidak tahu apa keputusan anda. Bila 2 ahli kumpulan perlu buat keputusan sepakat, maklumat keputusan sepakat ini akan dirahsiakan dari ahli yang ketiga.

Giliran dan tugas anda akan ditentukan dengan peranan yang diberi. Peranan anda adalah; ***AHLI A, AHLI B1*** *atau* ***AHLI B2.*** *Ahli A akan buat keputusan dulu. Ahli B1 dan Ahli B2 akan buat keputusan lepas Ahli A.*

Lepas saya baca aturan aktiviti ini, tugas anda akan diberikan.

Untuk aktiviti ini, 2 projek akan dirancang untuk kumpulan anda; iaitu ***Projek Biru*** *dan* ***Projek Merah****. Ahli A akan bertanggungjawab untuk merancang* ***Projek Biru*** *dalam bentuk satu cadangan untuk kumpulan dia. Saya akan merancang* ***Projek Merah****. Lepas tu Ahli B1 dan B2 akan pilih projek mana untuk dilaksanakan.*

Dari keputusan Ahli A dan lepas tu keputusan Ahli B1 dan B2 satu daripada tiga hasilan mungkin berlaku pada kumpulan anda: ***Hasilan X, Hasilan Y*** *atau* ***Hasilan Z****.*

Untuk melihat macam mana setiap hasilan memberi kesan kepada anda, ahli kumpulan anda dan seluruh kumpulan anda, buka muka surat ***RS1.***

Muka surat SR1 terangkan ***Hasilan X:*** *Jika projek yang anda pilih ada* ***Hasilan X****, Ahli A akan terima RM20. Ahli B1 dan Ahli B2 akan terima RM25 seorang. Jumlah nilai projek ini kepada kumpulan anda adalah tambahan apa Ahli A, Ahli B1 dan Ahli B2 terima, iaitu RM70.*

Buka muka surat ***SR2****.*

Mukasurat SR2 terangkan ***Hasilan Y****: Jika projek yang anda pilih ada* ***Hasilan Y****, Ahli A akan terima RM30. Ahli B1 dan B2 akan terima RM12.50 seorang. Jumlah projek ini kepada kumpulan anda adalah tambahan apa Ahli A, Ahli B1 dan Ahli B2 terima, iaitu RM55.*

Buka muka surat ***SR3***

Muka surat SR3 terangkan ***Hasilan Z****: Jika projek yang anda pilih ada* ***Hasilan Z****, Ahli A akan terima RM20. Ahli B1 dan B2 akan terima RM18 seorang. Jumlah projek ini kepada kumpulan anda adalah tambahan apa Ahli A, Ahli B1 dan B2 terima, iaitu RM56.*

Anda boleh lihat, ***Hasilan X*** *memberi Ahli B1 dan B2 pendapatan* ***tertinggi*** *yang boleh jadi kepada mereka (RM25), dan* ***Hasilan X*** *juga mempunyai nilai* ***tertinggi*** *kepada kumpulan. Tapi ia memberi Ahli A pendapatan* ***terendah*** *yang boleh jadi kepada dia (RM20).*

Hasilan Y *memberi Ahli B1 dan B2 pendapatan* ***terendah*** *yang boleh jadi kepada mereka (RM12.50), dan juga mempunyai nilai yang* ***terendah*** *kepada kumpulan. Tetapi ia beri Ahli A pendapatan yang* ***tertinggi*** *yang boleh jadi kepada dia (RM30).*

Ada apa-apa soalan pasal macam mana pendapatan ditentukan dalam aktiviti ini?

<Pause>

*Buka muka surat **SR4** untuk melihat macam mana Projek Biru dan Projek Merah berkait dengan Hasilan X, Hasilan Y dan Hasilan Z.*

Dalam peringkat pertama aktiviti ini, Ahli A dengan rahsia akan pilih perancangan untuk Projek Biru yang dia mahu cadangkan kepada kumpulan. Dia boleh pilih satu dari dua perancangan. Dengan salah satu perancangan, hasilan yang mungkin boleh sangat jadi adalah Hasilan X, tapi ada sedikit nasib yang perancangan itu jadi Hasilan Y. Dengan perancangan yang lagi satu, hasilan boleh sangat jadi Hasilan Y tetapi ada sedikit nasib yang ia boleh jadi Hasilan X.

Ahli B1 dan B2 tak tahu macam mana Ahli A akan rancang Projek Biru.

Projek yang lagi satu, Projek Merah, akan dirancang oleh saya, selaku ahli pasukan penyelidik. Ia dirancang supaya hasilan yang paling mungkin adalah hasilan Z, tetapi ada sedikit nasib yang hasilan yang terjadi adalah Hasilan Y.

Dalam peringkat kedua aktiviti, Ahli B1 dan Ahli B2 akan dengan sepakat menentukan dari 2 projek yang mana akan di laksanakan. Ahli A tidak akan berada dalam bilik ini waktu itu, dan tidak akan tahu keputusan yang dibuat oleh Ahli B1 dan B2.

*Ambil perhatian! **kalau Ahli A telah rancang Projek Biru supaya Hasilan X boleh sangat terjadi**, Ahli B1 dan B2 boleh sangat menerima pendapatan yang lebih tinggi dengan Projek Biru dari Projek Merah (RM25 dari RM18), dan Ahli A boleh sangat menerima pendapatan yang sama dari mana-mana projek (Biru atau Merah) yang dilaksanakan (RM20).*

*Tapi, **kalau Ahli A telah rancang Projek Biru supaya Hasilan Y boleh sangat terjadi**, Ahli B1 dan B2 boleh sangat menerima pendapatan yang lebih tinggi dengan Projek Merah dari Projek Biru (RM18 dari RM 12.50), tetapi Ahli A boleh sangat menerima pendapatan yang lebih tinggi dengan Projek Biru dari Projek Merah (RM30 dari RM20).*

Pada akhir sesi ini dan jika aktiviti ini terpilih sebagai aktiviti yang anda akan dibayar, setiap ahli kumpulan akan dibayar mengikut hasilan mana-mana projek yang dipilih secara sepakat oleh Ahli B1 dan B2. Tetapi tidak siapa akan di beritahu yang hasilannya adalah X, Y, atau Z. Sebab tu, walaupun lepas semua peserta telah dibayar, tak ada siapa yang boleh tahu keputusan yang telah dibuat oleh ahli-ahli kumpulan yang lain.

*Sebagai contoh, anggap Ahli A telah merancang Projek BIRU yang boleh sangat untuk menghasilkan Hasilan Y, dan Ahli B1 dan B2 sepakat untuk melaksanakan Projek BIRU tersebut. Anggap lepas tu yang Projek Biru **telah** jadi Hasilan Y, jadi Ahli B1 dan B2 akan dibayar RM12.50 sehaja. Peringatan! Jika Ahli A telah merancang Project Biru yang boleh sangat menghasilkan Hasilan X, Hasilan Y boleh juga terjadi. Saya akan terangkan macam mana ini berlaku. Jadi Ahli B1 dan B2 tak tahu apa Ahli A telah rancang.*

*Contoh lagi satu: anggap Ahli A telah rancang Projek Biru yang boleh sangat untuk menghasilkan Hasilan X, tetapi Ahli B1 dan B2 telah sepakat untuk sebaliknya melaksanakan Projek Merah. Projek Merah akan boleh sangat menghasilkan Hasilan Z. Anggap Hasilan Z **telah** terjadi. Ahli A akan dibayar RM20, iaitu apa yang dia akan* *terima jika Projek BIRU dilaksanakan. Jadi Ahli A tidak tahu apa yang Ahli B1 dan Ahli B2 telah lakukan.*

Anda ada apa-apa soalan?

<Pause>

Kita akan mulakan aktiviti sekarang.

Role Assignment

<All RAs will approach each subject to pick an envelope from the bag in their hands>

Ambil satu kad dari bag di depan anda.

Kad yang anda telah ambil telah dilabel ***Ahli A, Ahli B*** *atau* ***Ahli B2****. Ini adalah peranan anda dalam aktiviti ini.*

Letakkan kad ini dalam tag nama anda. Anda boleh lihat peranan ahli kumpulan anda dengan melihat pada tag nama mereka. Tengok, ini Ahli A dari Kumpulan {Bulat/Segi Tiga/Segi 4}. Dia akan buat keputusan dulu dalam kumpulan dia berdasarkan peranan dia. <point> *Lepas dia buat keputusan Ahli B1* <point> *dan B2* <point> *dari kumpulan yang sama akan buat keputusan masing-masing. Ini sama untuk Kumpulan yang lain.* point to a group and its members as an example>.

<RAs will place A4-label that have group and role identification in front of each subject's desk>

Set-up of Project Red

Saya akan rancang ***Projek Merah*** *sekarang. Perancangan Projek Merah adalah sama untuk setiap kumpulan (Bulat, Segi Tiga, dan Segi Empat).*

Ingat Projek Merah boleh sangat untuk menghasilkan Hasilan Z, tetapi ada sedikit nasib yang Projek Merah boleh juga hasilkan Hasilan Y.

*Ini adalah 2 kad, satu dilabel '****Hasilan Z****'*<show this> *dan satu dilabel '****Hasilan Y****'*<show this>.

Mula-mula, saya akan ambil kad Hasilan Z, masukkannya kedalam satu sampul kecil, dan akan tutupnya dengan pelekat. <Do this>

Sekarang saya akan masukkan sampul ini ke dalam satu sampul yang ditanda dengan bintang merah dan akan tutup sampul ini. <Do this, showing the envelope and star>*Bintang ini menunjukkan Hasilan Z telah diletakkan kedalam sampul ini. Bintang ini merah menunjukkan yang sampul ini mengandungi satu hasilan yang mungkin untuk Projek Merah.*

Sekarang saya akan mengambil kad Hasilan Y, masukkan kedalam dalam sampul yang kecil, dan akan tutupnya dengan pelekat. <Do this>

Saya akan masukkan sampul ini ke dalam satu sampul yang ditanda dengan segi lima, dan akan menutup sampul ini. <Do this, showing the envelope and

pentagon>*Segi lima menunjukkan yang kad hasilan Y telah diletakkan di dalam sampul ini. Segi lima ini merah untuk menunjukkan yang sampul mengandungi satu hasilan yang mungkin untuk Projek Merah.*

Projek Merah perlu diproses, kalau tak ia tak layak untuk dipilih oleh Ahli B1 dan B2. Projek Merah akan diproses sekarang, jadi ada sedikit nasib yang isi sampul bintang dan sampul segi lima boleh tertukar.

Saya akan meminta seorang peserta untuk 'offer' diri sebagai sukarela untuk baling dadu. Dia akan bulatkan nombor hasil balingan di atas satu kertas. Lepas tu saya akan baling dadu lain dibelakang tabir ini, tapi saya tak akan bagi tahu nombor apa yang terhasil. Jika nombor dua dadu tersebut lain, isi kedua sampul besar tidak akan berubah. Tetapi jika nombor kedua dadu adalah sama, isi kedua sampul akan tertukar. Jadi ada 1 dalam 6 nasib atau 17% yang isi kedua sampul akan tertukar.

Saya akan melakukan pertukaran sampul dibelakang tabir ini. Jika kedua nombor kedua dadu tak sama, saya akan mengeluarkan isi kedua sampul sebentar dan akan masukkan mereka kembali ke dalam sampul yang sama. Jadi anda tidak tahu sama ada sampul bintang merah dan segi lima merah telah tertukar. ***Anda akan lihat ada pergerakan dibelakang tabir tapi ini tak bermakna yang isi sampul telah ditukar atau isi sampul akan dipulangkan ke sampul asal.*** *Saya kemudian akan tutup kedua sampul dengan pelekat.*

<RA gives die and a paper with 1 to 6 to one subject, who rolls the die and circle a number on the paper. RA will collect that paper>

Sekarang saya akan baling dadu ini. <Do this>

Sekarang, jika kedua balingan sama, saya akan menukar isi kedua-dua sampul. <Do this>

Projek Merah telah pun diproses. Apa yang ada dalam sampul bintang merah akan menjadi hasilan untuk Projek Merah. Ada 5 dalam 6 nasib atau 83% yang ini adalah Hasilan Z. Jika tak, ianya adalah Hasilan Y.

Task of Member A

Sekejap lagi, setiap Ahli A akan dijemput ke Meja Kumpulan. Secara rahsia, Ahli A akan rancang Projek Biru dalam bentuk yang dia boleh cadangkan untuk kumpulan. Peringatan: ada dua cara yang berbeza untuk merancang Projek ini. Projek Biru boleh di rancang supaya ia boleh sangat untuk menghasilkan Hasilan X, atau ia boleh dirancang untuk boleh sangat untuk menghasilkan Hasilan Y. Ahli A perlu pilih satu cara untuk merancang Projek Biru.

Setiap Ahli A akan menerima 2 kad and 2 sampul kecil. Satu kad di label 'Hasilan X'. Kad lagi satu dilabel 'Hasilan Y'. <Show these>

Muka surat dari risalah yang menunjukkan akibat setiap hasilan kepada ahli kumpulan ada di atas meja.

Ahli A akan masuk setiap kad dalam sampul kecil, dan tutup sampul dengan pelekat. Dia kena ingat kad mana yang dia letak dalam 2 sampul ini.

Lepas tu, Ahli A akan beri isyarat kepada RA untuk datang ke Meja Kumpulan. RA akan bawa 2 sampul besar. Satu sampul ada bintang biru. Sampul lagi satu ada segi lima biru. . <Show these>

Mula-mula Ahli A akan diberi sampul besar dengan bintang biru. Kalau Ahli A telah pilih untuk rancang Projek Biru supaya boleh sangat untuk menghasilkan Hasilan X, dia akan letak sampul kecil diisi kad Hasilan X dalam sampul besar bintang biru. Kalau Ahli A pilih untuk rancang Projek Biru supaya boleh sangat untuk menghasilkan Hasilan X, dia akan letak sampul kecil diisi kad Hasilan Y dalam sampul besar segi lima. Jadi isi sampul bintang biru menggambarkan bentuk Projek Biru yang Ahli A telah cadangkan kepada kumpulan.

Lepas tu Ahli A akan diberi sampul besar dengan segi lima biru. Dia akan letak sampul kecil lagi satu yang ada kad yang lagi satu dalam sampul segi lima biru. Jadi isi sampul segi lima biru menggambarkan bentuk Projek Biru yang Ahli A tidak cadangkan pada kumpulan.

Akhir sekali, setiap Ahli A akan ditanya secara rahsia sama ada dia jangka yang keputusan sepakat Ahli B1 dan B2 kumpulan dia akan jadi Projek Biru atau Projek Merah.

Selepas Ahli A siap tugas dia, Projek Biru perlu di proses macam Projek Merah. Projek Biru hanya layak sebagai pilihan selepas dia diproses. Projek Biru akan diproses cara yang sama dengan Projek Merah.

< RA will place 1 card labelled Y, 1 card labelled X, 2 small envelopes on each group's decision desk, 2 stickers, Page **SR2** and **SR3** that contain the payoffs for **Outcome X, Outcome Z** and **Outcome Y.**>

Ahli A, sila ke Meja Kumpulan.
<RA will ask the control questions. Then leave the Member A to make the decision.>

<After the decision has been made, place intended small envelopes into the larger envelopes with blue star or blue pentagon. Verbally conduct Member A additional questions and record his/her responses. Dismiss Member A to his/her seat>

Projek Biru akan diproses sekarang jadi ada sedikit nasib yang isi sampul bintang biru dan bintang segi lima akan tertukar. Kita akan proses Projek Biru untuk Kumpulan Bulat, kemudian Kumpulan Segi 3 dan akhir sekali Kumpulan Segi 4.

Saya akan minta seorang dari setiap kumpulan untuk 'offer' ***diri*** *untuk baling satu dadu. Dia akan bulatkan nombor hasil balingan di atas kertas yang diberikan. Setiap RA untuk kutip kertas ini. Lepas tu setiap RA akan baling satu dadu yang lain dibelakang tabir, tetapi nombor hasil balingan takkan di bagi tahu. Jika nombor hasil kedua balingan adalah lain, isi kedua sampul biru akan tidak berubah. Jika nombor hasil kedua balingan adalah sama, isi kedua sampul akan ditukar. Jadi ada 1 dalam 6 nasib atau 17% yang isi sampul akan tertukar.*

RA akan tukar sampul dibelakang skrin ini. Jika nombor hasil balingan berlainan, RA akan keluarkan sampul kecil dari sampul bintang biru dan segi lima biru seketika dan masukkan mereka balik. Jadi anda tak tahu sama ada isi sampul bintang biru dan segi lima biru telah ditukar. Lepas tu RA akan tutup kedua sampul dengan pelekat. ***Anda akan lihat ada pergerakan dibelakang tabir tapi ini tak bermakna yang isi sampul telah ditukar atau isi sampul akan dipulangkan ke sampul asal.***

<Each RA gives a die to B1 in their group and a piece of paper. B1 rolls the dice and circle a number>

<Each RA will collect the piece of paper>

RA untuk Kumpulan Bulat akan baling dadu sekarang. <Do this. Make sure the die roll can be heard by everyone.>

RA untuk Kumpulan Segi Tiga akan baling dadu sekarang. <Do this. Make sure the die roll can be heard by everyone.>

RA untuk Kumpulan Empat akan baling dadu sekarang. <Do this. Make sure the die roll can be heard by everyone.>

RA untuk Kumpulan Empat akan baling dadu sekarang.

Projek Biru untuk Kumpulan Bulat telah diproses. Apa dalam sampul bintang biru akan jadi hasilan Projek Biru untuk Kumpulan Bulat. Ada 5 dalam 6 nasib atau 83% yang apa dalam sampul bintang biru adalah Hasilan X dan Y telah dicadangkan oleh Ahli A. Kalau tak, ianya hasilan yang TIDAK dicadangkan.

Penglibatan tiga Ahli A dalam activiti ini telah berakhir. Untuk memastikan semua Ahli B ada 'privacy' semasa membuat keputusan sepakat, Ahli A perlu meninggalkan bilik ini. Sila ikut RA1.

<RA1 will lead Members A to leave the room. RA1 will wait for signal from the room to bring Members A back in>

Tasks of Members B1 and B2

Sekarang Ahli B1 dan B2 perlu buat keputusan projek yang perlu dilaksanakan untuk kumpulan, Projek Biru atau Projek Merah.

Mula-mula, setiap Ahli B1 akan ditanya secara rahsia projek mana dia rasa patut dilaksanakan untuk kumpulan dia. Dia juga akan ditanya beber apa soalan lain. Jawapan untuk soalan-soalan ini akan dirahsiakan dari Ahli B2 dan A.

Lepas tu setiap Ahli B2 akan ditanya soalan yang sama.

Akhir sekali Ahli B1 dan B2 dari setiap kumpulan akan buat keputusan sepakat untuk memilih projek yang akan dilaksanakan untuk kumpulan, Projek Biru atau Projek Merah. Mereka akan berbincang bersama dan capai sepakat.

Ingat, setiap ahli kumpulan akan dibayar mengikut hasilan dalam mana-mana projek yang dipilih secara sepakat oleh Ahli B1 dan B2.

Members B Private Decision

Ahli B1 dari Kumpulan {Bulat/Segitiga/Segiempat} sila datang ke meja Kumpulan masing-masing.

<RA2 and RA3 will administer the control question and then wait for Player B1 from Group {Circle/Triangle/Square} to make her decision. Session Leader will take over

RA1 in administering the control questions. Verbally conduct Member B additional questions and record his/her responses. RA will instruct Player B1 to return to the seat and will record the decision. >

Ahli B2 dari Kumpulan {Bulat/Segitiga/Segiempat} sila datang ke meja Kumpulan masing-masing.

Players B Joint Decision

Kita akan ke peringkat keputusan sepakat.

Bila saya panggil, kedua Ahli B1 dan B2 sila datang ke Meja Kumpulan.

Anda mesti dapat keputusan sepakat untuk projek mana akan dilaksanakan. Saya akan berikan anda beberapa minit untuk berbincang.

Pada Meja Kumpulan ada 2 sampul surat, satu dengan bintang biru dan satu dengan bintang merah. Sampul bintang biru ada isi hasilan Projek Biru yang boleh sangat di rancang oleh Ahli A dan di proses. Sampul bintang merah adalah sampul wakil untuk Projek MERAH yang dirancang saya dan telah diproses. Anda TAK boleh membuat kedua-dua sampul.

Bila anda telah setuju dengan keputusan sepakat, beri isyarat kepada RA. Bagi sampul yang ada Projek yang anda berdua mahu laksanakan kepada RA di belakang tabir.

Ahli B1 dan B2 sila datang ke Meja Keputusan.

<Players make their decision then return to their seat. RA2 will call RA1 to bring Members A to the room>

-- Aturan Tamat –

Figure 3.6A. Page 1 of Subjects' Reference (English)

<u>Outcome X</u>

Member	Payoff
A	RM20 or 
B1	RM 25 or  
B2	RM 25 or  

Total Value of X

RM 70 atau  

Figure 3.7A. Page 1 of Subjects' Reference (Malay translation)

<u>Hasilan X</u>

Ahli	Pendapatan
A	RM20 atau 
B1	RM 25 atau  
B2	RM 25 atau  

Nilai Seluruh Projek

RM 70 atau  

Figure 3.8A. Page 2 of Subjects' Reference (English)

Outcome Y

Member	Payoff	
A	RM30 or	
B1	RM 12.50 or	
B2	RM 12.50 or	

Total Value of Y

RM 55 or 

SR2

Figure 3.9A. Page 2 of Subjects' Reference (Malay translation)

<u>Hasilan Y</u>

Ahli	Pendapatan
A	RM30 atau 
B1	RM 12.50 atau 
B2	RM 12.50 atau 

Nilai Seluruh Projek

RM 55 atau 

Figure 3.10A. Page 3 of Subjects' Reference (English)

Outcome Z

Member	Payoff	
A	RM20 or	
B1	RM 18 or	
B2	RM 18 or	

Total Value of Z

RM 56 or	

SR3

Figure 3.11A. Page 3 of Subjects' Reference (Malay translation)

Hasilan Z

Ahli	Pendapatan
A	RM20 atau 
B1	RM 18 atau     
B2	RM 18 atau     

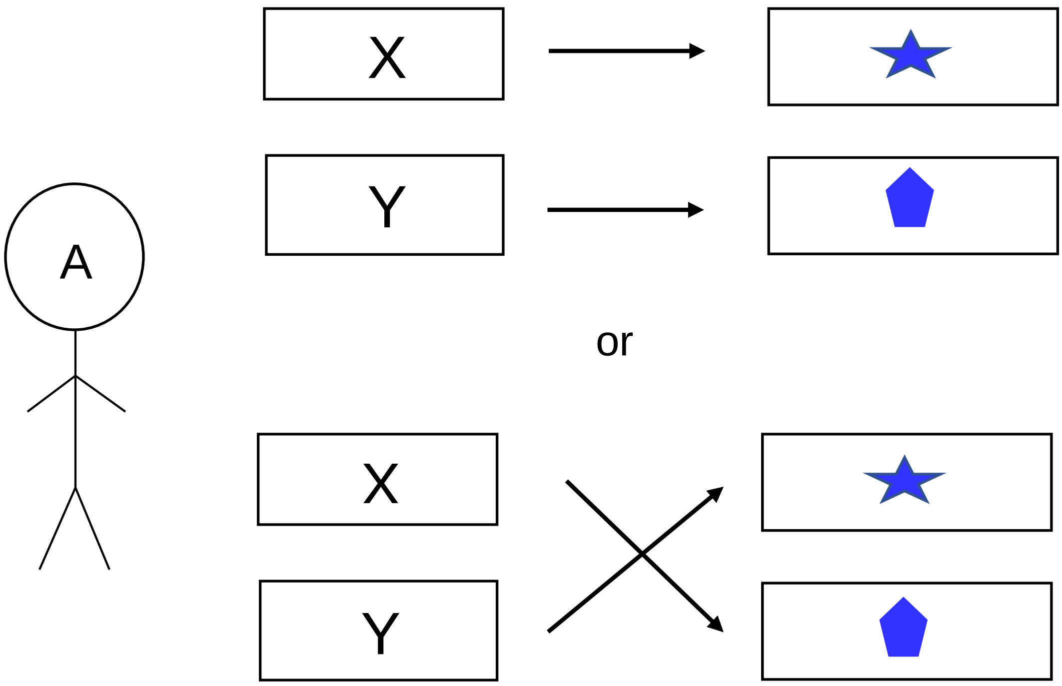
Nilai Seluruh Projek

RM 56 atau	  

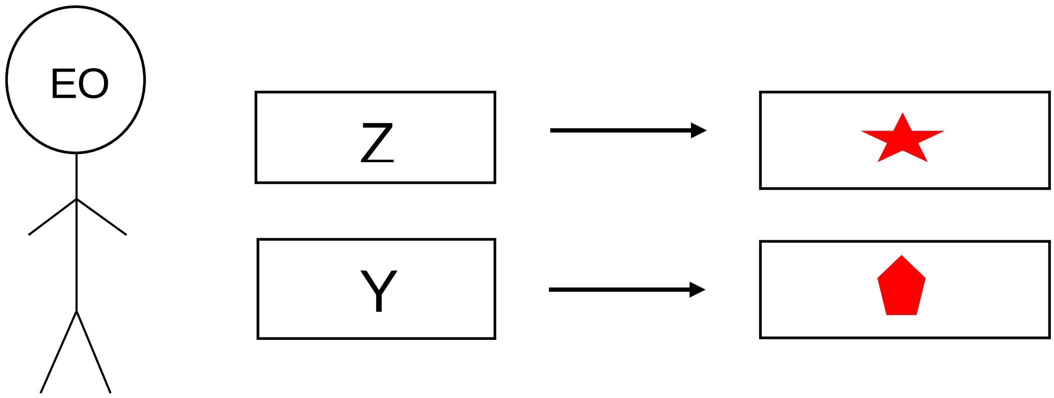
SR3

Figure 3.12A. Page 4 of Subjects' Reference (English)

Blue Project



RED PROJECT



SR4

Figure 3.13A. *Page 4 of Subjects' Reference (Malay translation)*

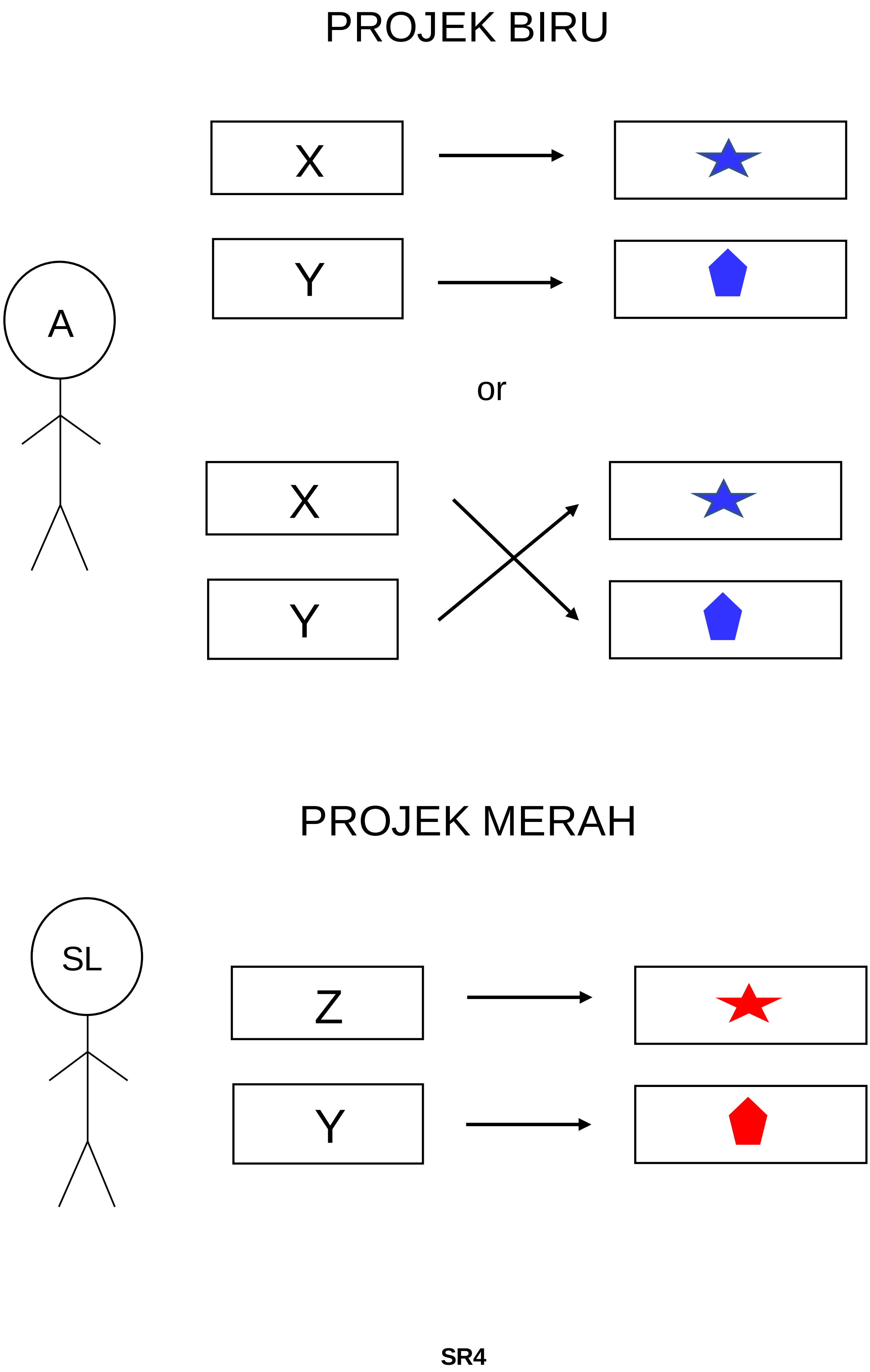
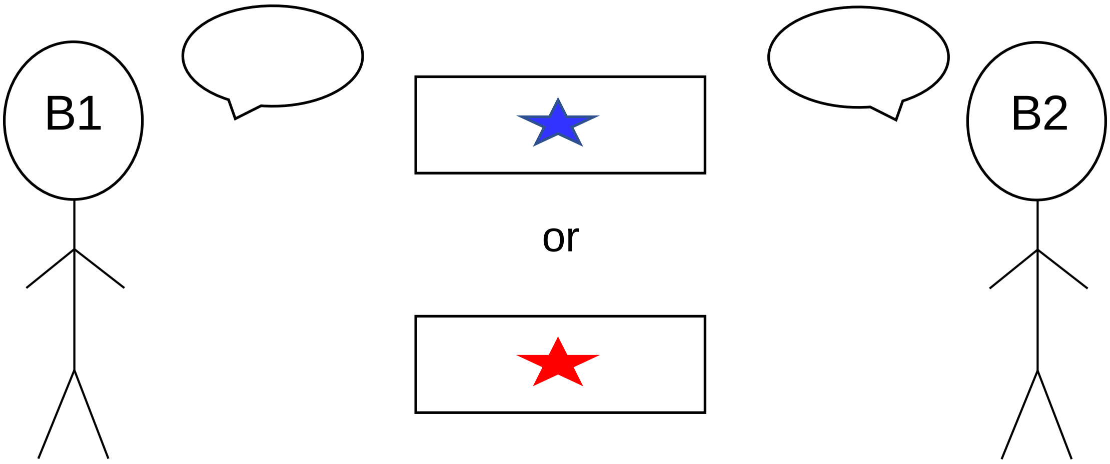
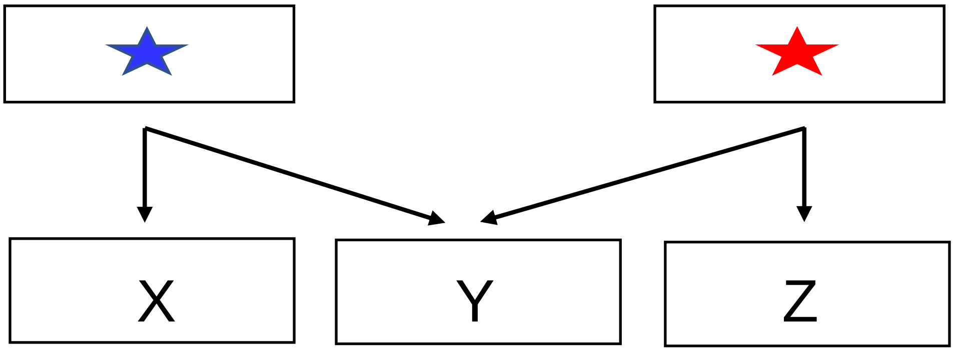


Figure 3.14A. Page 5 of Subjects' Reference (English)

Pick 1 Project

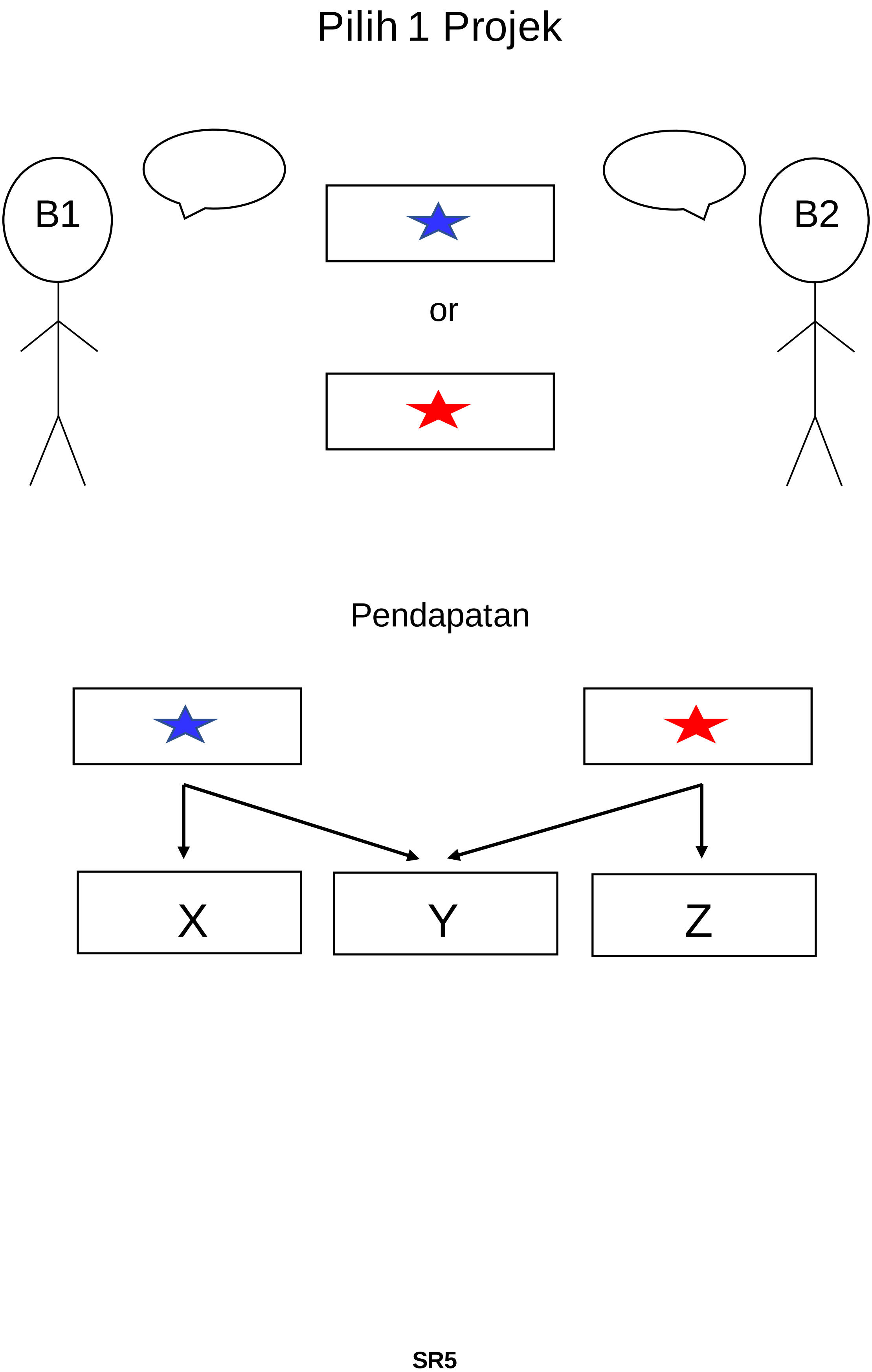


Payoffs



SR5

Figure 3.15A. Page 5 of Subjects' Reference (Malay translation)



Appendix B3: Control questions for Sender (English instructions)

Before you make any decision, please answer the following questions;

- *If you decide to place card with the **Outcome X** in the blue star envelope as **Project BLUE**, your earnings is ________ provided the content wasn't swapped and the **Project BLUE** is chosen by Members B1 and B2.*
- *If the **Outcome Z** placed by the Session Leader has been swapped with **Outcome Y** and both Members B picked the **Project RED**, your earnings will be _______.*

You will now make your decision now.

Please make your decision by placing one card into one envelope and do the same for the other card and envelope. Remember which envelope you have placed the outcome that you want. Once you have done this signal the RA. Hand the envelope with the content that you want to set-up as the Outcome for Project BLUE to the RA.

<RA will insert the envelopes to the intended bigger envelopes>

Please answer the following questions. Point the answer to me.

<RA will ask questions from **Member A additional questions** and record the responses>

You have completed the task. Please return to your desk.

Appendix B4: Control questions for Sender (Malay-language instructions)

Sebelum anda membuat apa-apa keputusan, sila jawab soalan-soalan yang berikut:

- *Bayangkan anda letak kad **Hasilan X** dalam sampul biru bintang. Kalau isi sampul biru bintang dan biru segi lima tak tertukar, dan kalua Ahli B1 dan B2 pilih **Projek Biru**, pendapatan anda adalah________*
- *Ingat yang Ketua Sesi dah letak kad **Hasilan Z** dalam sampul merah bintang dan kad **Hasilan Y** dalam sampul segi lima merah. Kalau isi dua-dua sampul tertukar dan kalau Ahli B1 dan B2 pilih **Projek MERAH**, pendapatan anda adalah_______*

Anda boleh membuat keputusan sekarang.

Sila buat keputusan anda dengan memasukkan satu kad ke dalam satu sampul dan buat benda yang sama untuk sampul dan kad yang lagi satu. Ingat sampul mana yang anda letak Hasilan yang anda mahu cadangkan. Bila sudah, beri 'signal' pada RA. Hulur sampul yang diisi dengan kad hasilan yang anda mahu letakkan sebagai Hasilan untuk Projek BIRU kepada RA.

<RA will insert the envelopes to the intended bigger envelopes>

Sila jawab soalan berikut. Tunjukkan jawapan anda pada saya.

<RA will ask questions from **Member A additional questions** and record the responses>

Tugas anda selesai. Sila pulang ke meja anda.

Appendix B5: Control questions for Receivers (English instructions)

Before you make any decision, please answer the following questions;

- *If Player A decide to set-up **Outcome X** as **Project BLUE** and in the Processing Stage the envelope containing **Outcome X** has been swapped with **Outcome Y,** my earnings is* __________
- *If the **Outcome Z** placed by the Session Leader has been swapped with **Outcome Y** and both Players B picked the **Project RED**, my earnings will be* ________

You will now make your decision now.

Show the envelope that you think should be carried out to the RA. Do this behind the screen so Member B1/B2 do not see your decision.

<RA to swap the position of each envelope after Member B1 made decision>

Please answer the following questions. Point the answer to me.

<RA will ask questions from **Member B1/B2 additional questions** and record the responses>

You have completed the task. Please return to your desk.

Appendix B6: Control questions for Receivers (Malay-language instructions)

Control Questions Members B1 & B2

Sebelum anda buat apa-apa keputusan, sila jawab soalan-soalan yang berikut;

- *Bayangkan Ahli A pilih untuk rancang **Projek BIRU** dengan **Hasilan X**, dan bila **Projek BIRU** ini di proses sampul **Hasilan X** tertukar dengan sampul **Hasilan Y**. Kalau anda dan Ahli B1/B2 pilih **Projek BIRU**, pendapatan anda adalah* _____
- *Ingat yang Ketua Sesi dah letak kad **Hasilan Z** dalam sampul merah bintang dan kad **Hasilan Y** dalam sampul merah segi lima. Kalau isi kedua sampul tertukar dan kalua anda dan Ahli B1/B2 pilih **Projek MERAH**, pendapatan anda adalah* ______
- *Kalau Ahli A pilih untuk letak **Hasilan X** sebagai **Projek BIRU** dan dalam peringkat pemprosesan, sampul dengan **Hasilan X** telah tertukar dengan **Hasilan Y**, pendapatan saya adalah* _______
- *Kalau **Hasilan Z** yang telah diletakkan oleh Ketua Sesi telah tertukar dengan **Hasilan Y** dan kedua-dua Ahli B1 dan B2 memilih **Projek MERAH**, pendapatan saya adalah* __________

Anda boleh membuat keputusan sekarang.

Tunjuk sampul yang anda rasa patut dilaksanakan pada RA. Buat ni belakang tabir supaya Ahli B1/B2 tidak boleh lihat keputusan anda.

<RA to swap the position of each envelope after Member B1 made decision>

Sila jawab soalan berikut. Tunjuk jawapan pada saya,

<RA will ask questions from **Member B1/B2 additional questions** and record the responses>

Tugas anda selesai. Sila pulang ke meja anda.

Chapter 4

Representation in Public Good Provision: An Experimental Investigation

4.1 Introduction

The presence of a representative acting on behalf of a group is ubiquitous in multiple social organizations – for example: elected representatives negotiating benefits for their constituents, heads securing funding for their departments, lobbyists influencing regulators on behalf of their clients, and in developing countries, village heads lobbying for development projects, from the government and NGOs, on behalf of the villagers. Typically, a representative serves the group by performing a distinguished act within the collective action to increase social benefit. A good organization appoints a representative to lobby for funding from the government. At the same time, the representative would be effective if she/he lobbies for a well-run organization. Consequently, the organization produces optimal benefits if it is represented by an effective representative and run by an efficient workforce.

The main objective of this chapter is to investigate behaviour from the theoretical novelty of our PGG structure: the positive complementarity between representative's and the rest of the group's actions. In this chapter the relationship between a representative and the rest of her/his group members is examined under standard lab conditions, therefore allowing this variation of PGG to be comparable with the findings from the standard PGG literature. Our PGG implementation lab-in-the-field settings in Sarawak differed from the standard lab settings on different dimensions due to elements of non-anonymity and the recruitment of a non-standard subject pool. The lab-in-the-field settings also constrained the investigation of this PGG from examining decisions in repeated rounds and whether variation in the order of the representative's decision affects subjects' behaviour.

This chapter will use the framework of representative leadership described in Chapter 2, in which a group of 3 consisting of 1 representative and 2 ordinary group members, each perform differentiated and complementary tasks. Group members are provided with the opportunity to contribute to a public good, while the representative has an opportunity to act on behalf of the group by expanding the public good's benefit through enlarging the multiplier attached to the group members' contributions. This turns the act of representation into a form of leadership: the presence of a representative could motivate group members to provide collective action as the return from contribution increases with the representative's effort. Each player receives an equal endowment and the payoff from the public good is distributed equally between the representative and ordinary group members. Because the marginal private benefit of the representative's effort increases as group members' contributions increase, the representative's payoff is interdependent with the contribution levels of the group members. At the same time, the marginal private benefit of contribution increases as the representative's effort increases.

The PGG implemented as a lab-in-the-field in Chapter 2 is unable to disentangle the explanation behind the generally high level of effort among representatives irrespective of their social status. Their behaviour could have stemmed from a sense of responsibility attached to the role, i.e. the function of representation has been performed in one way or another by both non-aristocrats or aristocrats in the village, or the presence of contributing group members obliged them to exert high levels of effort to preserve their reputation outside the game, despite the credible deniability component in the experimental design.

Here, using the PGG structure introduced in Chapter 2 we vary the order the of representative's decision with respect to group members' decisions. The objective of this Chapter is to find out whether the order of the moves affects the effort by the representative, the contribution by group members, and both effort and contribution outcomes in the subsequent periods. To achieve this, the experiment consisted of three treatments. In the first treatment, *SimRep,* the representative and the group members made decisions simultaneously. In the second treatment, *RepFirst*, the representative exerted his/her effort first and the level of effort was communicated to the respective group members before they decided on their contribution levels. In the last treatment, *RepLast*, the representative's decision was made after he/she had learned about the contribution level of group members. The *RepLast* treatment has the same decision sequence as the PGG in Chapter 2.

Apart from using standard student subjects, this chapter also expands from Chapter 2 as subjects in each treatment play the public good game for 20 rounds, with feedback at the end of each round.

Empirical evidence has documented effects from sequential public good games, particularly in leadership experiments (Arbak & Villeval, 2013; Brandts, et al.,2015; Cappelen, et al., 2016; Drouvelis & Nosenzo, 2013; Gächter, et al., 2010; Gächter & Renner, 2018; Güth, et al., 2007; Haigner & Wakolbinger, 2010; Potters, et al., 2007; Van der Heijden & Moxnes, 2012). By sequencing the leader's decision before the followers and revealing her/his contribution level, followers could be motivated to make contributions. Several experiments have found that this sequencing increases contributions relative to simultaneous public good games. Making the subjects play the public good game for 20 rounds allows this experiment to examine the dynamics of representation over time. On the other hand, findings from conventional PGG designs that involve simultaneous moves among players have shown that it is difficult for groups to maintain high levels of cooperation over time (Fischbacher & Gächter, 2010). Much of the explanation behind the outcomes in sequential and simultaneous public good games revolves around the role of reciprocity and conditional cooperation among subjects.

The rest of this chapter is organized as follows. Section 2 discusses the relevant literature on representation, public good games and leadership. The full descriptive model of representative leadership is found in Section 3 and Section 4 outlines the hypothesis. Section 5 provides the details on the experimental design and implementation. Findings from this experiment can be found in Section 6 and we conclude in Section 7.

4.2 Related literature

Effective representation is a type of function of leadership. Previous experiments have examined leadership functions such as a reward giver, a punisher or a communicator within a group. In some of these experiments, it is not a necessity for the leader to act as the first mover; the essential feature is that a leader possesses a function that is able to motivate followers or group members to cooperate. We believe that our experiment is the first to measure representation as a function of leadership.

The earliest theoretical work to explain leadership is made by Hermalin (1998) and Hermalin (2007), in which the role of the leader is to convince the followers to voluntarily contribute towards the team output through: i) leading-by-example, or ii) leading-by-sacrifice. Hermalin's theory of leadership relies on the leader providing a signal in an asymmetric information setting in the form of an example or sacrifice to the follower. Leaders are assumed to have private information on the task and communicate the level of efforts needed to followers via signalling. Hermalin's theory of leadership was tested by Meidinger & Villeval (2002) by comparing it with followership that emerges from the effect of reciprocity. The experiment found that in the leading-by-example treatment, the followers were more likely to follow the leader's example by matching the leader's contribution, indicating that reciprocity plays a bigger role in inducing followers to follow the leader. In a similar vein, Potters et al. (2005) also examined signalling in leadership by granting the first mover more information about a public good and only her/his contribution value was communicated to the second mover. In this experiment, information asymmetry facilitates mimicking from the followers while the leaders' expectations of following sustain the contribution.

Most recent literature on leadership in PGGs has focused on social preferences with less emphasis on information asymmetry. In one common experimental design, the leader chooses her/his contribution first. Her/his followers observe that contribution and then choose their contribution values. A public good will be produced when there are elements of reciprocation and cooperation between the leader and her/his followers. In addition to the contribution by Meidinger & Villeval (2002), Gächter & Renner (2004) examined leadership using several variations of sequential PGG. The first type of comparison was made between a one-shot simultaneous PGG and a sequential PGG with a randomly selected leader. The other treatments involved repeated PGGs, one comparing different values of the marginal per capita return (MPCR) on contributing and the others involving selecting a group member to be the first mover. The stylized facts found in the simultaneous standard PGG literature are also present here (Ledyard, 1995); in the one-shot games, subjects contributed midway between the Pareto and free-riding levels, and in the repeated treatments, the overall contributions by first and second movers declined over time. In the sequential PGG, Gächter and Renner (2004) found that the second movers' contributions were positively correlated with the first mover's contribution in one-shot games and at the initial round for repeated PGG. They found that contribution levels in sequential treatments were higher than in the baseline treatment, but only in the initial rounds. Decline in contributions still happened as games progressed and there was no statistically significant difference between the average contributions of subjects in the leadership and baseline treatments. What the sequential mechanism is able to do is to make subjects assigned as leaders contribute more than subjects in the baseline treatment over time, but this does not motivate the followers to directly match their leaders' contributions. Due to this, leaders' payoffs in general are lower than followers' payoffs, indicating that the leader has been suckered in to contribute and followers are free riding on her/his contribution.

The evidence on this 'leading-by-example' mechanism is mixed. Leaders in Arbak & Villeval (2013), Gächter & Renner (2004 & 2018) and Güth et al. (2007) are found to be effective in motivating followers to contribute to the PG and followers' contributions are found to be positively correlated with the leader's contribution. On the other hand, there are other experiments that have found that the presence of a leader does not motivate followers to contribute, especially in instances where followers were already cooperative without the presence of the leader. In Sahin et al. (2015), a leading-by-example mechanism in a linear public good game was unable to improve cooperation among the followers, in comparison to the baseline treatment, as followers' MPCR on contribution drives followers to conditionally cooperate with the leader. In addition, Haigner & Wakolbinger (2010) found followers' contributions were not significantly greater in a leadership setting than in a simultaneous public good set-up.

The only experiment that has tested the effect having 1 player deciding last in a sequential PGG was introduced by Cox et al. (2013). Here they labelled the PGG as the 'provision game' and it happened in a group of 4 with 3 players acting as the first movers. The second mover in each group decides after observing the first movers' decisions. In the 'boss' treatment, the second mover could choose to free ride on the first movers' contributions or increase everyone's payoff by contributing to the PG. The 'king' treatment extends the power of the 'boss' by allowing the second mover to appropriate contributions made by the first movers in the PG. The singular second mover has asymmetric power in this type of sequential game as she/he determines the final shape of total contribution. The control treatment is where everyone decides simultaneously. These treatments were implemented as a one-shot game. The experimenters found that the average group earnings in the simultaneous treatment outperformed average group earnings in the boss and king sequential treatments with the king treatment performing the worst among the three. They also found that, on average, everyone in the simultaneous treatment contributed more to the PG than the first movers in the boss and king treatments. An average second mover in the boss treatment contributed less than the first movers while an average ‘king’ exploited her/his position by appropriating a small amount of first movers’ contribution to the PG.

One consistent finding in the sequential PGG literature is that the second mover(s) free ride on the contribution of the first mover(s). This can be explained by backward induction, assuming that everyone is self-interested. Since the marginal private return on contribution is less than one, the first mover(s) can infer that their contributions will not affect the contributions of the second mover(s); while the second mover(s) will not contribute because the marginal private return on contribution is less than one. As the marginal private return on contributing is the same for both types of players, the first mover(s) is more exposed to any free riding committed by the second mover(s) if they contribute and believe that their contributions will be reciprocated by the second mover(s). In both Gächter & Renner (2004) and (Cox et al.2013), the second mover(s) received a higher payoff than the first mover(s), while the first mover(s) were being suckered in to contribute.

Since a sequential PGG produces a free-riding opportunity for the second movers when paired with cooperative first movers, several works have tried to explore this issue by modifying the marginal private return of the first and second movers. Works by Andreoni et al. (2002) and Gächter et al. (2010) have the first and second movers face unequal returns in some treatments. The main feature of this type of PGG is negative complementarity between the first and second movers. This is achieved when the marginal private return on contribution for the first mover decreases as the second mover contributes more, and vice versa. In the context of strong negative complementarity, zero contribution from the first mover makes the marginal private return for the second mover to be larger than one, making it Pareto optimal for one subject to free ride while the other contributes all his/her endowment to the PGG.

A theoretical foundation to this strain of sequential PGG is provided by Varian (1994), in which he proposed that when one player values the PG more than the other player, the player who values it more contribute more to the PG than if she/he is the only contributor. When this PGG is implemented in a sequential setting, the first mover would only contribute if she/he valued the PG more than the second mover. However due to the threat of free riding from the second mover, the best strategy for the first mover is to free ride and leave the PG contribution to be done by the second mover. The work concludes that public good provision under sequential moves is smaller than in the simultaneous setting.

In Andreoni et al. (2002), the sequential contribution set-up involved 14 rounds with unequal equilibrium payoffs between the first and second movers while preserving both players' free-riding strategy. The experiment aims to examine preferences for fairness when subjects are faced with equilibrium payoff differences. The experiment is conducted in a 2-person group. Here, both players face decreasing marginal returns from contributing and even if both players decide to equalise contribution at any value, one player will receive lower payoff than the other. They found that average contributions among the two players in the simultaneous move PGG are almost identical for every round while the second movers in the sequential move PGG on average contributed more compared to the average contribution by first movers. However, the difference between the first and second movers' contributions is not statistically significant. The authors noted that closer to the end of the game, behaviour in the simultaneous and sequential games becomes more similar. On average, the first movers in the sequential treatment behaved as predicted in their framework: free riding on second movers' contributions in the early rounds. As the rounds progressed, fairness consideration entered the second mover's consideration and they reduced their contributions as a way to punish the low-contributing first movers. Another work that examines differences in sequential and simultaneous contributions with asymmetric returns to players is by Gächter et al. (2010). They further varied the sequential treatments, as a test of Varian's (1994) equilibrium prediction that the first mover has a free-riding advantage over the second mover. They found support for the hypothesis that aggregate contributions are lower in the treatment in which first movers have higher returns. Similarly, subjects in Andreoni et al. (2002) also exhibited preferences towards equitable allocations in which the second mover 'punishes' the low contributing first mover by withholding contribution.

In our experimental design, contributions made by the representative and group members are positive complements, regardless of who moves first. To the best of our knowledge, no studies have examined this PGG's feature.

In our treatments in which group members decide simultaneously or before the representative, their contributions are risky decisions since they have information only about the possible range of MPCR values; the exact value is determined by their representative. There are several related works that examine risk and uncertainty in the determination of MPCR and its subsequent effect on PG contributions. Boulu-Reshef et al. (2017), Levati & Morone (2013) and Stoddard (2015) incorporated a probabilistic element in the determination of group-level MPCR. Levati & Morone (2013) examines contribution levels under the condition that the minimum value from possible MPCR values allows for efficiency gain, and finds that the stochastic determination of the MPCR value does not affect public good contribution. Similarly, uncertainty in the form of a combination of partial uncertainty of personal MPCR and the distribution of MPCRs in a group are found not to be detrimental to PGG contribution by Boulu-Reshef et al. (2017). On the other hand, Stoddard (2015) using a within-subjects design examines the effect of contribution by exposing subjects to PGG with uncertain and certain MPCR values between rounds. The experiment found effects on contribution levels depending on the order of the uncertainty treatment relative to treatment that have fixed MPCR value.[29]

4.3 A Model of representative leading in public good game

We use a linear public good game (PGG) as the base of this model. In the standard linear PGG, each player i in a group of n players receives an endowment of 1. She/he chooses an amount x_i from the interval ($0 \leq x_i \leq 1$) to allocate to the group project. The remainder from the endowment is allocated to a private account. For each unit allocated to the private account, the player will receive a return of 1. The return from the group account will depend on total allocations to the group project, $\sum_i x_i$. Total

[29] Another category of PGG experiments that have stochastic determination of MPCR values by varying its values among group members, i.e. heterogeneous MPCR's values for each group member. For examples (Fischbacher et al. (2014) and Gangadharan & Nemes (2009) found contributions are affected when the uncertainty involved differences of MPCR values within a group.

contributions in the group project are multiplied by a pre-defined multiplier, m, and then divided equally among the n group members. The payoff of each individual i is given by:

$$\pi_i = (1 - x_i) + \frac{(\sum_i x_i) * m}{n}$$

In the standard linear PGG setting, we need to satisfy $m/n < 1$ and $m > 1$ to create a social dilemma for each player i. The former, $m/n < 1$, implies it is best for each i to contribute zero to group project in a unique Nash equilibrium since the marginal private return on contribution is less than 1, while the latter, $m > 1$, indicates that all i will obtain a Pareto optimum payoff from contributing all of their endowment $\sum_i x_i = n$ to the group account.

The group decision-making framework presented in this chapter involves the presence of a representative. The representative determines the value of the PG multiplier attached to any contribution made to the group project. The representative performs a differentiated role in the PGG in comparison to other group members but receives the same share of the PG as other group members. Contribution from the representative is not incorporated into the total allocation of the group account, but it affects the value of the multiplier m. Public good provision is derived from contributions by other group members to the group project multiplied by a multiplier selected by the representative. PG provision is maximised when the representative allocates all her/his effort to increase the multiplier value and other group members allocate all their endowment to the group project. The representative and other group members will earn equal share from the public good as part of their individual payoffs.

The presence of a representative could potentially rally group members to produce a public good with the awareness that a representative will amplify the public good's benefit by expanding the multiplier value. Thus, a representative performs a leadership function. On the other hand, the representative still receives a share from the PG even if she/he did not exert any effort to increase the multiplier value.

4.3.1 Representative leading in public good game

In a group of n players there are two types of players; i) non-representative group members (i), and ii) the representative (j). There are n -1 players i, in which ($i \in \{1,2,3 \ldots, n-1\}$), and j is the n^{th} player. Regardless of players' types, everyone receives the same endowment of 1. Players i can allocate x_i from the interval $0 \leq x_i \leq 1$ and keep the remainder for private return. Player j decides as a representative by allocating her/his endowment as an effort to increase the value of the PG multiplier. The implemented PG multiplier, M^*, is determined by player j's allocation of effort, e_j, from her/his endowment ($0 \leq e_j \leq 1$). The default value of the PG multiplier is set at M_0, when $e_j = 0$; in which $n/(n\text{-}1) > M_0 > 1$ to preserve the social dilemma condition. When j provides any effort with $e_j > 0$, the multiplier value for the PG is now:

$$M^* = M_0 + ae_j$$

in which a is a constant attached to any positive value of e_j, as each unit of effort by player j incrementally increases the value of multiplier.

Players' i strategy x_i in [0,1] will result in the following payoff function for each i;

$$\pi_i = (1 - x_i) + \frac{(\sum_i x_i)(M_0 + ae_j)}{n} \qquad \textstyle\sum_i \text{ is } \forall \text{ player } i; \qquad (1)$$

And player j's strategy e_j in [0,1] leads to this payoff function,

$$\pi_j = (1 - e_j) + \frac{(\sum_i x_i)(M_0 + ae_j)}{n} \qquad (2)$$

The summation of the payoffs for players i and a player j in a group forms the following group payoff,

$$\pi_G = (n - \textstyle\sum_i x_i - e_j) + (\sum_i x_i)(M_0 + ae_j) \qquad (3)$$

Social dilemma is still an integral part of this PGG as multiplier values will be parameterised to ensure that both types of players possess dominant strategies of non-contributing and zero effort; as well as the possibility of obtaining the socially optimal outcome from maximum contribution and effort. Player j would be able to free ride on players i by not exerting effort as she/he would receive a share of PG return. Zero contribution from players i would be a dominant strategy for them as this would prevent player j from free riding on their contributions. Both types of players would maximise the payoff by exerting full effort and contributing all endowment to the group project.

In Section 3.2 to 3.5, we outline how these conditions are derived when n =3, i.e. there are 2 players i and 1 player j in a group. This is aligned with the implementation of the lab experiment. We begin by outlining the marginal private return on contributions and marginal social returns for all types of players in the group. Following that, we examine the marginal collective return for players i. Multiplier values are drawn from the solutions of the players' marginal returns.

4.3.2 Marginal private return

We start by partially differentiating equations (1) and (2) to find the optimum for each type of player and since the derived equations are linear, the optima are corner solutions. This provides marginal private returns for both players. From (1), the marginal private return for a player i or a group member is;

$$\frac{\partial \pi_i}{\partial x_i} = -1 + (\frac{1}{3})(M_0 + ae_j) \qquad (4)$$

The marginal private return for player i is independent of x_i but has an increasing relationship with e_j. This is a departure from the standard PGG as effort from player j influences the marginal private return an average player i could receive. For a player i, non-contribution $(x_i = 0)$ is a dominant strategy when $e_j = 1$ under this condition: $-1 + \left(\frac{1}{3}\right)(M_0 + a) < 0$, hence $M_0 + a < 3$. We identify this as Condition (A) that will be useful in determining parameter values for the experimental design.

From (2), the marginal private return for player j (the representative) is:

$$\frac{\partial \pi_j}{\partial e_j} = -1 + (\frac{1}{3})(\sum_i x_i)(a) \qquad (5)$$

For player j, the marginal private return on exerting effort is increasing with x_i but independent of e_j. This feature also departs from the standard PGG since player j's marginal private return increases with each player i's contribution. Player j receives positive marginal private return if $(\sum_i x_i/3)(a) > 1$. If both players i have made maximum contributions, i.e. $\sum_i x_i = 2$, private return on effort is negative if $2a < 3$. This is Condition (B). It is a dominant strategy for player j to exert no effort in this condition.

Players i maximise private return by not contributing to the PG and for player j to arrive at the same outcome, she/he does not need to exert any effort to improve the PG multiplier.

4.3.3 Marginal social returns

Every player is provided with an opportunity to assign their endowment to the public good for social return. This produces marginal social returns, that is, the change in returns associated with increasing effort and/or contribution by an additional unit. This points to the possibility that both types of players benefit from collectively allocating their endowments to the public good. Using (3) above, we derive the marginal social return for players i's contribution and player j's effort. For each player i, her marginal social return on contribution is:

$$\frac{\partial \pi_G}{\partial x_i} = -1 + M_0 + ae_j \qquad (6)$$

Equation (6) shows that the marginal social return on player's i's contribution is independent of x_i while increasing with e_j, similar to the implication for her/his marginal private return. The marginal social return for player j is;

$$\frac{\partial \pi_G}{\partial e_j} = -1 + (\textstyle\sum_i x_i)(a) \qquad (7)$$

Again, the marginal social return for effort is increasing with x_i but independent of e_j.

From equation (6), at any given value of e_j, if $M_0 + ae_j > 1$, the marginal social return to contributions is positive at all x_i. Under this condition, it is socially optimal for contributions to be at the maximum level, i.e. $x_i = 1$, a corner solution. Conversely, if $M_0 + ae_j < 1$, the socially optimal contributions will be zero. We identify $M_0 + a > 1$ as Condition (C), after e_j is set to be 1 (i.e. the condition that if player j makes maximum effort, it is socially optimal for each player i to make the maximum contribution). Equation (7) indicates that at any given value of $\sum_i x_i$, if $\sum_i x_i > 1/a$, the marginal social return to effort is positive at all e_j. Here, it is socially optimal for effort to be at the maximum level, i.e. $e_j = 1$, a corner solution. On the other hand, if $\sum_i x_i < 1/a$, it is socially optimal for effort to be zero. We set x_i= 1 and since there are two players i, the social optimal condition for effort is $2a > 1$. We labelled $2a >$

1 as Condition (D) (i.e. the condition that if each player i makes the maximum contribution, it is socially optimal for player j to make maximum effort). If Conditions (C) and (D) are satisfied, it is socially optimal for contributions and effort to be at their maximum levels, i.e. $x_i = 1$ and $e_j = 1$.

4.3.4 Marginal collective returns on Players *i* contribution

We consider the possibility that players i decide as a collective against player j. From (1), we sum the payoff function of the two players i into:

$$\sum \pi_i = (2 - \sum_i x_i) + [(\frac{2}{3})(\sum_i x_i)\,[M_0 + ae_j] \qquad (8)$$

We partially differentiate (8) to derive the marginal collective return from contribution;

$$\frac{\partial \pi_i}{\partial \sum_i x_i} = -1 + (\frac{2}{3})[\,M_0 + ae_j] \qquad (9)$$

(9) shows that the marginal collective returns for players i is a positive function of player j's effort, indicating complementarity between the contributions of players i and player j's effort. If both players as a collective expect that player j will not exert any effort ($e_j = 0$), then the value of (9) is negative if $M_0 < 3/2$. $M_0 < 3/2$ is set as Condition (E), i.e. the condition under which it is in the best interest of players i as a collective to contribute nothing to the PG if player j makes zero effort. On the other hand, when players i as a collective expect that player j will exert maximum effort ($e_j = 1$), the value of (9) is positive if $M_0 + a > 3/2$. Under this condition, it is optimal for players i as a collective to make maximum contributions. is $M_0 + a > 3/2$ is set as Condition (F).

4.3.5 Conditions for multiplier values selection

For the PGG to be considered as a social dilemma, the multipliers selected as M_0 and a must fulfil Conditions (A) to (D) above. Condition (A) and (B) imply that zero effort and zero contribution are the dominant strategies for both types of players. On the other hand, maximum effort and contribution are socially optimal under Conditions (C) and (D).

- $M_0 + a < 3;$ (Condition A)

- $2a < 3$; (Condition B)
- $M_0 + a > 1$; and (Condition C)
- $2a > 1$. (Condition D)

Under Conditions E and F, there is a social dilemma for the group members as it is in their collective interest to contribute the maximum value if the representative chooses maximum effort but there is no dilemma if the representative chooses zero effort.

- $M_0 < \frac{3}{2}$ (Condition E)
- $M_0 + a > \frac{3}{2}$ (Condition F)

In the experimental design below, the selected values of M_0 is 1.2 and a is 1.0. These values satisfy the conditions set above.

4.3.6 Benefits from representation relationship

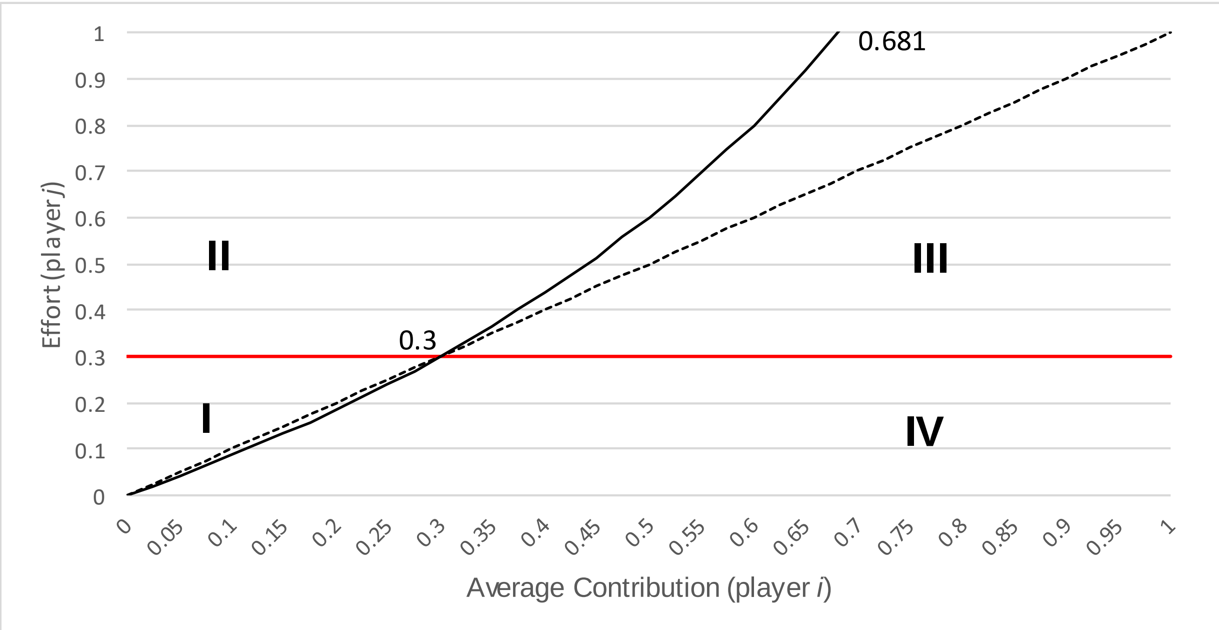
The conditions for social and collective contributors' dilemmas show that effort from player j and contributions from players i are complementary but produce different implications for the two types of player.

We determine which type of player has higher marginal private return (MPR) to contribute or exert effort under the condition that all players make equal contributions or effort, i.e. $x_i = e_j = z$. z is a constant. Under $x_i = e_j = z$, MPR$_i$ is $-1 + (\frac{1}{3})(M_0 + az)$ and MPRj is $-1 + (\frac{1}{3})(2za)$. Since the maximum value of z is 1 and by substituting the chosen parameter values of M_0 and a, a comparison between MPR$_i$ and MPRj would yield MPR$_i$ > MPRj at all values of z if $M_0 > a$. In this sense, there is a stronger incentive for group members to contribute than for the representative to make effort.

We also determine which type of player has higher marginal social return (MSR) from contributing or exerting effort under the condition that all players make equal contribution or effort, $x_i = e_j = z$. z is a constant. We use equations (6) and (7) from above and substitute the chosen parameter values of M_0 and a to them. x_i and e_j in equations (6) and (7) are to be replaced with constant z. The maximum value of z is 1, the same with x_i and e_j. Equation (6) is the MSR$_i$ and equation (7) is MSRj and it determines the benefits a type of player receives by allocating an additional token as contribution or effort. Given that the selected values of M_0=1.2 and $a = 1$, comparing MSR$_i$ and MSRj yields MSRi > MSRj or $M_0 + a(1) > (2-1)(z)(a)$ at all values of z if $M_0 > a$. Since MSR$_i$ > MSRj, contributions from players *i* result in greater benefit to the public good compared to effort from player *j*. In this sense, players *i* that value public good provision have stronger incentive to contribute since their additional contribution to the public good yield greater benefits to everyone in the group.

Figure 4.1 below gives a graphical representation of the possible returns to players *i* and *j* relative to the Nash-equilibrium benchmark in which their respective payoffs are equal to 1, i.e., π =1, at zero contribution and zero effort by all players. The space of the figure shows all possible combinations of effort by player *j* and average contribution by players *i*. This space is divided into regions according to the benefits received by the two types of player. A player's benefit is defined as the actual payoff they receive minus the Nash-equilibrium payoff of 1. The vertical axis refers to the effort space available to player *j* while the average contribution of players *i* is shown on the horizontal axis, i.e.$(x_1 + x_2)/2$. When discussing the figure, we will assume that both players *i* are contributing equally given their contribution space.

Figure 4.1. Possible benefits from public good based on combinations of effort and average contribution to public good.



The origin point of the graph is the non-interaction or Nash-equilibrium benchmark, in which both effort and contribution is zero. The dotted 45-degree line in Figure 4.1

represents the equality between, i) average payoff to the two players *i*, i.e. $(\pi_{i1} + \pi_{i2})/2$, and ii) the payoff to player *j*, i.e. π_j. The red line represents the combination of decision of players *i* and *j* that result in $\pi_i = 1$, i.e. the average payoff to players *i* is equal to what they would have got in Nash equilibrium when player *j*'s effort is 0.3, an average player *i*'s payoff π_i is 1, independent of their average contributions. On the other hand, the solid black curve shows the combination of effort and contributions that result in $\pi_j = 1$. It links points at which player *j*'s payoff is equal to what she/he would have got in Nash equilibrium. When average contribution, $(x_1 + x_2)/2$, is 0.681, player *j*'s payoff from maximum effort, π_j is 1, just as if she/he had made zero effort and both players *i* had made zero contributions. The point where the red line and solid black curve cross marks the point at which positive contributions and positive effort produce an average payoff of the two players *i*, $(\pi_{i1} + \pi_{i2})/2$ and a payoff of player *j*, π_j, both of which are equal to 1, i.e. the payoff from exerting effort and contributing is equal to the payoff of zero effort and zero contribution. It indicates that both players *i* must contribute 30% of her/his endowment to the public good and player *j* must allocate 30% of her/his endowment as effort for everyone to receive a payoff that equals the Nash-equilibrium benchmark payoff.

Regions I, II, III and IV are defined by the red line and solid black curve. If combinations of effort and average contribution fall in Region I, the payoffs for all players are less than 1. Region I is identified as a space of mutual losses, indicating that everyone is better off not engaging with the public good. For example, the average player *i* contribution is 0.1 and the effort from player *j* is 0.1. Combinations of decisions in Region II benefit an average player *i* at a cost to player *j*. An average player *i* receives a payoff more than 1, $\frac{\pi_{i1}+\pi_{i2}}{2} > 1$, while player *j*'s payoff is less than 1, $\pi_j < 1$. In this region, player *j* is engaging in leading-by-sacrifice or is acting prosocially. On the other hand, combinations of decisions in Region IV benefit player *j*, $\pi_j > 1$ but at a cost for an average player *i*, $\frac{\pi_{i1}+\pi_{i2}}{2} < 1$.

Region III produces a mutually beneficial outcome for everyone and encompasses the area below the solid black curve and above the horizontal red line. This is where contributions and effort benefit both player types beyond the Nash-equilibrium benchmark value and the socially optimal point is at the northeast point of the 45-

degree dotted line. It is possible for players i and j to attain payoffs within Region III such that one player type benefits more than the other. If their decisions end up in between the 45-degree line and the horizontal red line, the share of benefit is larger for player j compared to the average player i. On the other hand, share of benefits from the PGG is larger for the average player i than for player j if the combination of effort and contributions settles somewhere in between the solid black curve and the 45-degree line.

As long as effort is matched with contribution at any point to the right side of the solid black curve, player j will receive benefits from players i's collective action, $\pi_j > 1$. This refers to Regions III and IV. On the other hand, an average player i will receive positive return from contribution, $\frac{\pi_{i1}+\pi_{i2}}{2} > 1$, when the combinations of contribution and effort are at any point above the red horizontal line, or Region II and III. In the situation where players i and j match each other decision, their combination of decisions will end up on the 45-degree line and at the point everyone receives equal payoff from the public good, $\pi_j = \pi_{i1} = \pi_{i2}$.

In the experiment described below, everyone receives 10 tokens as endowment. As long as player j has exerted at least 3 tokens as effort, an average player i stands to benefit from contributing conditional on she/he and the co-group member having contributed at least 3 tokens to the public good. On the other hand, player j's benefit from exerting effort varies according to the contributions of players i. For example, if player j chooses to allocate all 10 tokens to improve the multiplier, her/his effort would only be beneficial for her/him if players i contributed more than an average of 6.81 tokens to the PG.

4.4 Hypotheses and conjectures

The focus of this chapter is on understanding whether the order in which the representative moves relative to other group members influences public good provision. This relates to the public good game (PGG) literature that incorporates comparisons between games in which decisions are made simultaneously by all subjects and games in which one subject in a group decides before the others. The standard game theoretic prediction of PGG is no contribution, assuming that everyone in the group is self-interested. Since everyone receives private benefit from other people's contributions, a potential contributor will try to free ride on the others to maximize her/his private payoff. However, the stylised facts of standard PGG with simultaneous decision making are as follows (Ledyard, 1995): i) on average, subjects contribute approximately halfway between the Pareto-efficient level and the free riding level in a one-shot game or in the initial round of a repeated game, and ii) with repetition, contribution levels decline. Therefore, we seek to examine whether the stylised facts of the standard PGG can be mapped onto our PGG structure. Since no work discussed in Section 2 covered and has findings involving a PGG structure like ours and has compared the three sequences of 'leader' movement in the same experiment, all the hypotheses below are conjectures, derived from extrapolating the findings from the leadership and PGG literature mentions in Section 4.2 above.

From this section onwards, player j will be identified as the 'representative' and players i will be identified as 'group members'.

The order of the representative's decision relative to group members' decisions is hypothesised to produce treatment differences between *SimRep, RepFirst* and *RepLast*. As shown in experiments by Cox et al. (2013), Gächter, et al. (2012) and Gächter & Renner (2014) from the section above, a singular first mover ends up contributing more to the public good compared to the second mover(s) in the same group. On the other hand, in our representative leadership framework, for a representative to realise any gain from the public good, she/he must convince group members to contribute to it. Furthermore, to equalise individual gains from the PG, the representative must convince her/his respective group members to contribute at the same level as her/him.

The first hypothesis is that the representatives in *RepFirst* are expected to exert a higher effort level than representatives in *SimRep* and *RepLast*. This is the result of the combination of being the first mover and the group's representative. On the other hand, representatives in *RepLast* are expected to exert the least amount of effort due to their second mover advantage and/or the attraction to free ride on group members' contributions. Free-riding could be a result of i) the representative's self-interest, and, ii) low-level contributions from group members that fail to motivate the representative to exert effort. Effort by representatives in *SimRep* on the other hand would be more likely to depend on the representative's belief about group members' contribution, especially in the first round of decision-making. Representatives' efforts in *SimRep* are predicted to be driven by the disjunction effect (Shafir & Tversky, 1992; Tversky & Shafir, 1992). The lack of awareness of each other's strategy makes the representative susceptible to quasi-magical thinking; acting on the belief that the others will behave like oneself. An example of this behaviour is the representative taking her/his role seriously and exerting full effort by believing that group members are going to contribute all their endowment to the PG.

Hypothesis 1: Effort by the representative is highest in RepFirst, lowest in RepLast, and intermediate in SimRep.

Provided that group members are responsive to effort made by their respective representative, there would be differences in contributions made in each treatment. In round 1 (R-1), group members in *RepFirst* receive information about their representatives' effort while group members in *SimRep* and *RepLast* need to decide based on their belief about what their representatives will do. In addition to paying attention to the representative's decision (or would-be decision for *SimRep* and *RepFirst*), each group member decides simultaneously in every treatment, indicating the possibility of a disjunction effect between them.

Assuming that a representative in *RepFirst* exerted effort to adjust the multiplier, a group member is more likely to reciprocate that effort by contributing to the PG, as engaging in the zero contribution strategy with a prosocial representative would not produce any benefit to group members. Group members in *SimRep* would be expected to make decisions in similar ways as the representative in the group; i.e. the decision in the initial round is based on the belief about what the representative and the co-group member will do. On the other hand, the group members in *RepLast* are expected to contribute the least because of the expectation that the representative will free ride on their contributions. Since there is a social dilemma problem between the two group members, a group member could also refuse to contribute if she/he believed the co-group member would free ride on her/his contribution. This social dilemma is one of the reasons why group members in *RepLast* will not be assumed to act collectively to signal their representative to exert effort.

Hypothesis 2: Contribution by a group member is highest in RepFirst, lowest in RepLast, and intermediate in SimRep.

Another feature from the leadership literature is the relative differences in contribution of the leader as the first mover and the subsequent contributions of the followers. For example, works by Arbak & Villeval (2013), Cappelen et al. (2016), and Gächter & Renner (2004 & 2018) show that followers' contributions are consistently below the contribution made by their leaders. Based on the findings from these leadership experiments, group members in *RepFirst* are expected to contribute either the same number or fewer tokens than their representatives. To determine whether the representative or group members play a bigger role in providing the public good, we will calculate the effort share. It will be calculated by taking the ratio between the effort of the representative and the sum of effort plus average contribution. The effort share in *RepLast* is expected to be affected by the decision sequence. As contributions from group members in *RepLast* are expected to be low, the representative in this treatment as the second mover is expected to contribute either the same number or fewer tokens than the group members.

Hypothesis 3: The effort share is highest in RepFirst, lowest in RepLast, and intermediate in SimRep.

4.5 Experimental Design

Experimental sessions were conducted at the University of Nottingham in experimental laboratories administered by the Centre for Decision Research and Experimental Economics (CeDEx). Subjects were recruited from a pre-existing pool of student subjects. This experiment involved participation of 174 students from various areas and levels of study. Sessions were implemented using zTree experimental software (Fischbacher, 2007). Each subject was assigned to a computer cubicle. Before a session started, the experimenter read the instructions. Each subject also received a copy of the instructions for reference. Instructions can be found in Appendix A. After reading the instructions, subjects were required to answer three control questions to ensure their they had understood the instructions and the incentive structure. Then subjects were assigned at random into groups of 3 and had complete anonymity from other group members.

Subjects were told that in each group, there would be a subject who could assign tokens to a Group Investment Account (GIA) and two subjects who could assign tokens to a Group Project (GP). Their roles were assigned at random. The representative in each group was identified as '*Member B*' while the non-representative group members were identified as '*Members A1 and A2*'. Subjects were informed that there would be 20 decision rounds and their roles would be fixed during the duration of the experiment from the beginning (partner design). At the beginning of each decision round, each subject, regardless of role, would receive 10 tokens as endowment and tokens that were not allocated to GIA or GP would be allocated to each subject's Individual Project (IP). This experiment uses a between-subject design, in which subjects within a session only participated in one treatment.

The type of information made available in each round before decision-making was varied according to treatment. In the *RepLast* treatment, subjects in the representative's role received information on the number of tokens that group members had allocated to the GP. In the *RepFirst* treatment, the two group members received information on the representative's allocation of tokens to the GIA before choosing their contributions. Subjects in the *SimRep* treatment did not receive any information on effort or contribution before making their decisions. At the end of each round, subjects received information on: i) the total allocations made to GP and GIA, ii) the implemented multiplier value, iii) the value of GP, and, iv) their total earnings, comprised of earning from GP and earning from IP.

The multiplier is determined by the number of tokens that the representative places in GIA. As explained in Section 3.5, the multiplier is given by $M^* = M_0 + ae_j$. M_0 is set to be 1.2 and a is 1 with e_j corresponding to the number of tokens allocated by the representative to GIA. M^* for each group is dependent on the representative's effort and is derived by the formula: $1.2 + [1 * \left(\frac{effort}{10}\right)]$.[30] The multiplier value in each decision round ranged from 1.2 to 2.2, according to the number of tokens that the representative allocated to the GIA. A multiplier of 1.2 results if the representative did not exert any effort to the GIA; a multiplier of 2.2 results if the representative has allocated all her/his effort tokens to the GIA. The maximum number of tokens that could be in the GP was 20. This is a socially optimal outcome. The value of GP was

[30] Effort and contribution need to be divided by 10 in the implementation of the game. In the Section 3 above, endowment equals to 1, and effort and contribution are continuous variables. In the experiment, endowment equals 10 and effort and contribution are discrete variables, with possible values of 0, 1, …,10. So 1 token in the experiment is equivalent to 0.1 units of value in Section 3.

derived by multiplying the number of tokens in GP by the value of multiplier. Everyone regardless of her/his role in the group earned an equal share from the GP. Earnings from 20 rounds were accumulated and at the end of the 20th round; accumulated tokens were converted to Pound Sterling at a rate of 20 tokens equal to £1. Each session lasted for about one hour and on average subjects earned £13.91 with earnings ranging from £10.44 to £17.78, including a show-up fee of £3.

The number of subjects and 3-person groups involved in this experiment is in Table 4.1.

Table 4.1. Number of individual subject (and group) observations by treatment

	RepFirst	*RepLast*	*SimRep*
Number of Observations	57 (19)	57(19)	60 (20)

Note: Figures in parentheses are the number of groups in each treatment.

4.6 Experiment results

4.6.1 Summary statistics

Before we discuss the findings that are related to the hypotheses above, we examine the summary statistics on players' decisions. As there are two group members in each group, the main analysis will only utilise the average contribution values[31].

[31] The summary statistics of Players *i*'s decision as an individual are shown in Table 3.1A of this chapter's Appendix. We found marginally significant differences in contribution decision among players *i* in *RepLast* treatment. We have no reason to believe that labelling of players *i* as A1 and A2 caused that difference as, i) no such difference could be observed in *SimRep* and *RepFirst* treatments, and ii) if labelling A1 could produce 'leadership' contribution, the average contribution of players labelled as A1 should be larger than player A2 but we observed the average of player A2 contributions are bigger than A1.

Table 4.2. Effort and contributions in Round 1 and across 20 rounds in tokens

		R-1		A20	
Treatment	**Obs.**	**Rep. effort**	**Group members' contribution**	**Rep. effort**	**Group members' contribution**
SimRep	20	5.05	5.98	4.23	4.33
		(3.86)	(3.53)	(3.49)	(3.67)
RepFirst	19	5.16	4.26	3.41	3.17
		(3.78)	(4.17)	(3.39)	(3.38)
RepLast	19	3.42	3.87	2.27	2.20
		(3.40)	(3.56)	(2.57)	(2.45)

Note: Representative's effort refers to the number of tokens she/he allocated to the Group Investment Account (GIA). Average group members' contribution is calculated by taking the average of group members' contributions. Figures in parentheses are standard deviations.

Subjects in the role of representative and group members in all treatments, on average, have allocated positive numbers of tokens to generate public goods for the group from the beginning to the end of 20 rounds. In the first round, representatives in *RepFirst* exerted more tokens to improve the multiplier then the representatives in *SimRep* and *RepLast*. However, after experiencing 20 decisions, representatives in *SimRep* on average allocated more effort than representatives in *RepFirst* and *RepLast*.

On the other hand, group members in *SimRep* contributed more to PG than those in *RepFirst* and *RepLast* in Round 1(R-1) and this ordering of contribution size is still the same when it is compared to average contribution after 20 rounds (A20). In all three treatments, the average number of tokens allocated by representatives and group members to the public good declines sharply at the end of the experiment.

The average decisions made in groups in every treatment and rounds are shown in Figures 4.2 and 4.3.

Figure 4.2. Average Effort over 20 Rounds

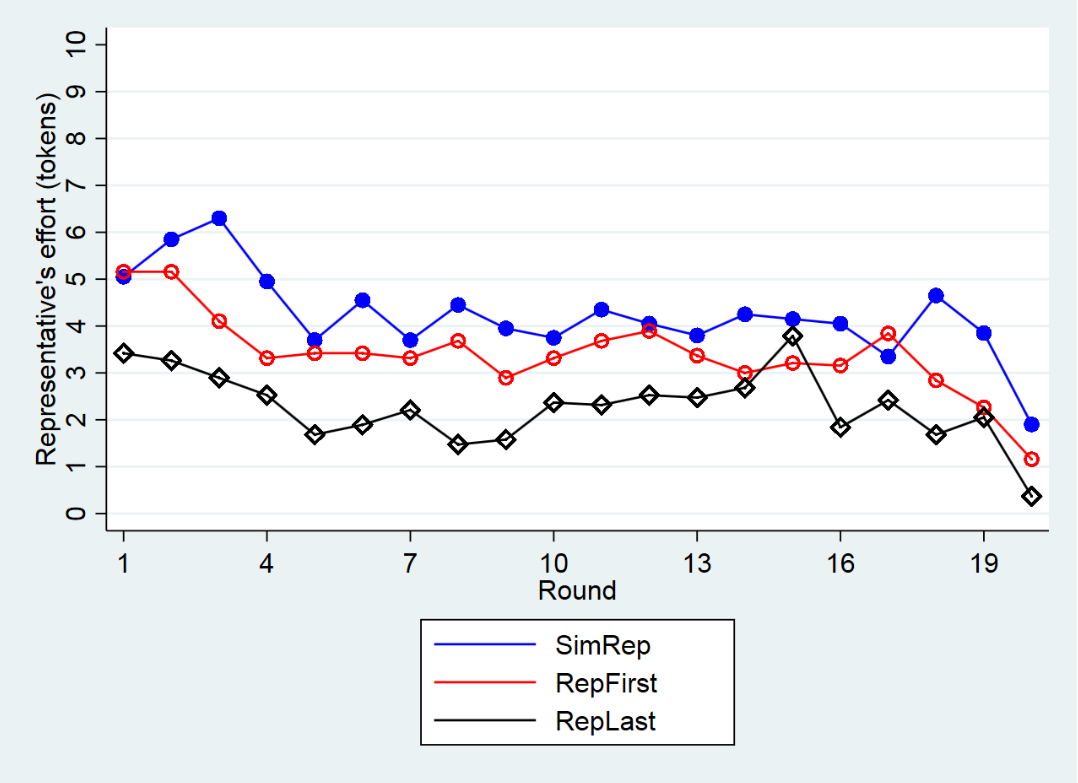
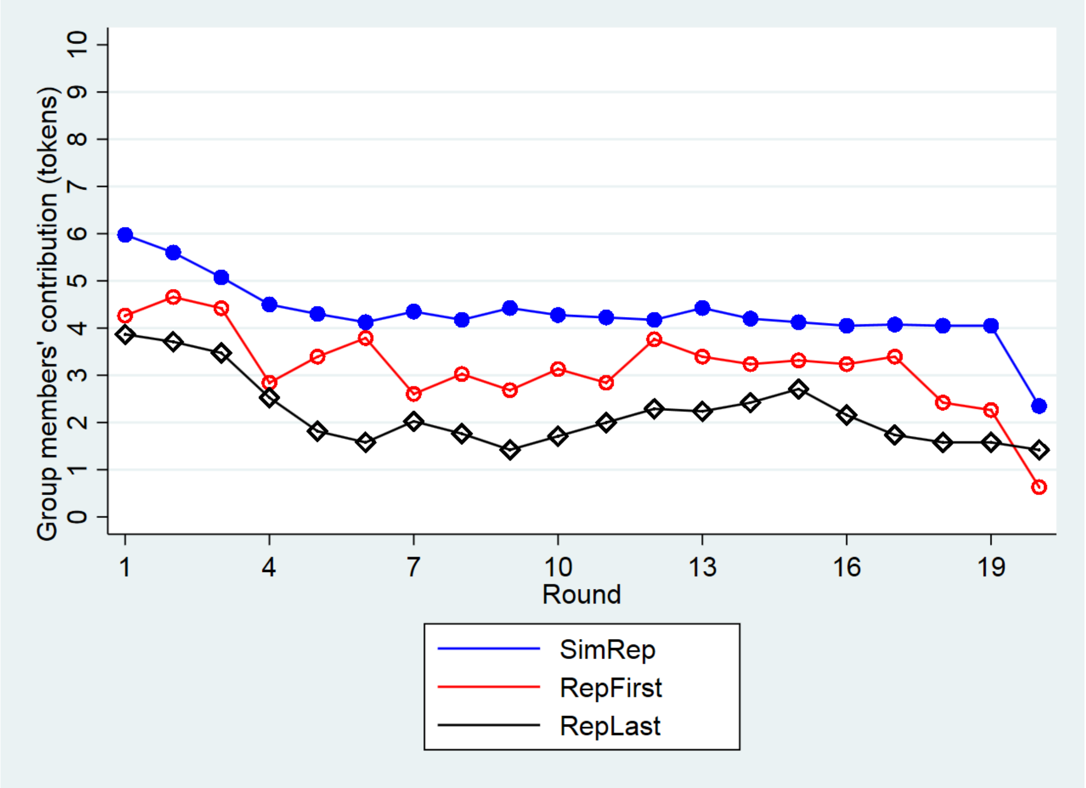


Figure 4.3. Average Contributions over 20 Rounds



Figures 4.2 and 4.3 have several consistent features. First, there is a clear ranking among treatments. Both representatives and group members in *SimRep* in general allocated more tokens to the PG compared to *RepFirst* and *RepLast*. This pattern started off in R-1 and persisted until the experiment ended at R-20, except for a few instances where *RepFirst*'s representatives on average exerted similar effort level to those in *SimRep*. Second, the effort and contribution levels by representatives and group members in the initial round (R-1) were close to the mid-point value between Pareto-efficiency and free riding values, consistent with the general findings in PGG as surveyed by Ledyard (1995). Third, after a short period of decline at the start of the game, effort and contributions stabilised until the final decisions round. The periods of stabilization found in all three treatments are not commonly found in the general PGG and leadership literature; i.e. contributions typically decline continuously until the end of the experiment. Furthermore, the period of stabilization in levels of effort and contribution is marked by approximately equal levels of effort and average contribution. These findings will be explored in the subsequent sections. Finally, all treatments above show the end game effect that has been frequently found in PGG literature in which contributions collapse close to zero in the final round.

4.6.2 Representative's efforts

Hypothesis 1 proposed that representatives in *RepFirst* will exert more effort compared to those in *SimRep* and *RepLast* treatments. It also predicted that representatives in *SimRep* exert less effort than those in *RepFirst* but more effort than those in *RepLast*.

In the initial round, R-1, as shown in Table 4.2, representatives in *RepFirst* did exert more effort than other treatments, as predicted by Hypothesis 1. However, as the game progressed and as shown by Figure 4.2, the average tokens used as effort in *RepFirst* was surpassed by tokens used by representatives in *SimRep* beginning from R-2. After 20 rounds, the average tokens allocated by representatives in *RepFirst was* 3.41 while those in *SimRep* exerted 4.23 tokens. On the other hand, representatives in the *RepLast* have consistently exerted the least number of tokens from the start of the experiment.

The Kruskal-Wallis test (K-W) found that there are no statistically significant differences in effort in the three treatments, measured by Kruskal-Wallis (K-W) test in the first period (K-W: 2.922, *p-value = 0.2320*), and the averages after twenty rounds (K-W: 4.321. *p-value = 0.1153*). We measured also measured the differences in the decisions made in a pair of treatments. The Mann-Whitney test (M-W) also reported no statistically significant differences across treatment in representative's effort in the Round 1 (R-1) as stated in Table 4.3. On the other hand, the same test found a statistically significant difference in the behaviour of representatives in *SimRep* and *RepLast* after 20 decision rounds. The Kolmogorov-Smirnov (K-S) test for equality of distribution in decisions between treatments found that representatives in all treatments exhibited similar distribution of efforts in R-1, and across 20 rounds.

Table 4.3. Mann-Whitney rank-sum and Kolmogorov-Smirnov tests between treatments for efforts

		Mann-Whitney		*Kolmogorov-Smirnov*	
Treatments	**Observations**	**R-1**	**A20**	**R-1**	**A20**
SimRep – RepFirst	20-19	-0.071 [0.9132]	0.970 [0.3322]	0.1429 [1.000]	0.4286 [0.541]
SimRep – RepLast	20-19	1.418 [0.1563]	2.080** [0.0375]	0.5000 [0.308]	0.6250 [0.108]
RepFirst – RepLast	19-19	1.545 [0.1225]	1.066 [0.2863]	0.6250 [0.108]	0.3036 [0.882]

Figures in brackets are p-values. ***Significant at 1 percent; ** significant at 5 percent; * significant at 10 percent.

Result 1: Average effort by representatives in SimRep is higher than by representatives in RepLast. There is no statistical evidence that representatives in SimRep exerted more effort than those in RepFirst or that representatives in RepFirst exerted more effort than those in RepLast.

When each representative is examined individually, there is heterogeneity in their decisions over the 20 rounds. In *RepFirst* and *RepLast*, a majority of decisions are on exerting zero effort tokens. On the other hand, more than 20 percent of decisions in *SimRep* and *RepFirst* are in the form of full effort while the percentage of full effort in *RepLast* is only 8.2 percent, i.e. 10 tokens used as effort. In all three treatments, more than two-thirds of representatives' decisions over the 20 rounds are either the Nash equilibrium strategy of zero token or the socially optimal strategy of 10 tokens. The breakdown of representatives' decisions over 20 rounds can be found in Table 4.4. The statistical test in Table 4.4 shows that there are statistically significant differences between treatments. For group-level decision over time, refer to Figures 4.1A, 4.2A and 4.3A in this chapter's Appendix.

Table 4.4. Breakdown of representatives' decisions over 20 rounds in percentage

	SimRep	RepFirst	RepLast	K-W test (*p-value)*
Zero tokens	41.5 (166)	53.4 (203)	58.2 (221)	17.32*** (0.000)
10 tokens	28.5 (115)	21.6 (82)	8.2 (32)	24.18*** (0.000)
Number of Decisions	400	380	380	

Figures in parentheses are the actual numbers of decisions or the p-value for statistical test.

4.6.3 Group members' contributions

Hypothesis 2 stated that group members in *RepFirst* will contribute more toward the PG than those in *SimRep* and *RepFirst*. Recall from Table 4.2 that in R-1, group members in *SimRep* contributed 5.975 tokens (*Standard Deviation=2.47)*, in *RepFirst* contributed 4.26 tokens (*SD=3.37*) and those in *RepLast* contributed 3.86 tokens (*SD=2.74*). This contribution order also persisted as decision rounds progressed as showed in Figure 4.3. The highest contributions to the PG are made by group members in *SimRep*, followed by those in *RepFirst* and *RepLast*.

Is there any detectable treatment effect among group members' contributions?

A K-W test conducted to compare contributions across the three treatments found statistically significant differences both for the first round (R-1), K-W test: 7.324**(*p-value=0.0257*), and across twenty rounds, K-W test: 6.341** (*p-value = 0.0420).*

Table 4.5. Mann-Whitney rank-sum and Kolmogorov-Smirnov tests between treatments for contributions

		Mann-Whitney		*Kolmogorov-Smirnov*	
Treatments	**Obs**	**R-1**	**A20**	**R-1**	**A20**
SimRep - RepFirst	20-19	1.385 [0.1660]	1.321 [0.1866]	0.3711 (0.137)	0.2658 [0.497]
SimRep - RepLast	20-19	2.495** [0.0126]	1.770* [0.0767]	0.5368*** [0.007]	0.3474 [0.190]
RepFirst - RepLast	19-19	0.294 [0.7685]	0.555 [0.5790]	0.3158 [0.300]	0.2632 [0.526]

Figures in brackets are p-values. ***Significant at 1 percent; ** significant at 5 percent; * significant at 10 percent.

The K-W tests could only detect differences in contributions between the three treatments at once but not a pair of treatments to accept or reject Hypothesis 1. Table 4.5 compares contributions between pairs of treatments. The median-based M-W tests detected statistically significant differences between *SimRep* and *RepLast* treatments in R-1 and across 20 rounds, i.e. group contributions to PG by those in *SimRep* is distinguishable from *RepLast*. However, using the two samples distributions K-S test, the distinguishable contributions differences can only be detected in R-1 between treatments *SimRep* and *RepLast*.

Result 2: Group members in SimRep contributed more tokens to the public good than those in RepLast. However, no effect can be detected when SimRep is compared with RepFirst. Contributions by those in RepFirst are also indistinguishable from those in RepLast.

Given Result 2, Hypothesis 2 cannot be accepted as we are not able to establish a contribution ranking with group members in *RepFirst* contributing the most, followed by those in *SimRep* with the least contribution coming from those in *RepLast*.

Similar to representatives' decisions, more than two-third of individual decisions made by group members were either in a form of Nash-equilibrium or socially optimum strategies for all treatments, indicating heterogeneity in decisions across 20 rounds and all groups. More than half of the decisions made in *RepFirst* and *RepLast* involved refusing to contribute, i.e zero tokens, while this only affects a little more than a third of *SimRep*, hence increasing the average contributions made by subjects in this treatment across 20 rounds. Table 4.6 shows the breakdown of group members' decisions across 20 rounds.

Table 4.6. Breakdown of group member's decisions over 20 rounds as percentages

	SimRep			RepFirst			RepLast		
	Ind	*Both GM*	*One GM*	*Ind.*	*Both GM*	*One GM*	*Ind.*	*Both GM*	*One GM*
Zero tokens	38.8 (310)	28.3 (113)	10.5 (42)	59.6 (453)	52.6 (200)	7.11 (27)	58.03 (441)	48.2 (183)	10.0 (38)
10 tokens	28.4 (227)	22.5 (90)	6 (24)	22.5 (167)	17.6 (67)	4.47 (17)	9.21 (70)	6.05 (23)	3.16 (12)
Number of Decisions	800	400	400	760	380	380	760	380	380

Columns labelled Ind refer to decisions by each group member as an individual without considering them as a pair of group members in a group. Columns label Both GM refers to the incidence that group members arrived at the same decisions of contributing nothing or everything when their decisions are viewed as a pair in a group. One GM refers to the incidence that one group member in a pair decides to contribute nothing or everything. Figures in parentheses are actual numbers of decisions.

Table 4.6 also reports the incidences when both group members as a pair contribute zero or 10 tokens and when one of them free rides or fully cooperates. Overall, the incidences in which both of group members contributed no tokens or all tokens are still prominent in all treatments, indicating an attraction to the extreme points, 0 and 10 by everyone within a group. For example, 52.6% of group members' collective decisions in *RepFirst* are non-contributing and 22.5% of all collective decisions are full contributions. Contributions in 'Both GM' at zero or ten tokens are consistently higher than those in columns 'One GM'. For example, 22.5% of pairs in *SimRep* chose to contribute everything compared to 6% of these pairs have only one member contributing 10 tokens. If all decisions were made independently, the probability of 'Both GM' contributing all tokens would be 0.008 and the probability of 'One GM' contributing all tokens would be 0.16[32]. The data in Table 4.6 suggests that there is a very strong correlation between the two group members' decisions in each treatment[33]. In principle, there are two complementary mechanisms that could induce this kind of correlation; i) a common time trend in the behaviour of individuals in all groups, and ii) a tendency for homogeneity of behaviour within groups. Which of these effects that was primarily responsible will be investigated further in the section below.

The lack of significant differences between treatments in effort and contributions showed in Tables 4.3 and 4.5 is not surprising given the size of standard errors in Table 4.2. The potential explanations include a combination of i) consistent ranking of the three treatments over time, as shown in Figures 4.2 and 4.3, and ii) decisions' path dependency, i.e. a lot of variation between groups but little variation over time within groups.

4.6.4 Complementarity between effort and contributions

We first look at the PG outcomes from representatives' efforts and group members' contributions before examining whether representatives or group members decisions' drive the outcome. PG size relies on the complementarity between representative's effort and group members' contributions. A PG size is maximised when everyone allocates all their endowment, 10 tokens, to the PG. Using the game parameters, the

[32] There are two independent decisions in each round, Group Members A1 and A2. Each is presented with 11 options between 0 to 10. This brings the probability of both group members contributing all to 1/121. In the case of 'One GM' or one group members contributing everything but the other contributing any number of tokens from 0 to 9, the probability of 'One GM' is 20/121, assuming that decision of Group Members A1 and A2 are independent from each other and there is a 10/121 chance that A1 contributes 10 and A2 contributes 0, and a 10/121 chance of the opposite.
[33] Pairwise correlations of decisions for all decisions and all rounds. *SimRep:* 0.7861***(*p-value = 0.0000), RepFirst:* 0.7995***(*p-value = 0.0000)*, *RepLast*: 0.6935***(*p-value = 0.0000).*

maximum value of PG is 44 tokens, in which 20 contribution tokens are multiplied by 2.2, a value that has been adjusted through the representative's 10 effort tokens. On the other hand, there won't be any PG if both group members refused to contribute despite the adjustment to the multiplier through representative's effort tokens. Table 4.7 summarises the public good size by treatments for R-1 and across 20 periods.

Table 4.7. Public good size in R-1 and across 20 rounds in tokens

Treatment	Obs.	Public good size	
		R-1	A20
SimRep	20	20.00 (9.61)	16.89 (16.24)
RepFirst	19	16.06 (14.37)	12.70 (14.63)
RepLast	19	12.08 (8.39)	7.83 (9.96)

Note: Figures in parentheses are standard deviations.

The data in Table 4.7 reflect the findings about representatives' efforts and group members' contributions in the earlier section. Groups in *SimRep* have produced PG with larger sizes than those in *RepFirst* and *RepLast* in accordance to the treatment's rankings in Sections 6.2 and 6.3. Results from Table 4.7 also show the decline of public good size after R-1, hence a lower average PG size across 20 rounds in comparison to its size in R-1.

In this section, we examine the value of the effort share, using this to investigate whether representative, or the 'leader' motivates allocation for the provision of the PG.

The effort share in each group of three is calculated in this manner[34];

$$Effort\ share\ = \frac{Representative's\ effort\ (tokens)}{Effort +\ Average\ group\ members\ contribution\ (tokens)}$$

Effort share for each group takes a value between 0 and 1. In the event that the representative's effort is equal to the averages of the group members' contributions, the effort share is 0.5. Any value above 0.5 indicates that the representative allocates more effort tokens to the PG than the average of group members' contributions. On

[34] Effort share is calculated in the formula shown above instead of dividing effort by average contribution. This is to remove the need to drop observations for groups in which group members contribute zero tokens since any numerator divided by zero is undefined.

the other hand, a value less than 0.5 signals that the average of group members' contributions was greater than the effort exerted by the representative.

Figure 4.4. Effort share by rounds

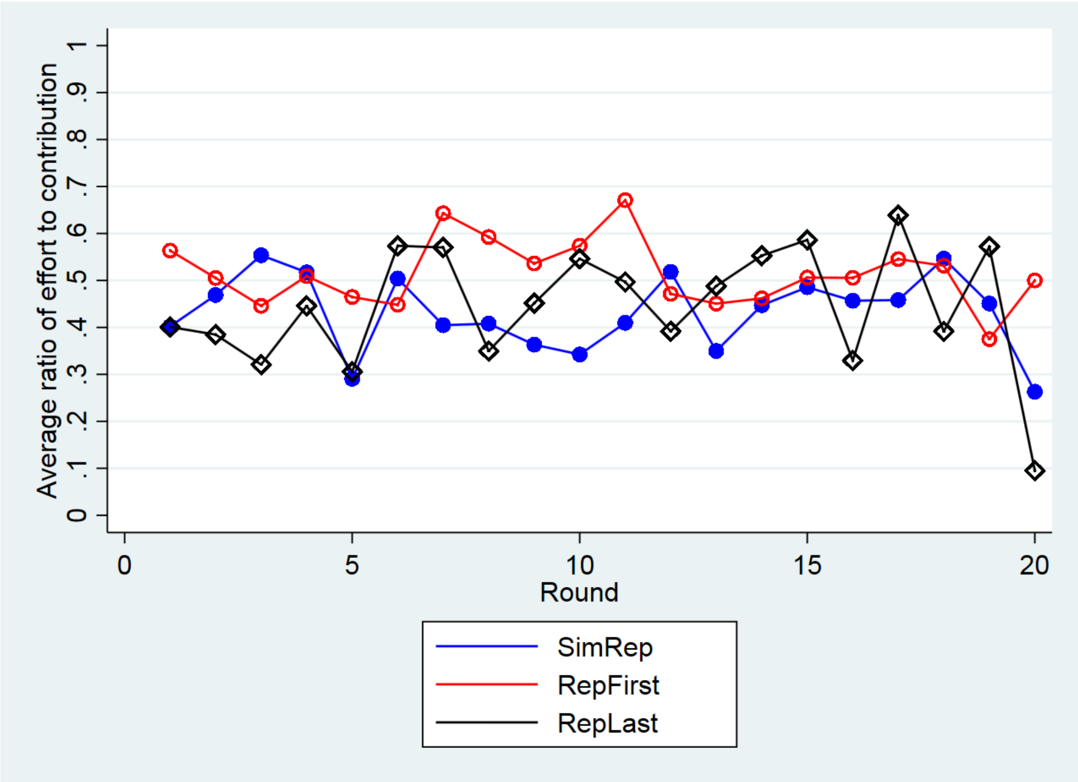


Figure 4.4 shows effort shares over time. In the first period, representatives in the *RepFirst* clearly exerted more tokens as effort than their group members. As the game progressed, there are periods in which representatives exerted more effort than group members but in general, the line is close to the 0.5 equality benchmark. The end game effect resulted in shirking by representatives in *SimRep* and *RepLast* while both representatives and group members in *RepFirst* ended the game with equality in effort and contribution.

Table 4.8 shows the summary statistics of effort share in the three treatments.

Table 4.8. Effort share in round 1 and across 20 rounds

Treatment	**Obs.**	**Mean Effort Share in R-1**	**Mean Effort Share across 20 rounds**	Kruskal-Wallis test	
				Effort Share in R-1	**Effort Share across 20 rounds**
SimRep	20	0.402	0.453		
		(0.278)	(0.177)		
RepFirst	19	0.563	0.537	0.469	4.067
		(0.321)	(0.198)	[0.2910]	[0.1309]
RepLast	19	0.401	0.421		
		(0.324)	(0.176)		

Figures in parentheses are standard deviations in the ratio columns and p-values in the Kruskal-Wallis test columns. ***Significant at 1 percent; ** significant at 5 percent; * significant at 10 percent.

In R-1, the representatives in *RepFirst* allocated more tokens to the public good than their respective group members. On the other hand, representatives in *SimRep* and *RepLast* allocate fewer tokens to the PG than their group members. This pattern could still be observed across 20 rounds. A notable feature in Table 4.8 is that as the rounds progress, the effort shares for all treatments move closer towards 0.5, the point where contributions and effort are equal. There is no statistically significant difference in effort share across treatments as measured by K-W test, indicating that in R-1 and across 20 rounds that representatives' effort in relative to group members' contributions not statistically distinguishable.

Table 4.9 contains the results from non-parametric tests that compare a pair of effort share treatment.

Table 4.9 Mann-Whitney rank-sum and Kolmogorov-Smirnov tests between treatments for effort shares

		Mann-Whitney		*Kolmogorov-Smirnov*	
Treatments	**Obs**	**R-1**	**A20**	**R-1**	**A20**
SimRep – RepFirst	20-19	-1.566 [0.1174]	-1.222 [0.2216]	0.2921 [0.377)	0.3237 [0.259]
SimRep - RepLast	20-19	-4.000 [0.6889]	1.169 [0.2422]	0.2529 [0.599]	0.4056* [0.089]
RepFirst - RepLast	19-19	0.993 [0.3208]	1.824* [0.0681]	0.2632 [0.563]	0.3506 [0.205]

Figures in brackets are p-values. ***Significant at 1 percent; ** significant at 5 percent; * significant at 10 percent.

The M-W statistics in Table 4.9 report that there is a statistically significant difference in effort share between *RepFirst* and RepLast as representatives in *RepFirst* did more than their group members compared to those in *RepLast*. This is consistent with the findings from prior leadership and public good game literature, that the second mover tends to rent-seek from the first mover. There is no statistical difference in effort share when comparisons are made between *SimRep* and *RepFirst*, and between *RepFirst* and *RepLast*, indicating representatives in *SimRep* that allocate more (less) tokens are not so different from those in *RepLast (RepFirst).* On the other hand, just by examining the equality of distribution share via K-S statistics, I found representatives in *SimRep* contribute more than their group members than what representatives in *RepLast* have done to their group members.

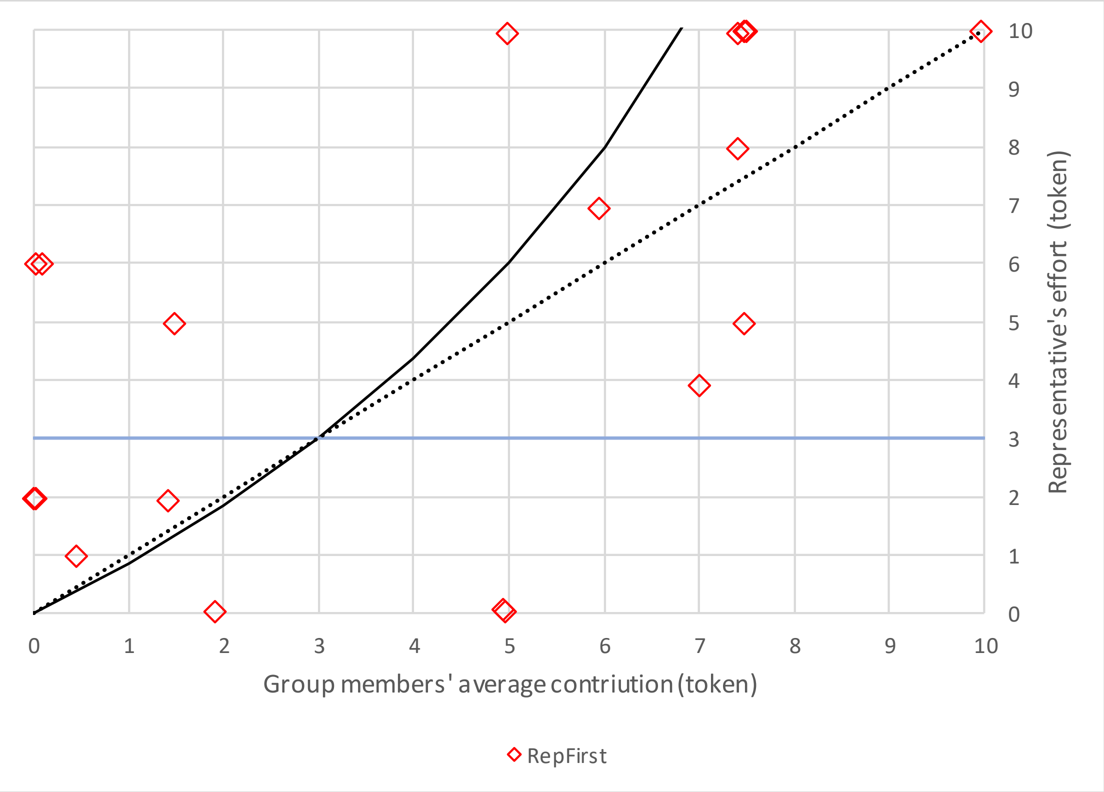
Hypothesis 4 could partly be accepted. We have found a difference (significant at the 10 per cent level) between the effort shares in *RepFirst* and *RepLast*. However, we are not able to reach firm conclusions about effort shares in *SimRep* relative to *RepLast*.

Result 3: There is some indication that effort share of RepFirst is higher than RepLast across 20 rounds. There is no statistically significant difference between effort share of SimRep and other treatments.

Decisions in the first round (R-1) capture the pure effect of reciprocity or complementarity, like the one-shot PGG implemented by Gächter & Renner (2004) for *RepFirst* and Cox et al. (2013) for *RepLast*. Data from R-1 capture 'pure' reciprocation by representatives in *RepLast* and by group members in *RepFirst*. There is no scope for this type of reciprocation in *SimRep*.

To illustrate the reciprocity in *RepFirst* and *RepLast* in R-1, we plot decisions made in R-1 using the template from Figure 4.1. Recapping from Figure 4.1, combinations of effort and contribution on the 45-degree line can be interpreted as reflecting an intention by the representative (in *RepLast*) or group members (in *RepFirst*) to reciprocate to contribution or effort of the other player(s) and to equalise earnings.

Figure 4.5. Combination of effect and average contribution at group-level for RepFirst in R-1



Group members reciprocation (or lack of it) towards representative's effort for all groups in *RepFirst* is shown in Figure 4.5. There are more groups ending up above the dotted line indicating that representatives are exerting more effort, measured by tokens allocated to GIA, than the group members contribution to PG. There are more groups in Region III, showing that in R-1 representatives in *RepFirst* play a role in motivating group members to maximise public good provision at personal cost. Effort and contributions in *RepFirst* are highly correlated indicating that group members reciprocated their representative's effort (*Pair-wise correlation=0.590; p-value = 0.0078*). Only one group managed to reach the socially optimal outcome, yet there are 5 groups with representatives that exerted full effort. This could indicate that the reluctance by group members to contribute could not be blamed on representatives' lack of engagement but on group members' willingness to cooperate with the co-group members, since a group member could still free ride on the other co-group member's contribution.

Figure 4.6. Combination of effort and average contribution at group-level for RepLast in R-1

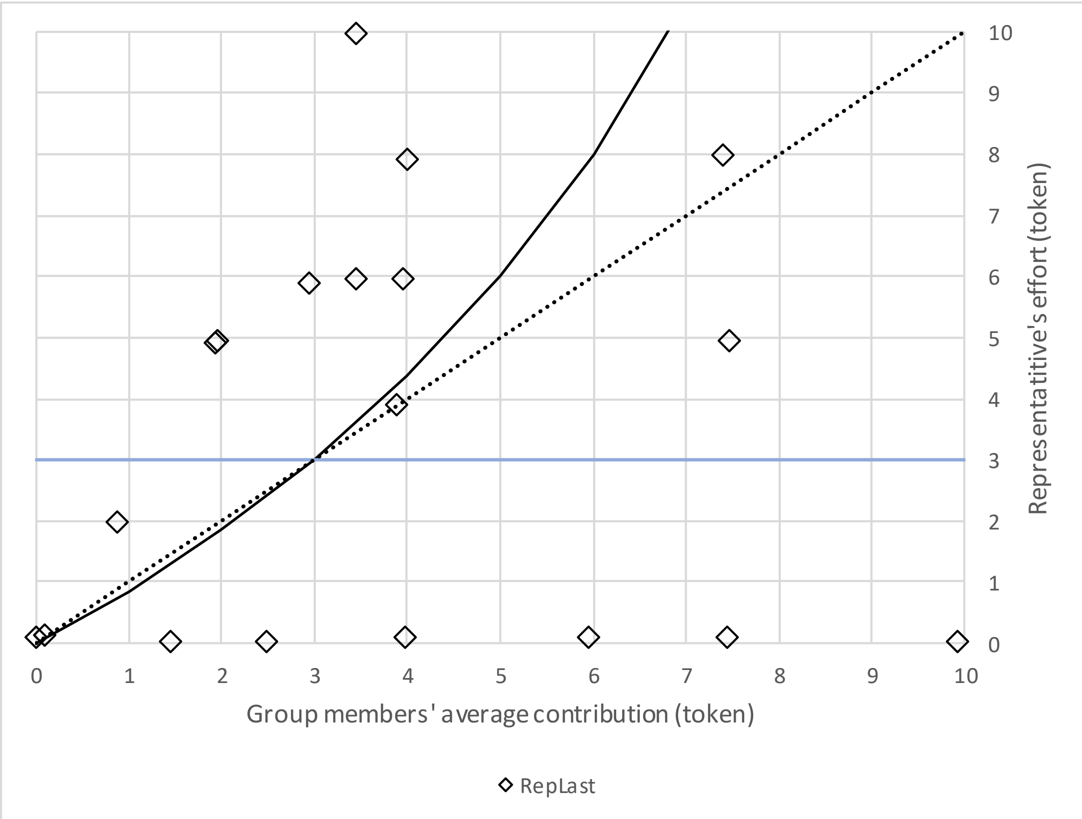


Figure 4.6 shows the combinations of effort and decisions made by groups in *RepLast* in R-1. No group ended up at the socially optimal point while a share of them are concentrated at the Nash-equilibrium point of zero effort and contributions. These Nash-equilibrium decisions were absent in treatments *RepFirst* and *SimRep*. Effort and contribution in *RepLast* were not correlated (*Pair-wise correlation=0.0836; p-value = 0.7336*). The lack of correlation in decisions may suggests representative's unwillingness to reciprocate group members' contributions by engaging in rent-seeking.

Figure 4.7. Combination of effort and average contribution at group-level for SimRep in R-1

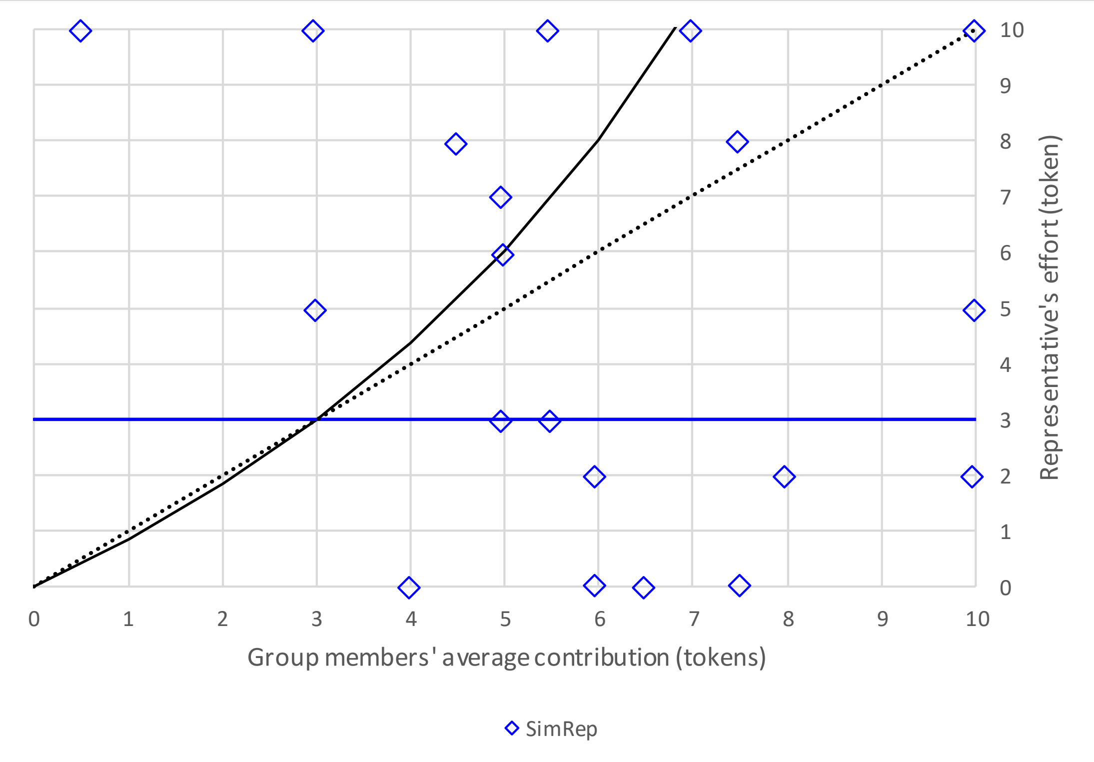


Figure 4.7 plots the combination of effort and average contributions for groups in *SimRep* in R-1. This is the pure effect of effort by representative and cooperation by followers as both types of players have to decide simultaneously without knowing the willingness of others to produce the PG. Decisions in Figure 4.7 are scattered in Regions II, III and IV as groups have been formed at random and until the end of R-1, no one has had information about the behaviour of any co-players. There are about as many observations below and above the 45-degree line with no correlation found between effort and contribution in R-1 (*Pairwise correlation = -0.2098, p-value =0.3745*). From Figure 4.7, we observe that one group is able to reach the socially optimum outcome and no group is in the Region 1 of mutual losses or at the Nash-equilibrium point. Region IV hosted the most groups outcomes showing the representatives gain from the interaction, and this resulted in smaller earnings for the respective group members.

After R-1, group members and representatives learn the outcomes of their decision and can infer what other players have done. This allows the second mover(s) in

RepFirst and *RepLast* treatments to reciprocate decisions made by the first mover(s) in these treatments.

Since the composition of groups and subjects' roles are fixed for the 20 rounds, it is natural for subjects in all treatment to adjust their effort or contributions once R-1 concluded. For an individual subject, there is a pull to decide based on the outcome from the previous round, for all treatments, and/or based on signal(s) from the first mover(s) for *RepFirst* and *RepLast.* Table 4.10 shows the pair-wise correlation between effort and average contribution for all treatments in 20 rounds.

Once subjects were informed about the outcome of R-1's decisions, decisions in the subsequent rounds started to show positive correlation between effort and contribution. In R-2 correlation is strongest among group in *RepFirst* while groups in *SimRep* and *RepLast* reported moderately positive correlations between effort and average contribution. The correlations get stronger as the rounds progress and, in some incidences, get close to 1 or perfect positive correlation showing that there is reciprocation between effort and contributions in groups.

This inter-round effect happened quickly among subjects in *SimRep* as by R-5, there is a strong positive correlation between effort and contributions, indicating that representatives and group members are reciprocating each other with in the same round even though subjects cannot signal to each other before deciding. Groups in *RepFirst* showed high positive correlations from R-2 onwards implying that groups can reach their reciprocation steady state quicker than other treatments with the assistance of a signal from the representative. Similarly, the inter-round effect between group members and representative also increased the correlation strength for groups in *RepLast.*

The changes in correlation strength over time shown in Table 4.10 suggest that there is a reciprocal relationship between the representative and group members for all treatments. For reporting on direct matching of representative and group members' decisions across treatments and rounds, refer to Table 4.4A of the Appendix.

Table 4.10. Pairwise correlation between effort and average contribution for 20 rounds

	SimRep	*RepFirst*	*RepLast*
R-1	-0.2098 (0.3745)	0.590*** (0.0078)	0.0836 (0.7336)
R-2	0.4386** (0.0530)	0.8364*** (0.000)	0.4907** (0.0329)
R-3	0.7506*** (0.0001)	0.7083*** (0.0007)	0.4820** (0.0366)
R-4	0.6594*** (0.0016)	0.8259*** (0.0000)	0.5212** (0.0221)
R-5	0.7506*** (0.0001)	0.8795*** (0.0000)	0.9310*** (0.0000)
R-6	0.8024*** (0.0000)	0.9121*** (0.000)	0.8434*** (0.0000)
R-7	0.8172*** (0.0000)	0.9264*** (0.0000)	0.4163* (0.0762)
R-8	0.8127*** (0.0000)	0.8636*** (0.0000)	0.8211*** (0.0000)
R-9	0.7817*** (0.0000)	0.8446*** (0.0000)	0.8357*** (0.0000)
R-10	0.8636*** (0.0000)	0.9160*** (0.0000)	0.8664*** (0.0000)
R-11	0.8541*** (0.0000)	0.8551*** (0.0000)	0.9382*** (0.0000)
R-12	0.9453*** (0.0000)	0.9294*** (0.0000)	0.9100*** (0.0000)
R-13	0.9593*** (0.000)	0.9188*** (0.0000)	0.8642*** (0.0000)
R-14	0.9828*** (0.0000)	0.8884*** (0.000)	0.9273*** (0.0000)
R-15	0.9802*** (0.0000)	0.9744*** (0.0000)	0.8068*** (0.0000)
R-16	0.9973*** (0.0000)	0.9510*** (0.0000)	0.8820*** (0.0000)
R-17	0.8687*** (0.0000)	0.7261*** (0.0004)	0.9663*** (0.0000)
R-18	0.8580*** (0.0000)	0.9140*** (0.0000)	0.9333*** (0.0000)
R-19	0.8001*** (0.0000)	0.9798*** (0.0000)	0.7485*** (0.0002)
R-20	0.5001** (0.0247)	0.6632*** (0.0000)	0.1909 (0.4336)

Figures in brackets are p-values. ***Significant at 1 percent; ** significant at 5 percent; * significant at 10 percent.

Figures 4.8 and 4.9 show scatterplots for all treatment at certain decision rounds. Figures 4.4A in the Appendix show scatterplots that illustrate the end game effect for all decisions made in the last round, R-20.

Figure 4.8.. Combinations of effort and average contribution at group level for R-2 to R-5

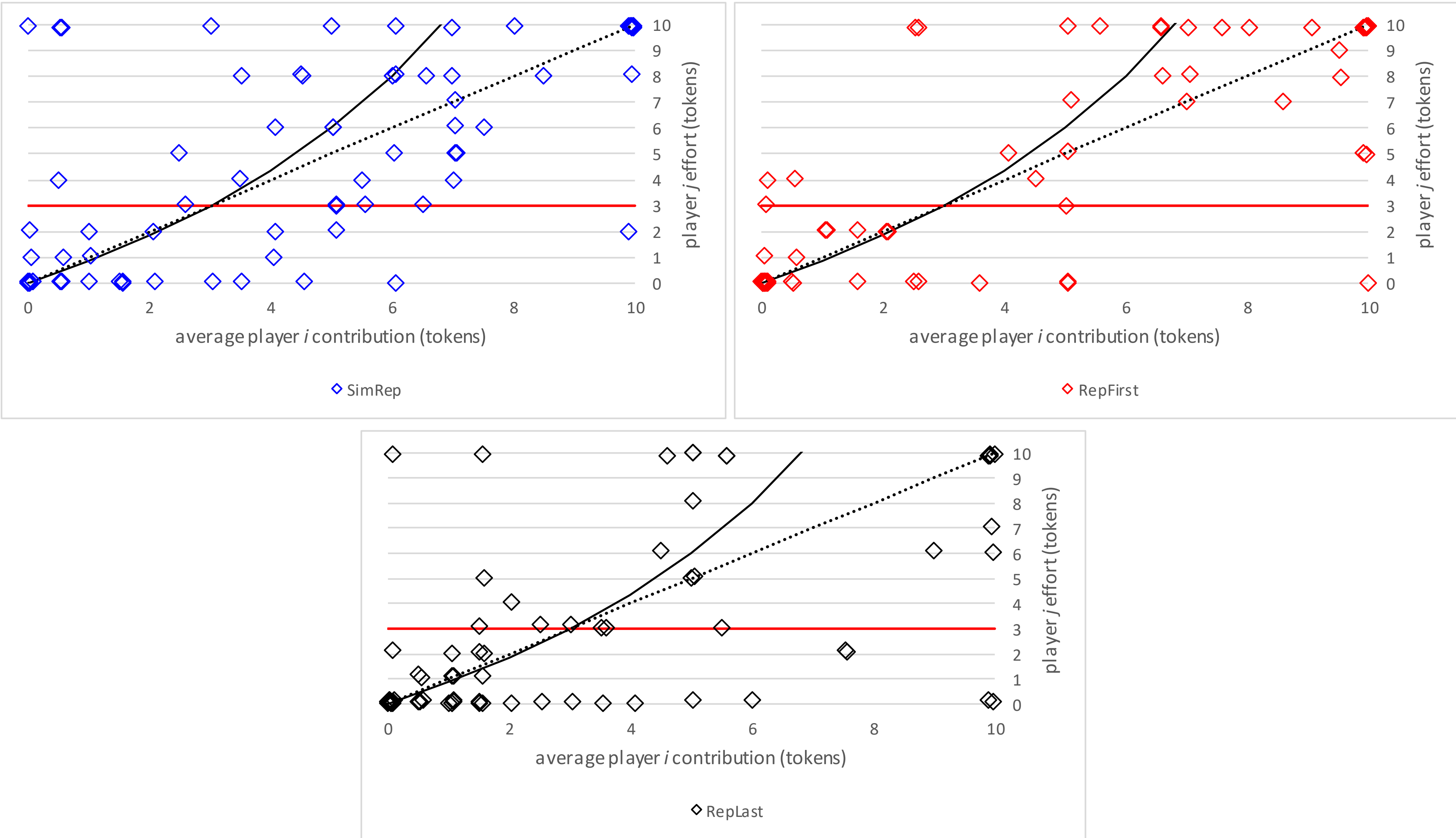
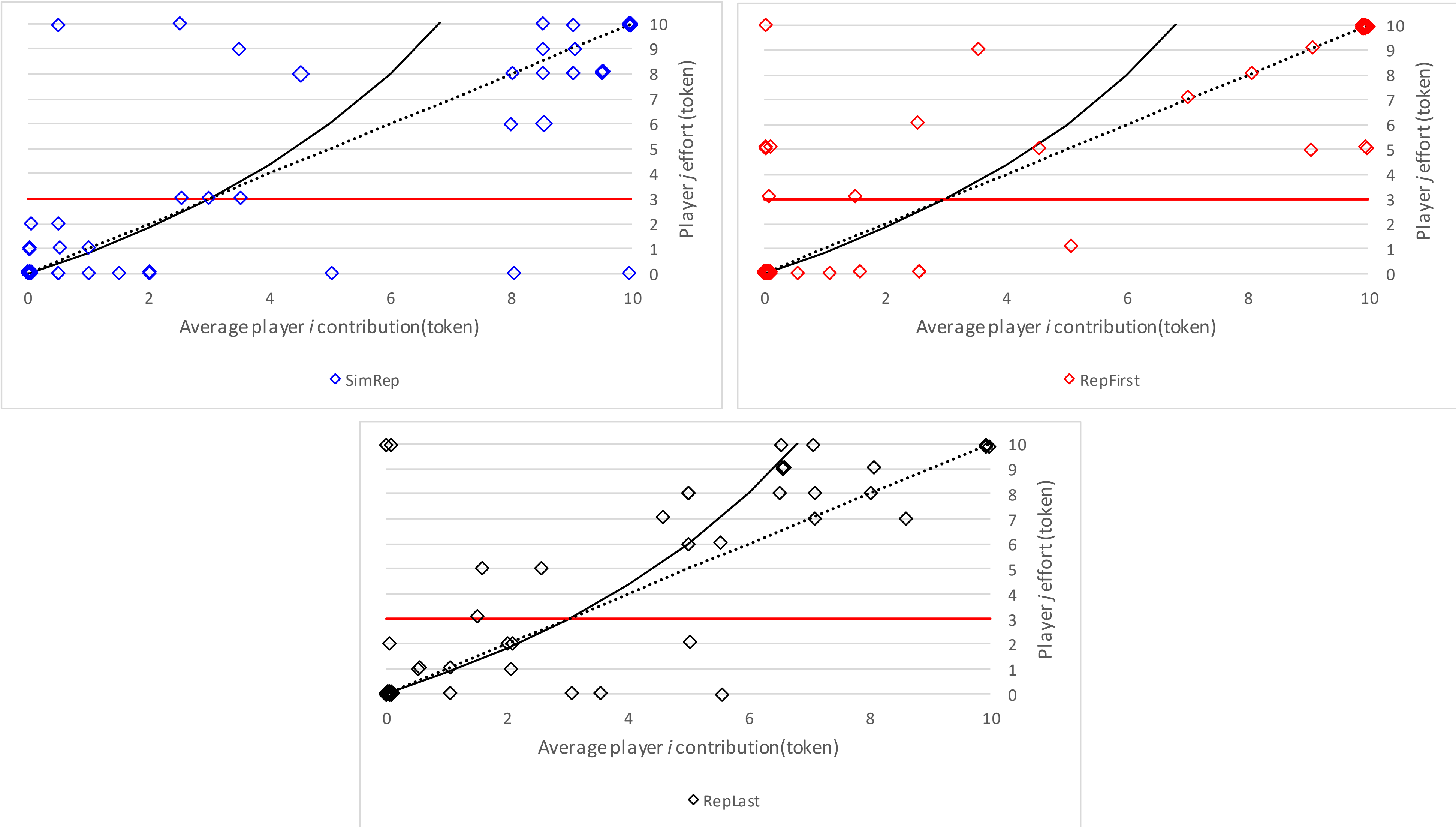


Figure 4.8 shows all decisions in the first 4 rounds after the initial round. Decisions for groups in *SimRep* are still scattered around the four regions, with group members benefiting more than their representatives. The difference between *SimRep* and *RepFirst* scatterplots could originate from the order sequencing, i.e. group members followed their representative leadership, and this resulted in more groups landing in Region III, i.e. both representative and group members benefitting from the public good. The *RepLast* scatterplot in Figure 4.8 illustrate the huge pull towards Region I or towards zero effort and contribution point.

Figure 4.9. Combination of effort and average contribution at group-level for R-14 to R-19



The scatterplots of decisions in Figures 4.9 that capture decisions made in rounds 14 to 19, in which decisions have stabilized after the early rounds and before the final round. First, there is an increasing tendency for points to be on the 45-degree line suggesting that both representative and group members matched each other's tokens allocation and as a result equalised each other's payoff from the public good. Third, there is increasing bifurcation towards the Nash-equilibrium (0,0) and socially optimal (10,10) points.

Result 4: There is tendency within groups to equalize effort and contributions overtime. It happened quicker for RepFirst due to the distinguished role of the representative as a leader in the group. After several rounds, more equalizing decisions appear among groups in SimRep and RepFirst.

Table 4.11. Incidences where efforts and contributions matched in percentage after twenty rounds

	SimRep			*RepFirst*			*RepLast*		
	Nash (0,0)	Social (10,10)	Recip.	Nash (0,0)	Social (10,10)	Recip.	Nash (0,0)	Social (10,10)	Recip.
Total 20 rounds	25.0 (100)	21.0 (84)	0.5 (2)	45.8 (174)	15.5 (59)	5 (19)	44.7 (170)	3.9 (15)	2.1 (8)

Note: Figures in parentheses are number of decisions made. For SimRep there are 400 decisions and 380 decisions for *RepFirst* and *RepLast*. Columns Nash (0,0) report the incidences in which the effort and contributions of the three players at 0 tokens. Columns Social (10,10) report the incidences in which effort and contributions of the three players are at 10 tokens. Columns Recip. report the incidences where everyone in the group allocated the same number of tokens that are non-zero and non-social optimal to the PG. For example, effort is 5 tokens and contributions by both group members are 5 tokens each.

Across 20 rounds, a bifurcation effect can be found in all treatments. The bifurcation effect in general is skewed towards the Nash-equilibrium solution of (0,0,0) rather than the socially optimal solution (10,10,10). Table XXA reports the incidences of decisions that happened at the Nash-equilibrium, socially optimal and other reciprocation points for every round.

The bifurcation towards the Nash-equilibrium solution is strongest for groups in *RepFirst*, followed by groups in *RepLast* and *SimRep*. Groups in *SimRep* have the highest incidence of bifurcation towards the socially optimal solution (10,10,10). Table 4.15 also shows that there is minimal 'pure' reciprocation incidences outside of the bifurcation points, in which all three subjects, 1 representative and 2 group members, decided on the same non-zero and non-social optimal value. 65.5% of total decisions made in *RepFirst* involved one of the bifurcation points, i.e. (0,0,0) or

(10,10,10). Only 51.0% of total decisions in *RepLast* involved one of the bifurcation points while the percentage of those decisions was 46.5% in *SimRep*. The relatively high occurrence of Nash-equilibrium decisions in *SimRep* could be explained by the simultaneous nature of decision-making.

Result 5: There is between-group bifurcation as equalizing decisions converged to either the socially optimal equilibrium or the Nash equilibrium. The occurrence of bifurcation towards Nash-equilibrium outcome is stronger for groups in RepFirst and RepLast.

To examine between-round reciprocal decisions between representative and group members, we pooled relative changes in subjects' decisions after each round. For example, in R-4, a subject could be influenced to make decision based on their counterparts' decisions in the previous round, R-3. A representative or group member could increase, decrease or maintain the same level of effort in this round from previous round. Depending on the effort or contribution in the previous round, R_{t-1}, subjects' behaviour could be classified as free-riding, positively reciprocating, negatively reciprocating or leading by example[35]. Adjustment across rounds will only happen from R-2 onwards hence the total number of representatives' decisions in *SimRep* is 380 and 361 for *RepFirst* and *RepLast.* Between-round reciprocity is expected to be integral in shaping the first mover(s)'s decision; i.e. representatives in *SimRep* and *RepFirst* would only know whether her/his effort was matched by group members once the round concluded, and the same applies for group members in *SimRep* and *RepLast*. Tables 4.12 to 4.14 show the pooled decisions made by representatives in all treatments as a reaction to group members' average contribution in the previous round.

Table 4.12. Breakdown of changes on representative effort as a reaction to group members' contribution in SimRep in percentage

	Effort in round *t* (e_t)		
	Decrease	Maintain	Increase
$e_{t-1} < x_{t-1}$	2.89 (11)	11.32 (43)	14.74 (56)
$e_{t-1} = x_{t-1}$	2.37 (9)	45.0 (171)	0.26 (1)
$e_{t-1} > x_{t-1}$	13.42 (51)	7.37 (28)	2.63 (10)

Note: e_t is representative's effort in the current round while e_{t-1} is effort in the previous round. The first column on the left contains the possible scenario that might happened in the previous round. e_{t-1} could

[35] Graphical representation and explanation of subjects' decisions is in Table 4.30 of Appendix B.

have been higher/lower/equal to average contribution in the previous round, x_{t-1}. Figures in parentheses are numbers of decisions.

Table 4.13. Breakdown of changes in representative effort as a reaction to group members' contribution in RepFirst in percentage

	Effort in round t (e_t)		
	Decrease	Maintain	Increase
$e_{t-1} < x_{t-1}$	1.39(5)	7.2 (26)	3.88 (14)
$e_{t-1} = x_{t-1}$	2.22 (8)	54.85 (198)	8.86 (32)
$e_{t-1} > x_{t-1}$	13.85 (50)	5.54 (20)	2.22 (8)

Note: e_t is representative's effort in current round while e_{t-1} is effort in the previous round. The first column on the left contains the possible scenario that might happened in the previous round. e_{t-1} could have been higher/lower/equal to average contribution in the previous round, x_{t-1}. Figures in parentheses are numbers of decision.

Table 4.14. Breakdown of changes in representative effort as a reaction to group members' contribution in RepLast in percentage

	Effort in round t (e_t)		
	Decrease	Maintain	Increase
$e_{t-1} < x_{t-1}$	4.99 (18)	11.91 (43)	6.65 (24)
$e_{t-1} = x_{t-1}$	4.16 (15)	41.55 (150)	6.93 (25)
$e_{t-1} > x_{t-1}$	13.02 (47)	6.09 (22)	4.71 (17)

Note: e_t is representative's effort in current round while e_{t-1} is effort in the previous round. The first column on the left contains the possible scenario that might happened in the previous round. e_{t-1} could have been higher/lower/equal to average contribution in the previous round, x_{t-1}. Figures in parentheses are numbers of decision.

In all three treatments and across 19 rounds, a huge proportion of decisions are in the central cells, i.e. if effort and average contributions are equal in round *t-1*, effort and average contribution are usually unchanged in round *t*. Since the top right corner cell represents positive reciprocity and the bottom left cell represents negative reciprocity, for groups in *SimRep*, there are more observations in both reciprocity cells than in the other two corners. In the other treatments, negative reciprocity seems to be stronger than positive reciprocity, which would tend to produce a downward drift in contributions and effort.

A potential explanation of the high level of positive reciprocity between representatives and group members in *SimRep* is the disjunction effect. As everyone in the group decides together in R-1, representatives may be more willing to adjust their effort in subsequent rounds to match group members' contributions. On the other hand, between-round punishment or effort reduction happened at much the same percentage levels in all three treatments. Knowing that their generosity has not been reciprocated within-round after getting feedback for the round, these representatives reduce their effort relative to the previous round. This behaviour is similar to leadership-based experiments, in which leaders adjust their contributions downward as the game progresses once they notice that their followers have free-ridden on their past contributions (Gächter & Renner, 2018).

Tables 4.15 to 4.17 show the adjustments of average group members contributions relative to their representative's effort after each round. We used the average contributions rather than the real contributions here to simplify the explanation.

Table 4.15. Breakdown of changes in group members' contribution as a reaction to representative's effort in SimRep in percentage

	Contribution in round t (x_t)		
	Decrease	Maintain	Increase
$x_{t-1} < e_{t-1}$	6.32 (24)	4.47 (17)	12.11 (46)
$x_{t-1} = e_{t-1}$	2.89 (11)	40.79 (155)	4.21 (16)
$x_{t-1} > e_{t-1}$	18.16 (69)	6.32 (24)	4.74 (18)

Note: x_t is average group member's contribution in current round while x_{t-1} is average contribution in the previous round. The first column on the left contains the possible scenario that might happened in the previous round. x_{t-1} could have been higher/lower/equal to effort in the previous round, e_{t-1}. Figures in parentheses are numbers of decisions.

Table 4.16. Breakdown of changes in group members' contribution as a reaction to representative's effort in RepFirst in percentage

	Contribution in round t (x_t)		
	Decrease	Maintain	Increase
$x_{t-1} < e_{t-1}$	10.80 (39)	7.20 (26)	3.60 (13)
$x_{t-1} = e_{t-1}$	3.32 (12)	52.63 (190)	9.97 (36)
$x_{t-1} > e_{t-1}$	7.76 (28)	1.94 (7)	2.77 (10)

Note: x_t is average group member's contribution in current round while x_{t-1} is average contribution in the previous round. The first column on the left contains the possible scenario that might happened in the previous round. x_{t-1} could have been higher/lower/equal to effort in the previous round, e_{t-1}. Figures in parentheses are numbers of decision.

Table 4.17. Breakdown of changes in group members' contribution as a reaction to representative's effort in RepLast in percentage

	Contribution in round t (x_t)		
	Decrease	Maintain	Increase
$x_{t-1} < e_{t-1}$	7.48 (27)	8.59 (31)	10.53 (38)
$x_{t-1} = e_{t-1}$	3.60 (13)	44.88 (162)	4.16 (15)
$x_{t-1} > e_{t-1}$	13.85 (50)	3.60 (13)	3.32 (12)

Note: x_t is average group member's contribution in current round while x_{t-1} is average contribution in the previous round. The first column on the left contains the possible scenario that might happened in the previous round. x_{t-1} could have been higher/lower/equal to effort in the previous round, e_{t-1}. Figures in parentheses are numbers of decision.

Between-round reciprocity influences *SimRep* and *RepLast* group members' decisions as they have the opportunity to adjust contributions after the conclusion of the previous round. Like the representatives, majority decisions by group members involved maintaining their contribution in the new round or adjusting it after finding out the representative's decision in the previous round. Adjustments in contributions do happen between rounds but huge proportions of decisions are located in the central cells, indicating that group members prefer not to adjust their contributions in the next round after finding out that contribution is equal to effort. Positive between-round reciprocity occurred more in *SimRep* than *RepLast*. Like the behaviour of representatives in *SimRep*, the group members in the same treatment also would adjust their contributions upwards when the representative's effort in the previous round was greater than contributions. Considering the free-riding opportunity for representatives in *RepLast*, the share of between-round negative reciprocity is higher among group members in *RepLast*.

Between-round positive reciprocity among group members is lower than for representatives in all treatments. Within each treatment, the frequency of negative reciprocity is greater for group members than for representatives. However, the adjustment of effort and contribution between rounds in Tables 4.15 to 4.17 do not capture the possibility that a group member adjusted her/his contribution based on the contribution made by the co-group member in the same group. For a group member, between-round reciprocity could also include maintaining and matching the co-group member's contribution in the previous round as both group members decide simultaneously.

Tables 4.18 to 4.20 contain the breakdown of one group member reactions after learning about the contribution made by co-group member in the previous round.

Table 4.18. Breakdown of changes in group members' contribution as a reaction to co-group members' contribution in SimRep in percentage

	Contribution in round t (x_t)		
	Decrease	Maintain	Increase
$x_{t-1} < x_{-1t-1}$	2.76 (21)	8.82 (67)	9.34 (71)
$x_{t-1} = x_{-1t-1}$	3.55 (27)	49.34 (375)	5.26 (40)
$x_{t-1} > x_{-1t-1}$	(12.76) 97	5.66 (43)	2.5 (19)

Note: x_t is a group member's contribution in current round while x_{t-1} is contribution in the previous round. The first column on the left contains the possible scenario that might happened in the previous round. x_{t-1} could have been higher/lower/equal to co-group member contribution in the previous round, x_{-1t-1}. Figures in parentheses are numbers of decision.

Table 4.19. Breakdown of changes in group members' contribution as a reaction to co-group members' contribution in RepFirst in percentage

	Contribution in round t (x_t)		
	Decrease	Maintain	Increase
$x_{t-1} < x_{-1t-1}$	1.11 (8)	7.20 (52)	3.88 (28)
$x_{t-1} = x_{-1t-1}$	4.43 (32)	63.02 (455)	8.17 (59)
$x_{t-1} > x_{-1t-1}$	8.45 (61)	2.77 (20)	0.97 (7)

Note: x_t is a group member's contribution in current round while x_{t-1} is contribution in the previous round. The first column on the left contains the possible scenario that might happened in the previous round. x_{t-1} could have been higher/lower/equal to co-group member contribution in the previous round, x_{-1t-1}. Figures in parentheses are numbers of decision.

Table 4.20. Breakdown of changes in group members' contribution as a reaction to co-group members' contribution in RepLast in percentage

	Contribution in round t (x_t)		
	Decrease	Maintain	Increase
$x_{t-1} < x_{-1t-1}$	2.22 (16)	7.48 (54)	11.08 (80)
$x_{t-1} = x_{-1t-1}$	2.77 (20)	50.83 (367)	4.85 (35)
$x_{t-1} > x_{-1t-1}$	13.71 (99)	5.82 (42)	1.25 (9)

Note: x_t is a group member's contribution in current round while x_{t-1} is contribution in the previous round. The first column on the left contains the possible scenario that might happened in the previous round. x_{t-1} could have been higher/lower/equal to co-group member contribution in the previous round, x_{-1t-1}. Figures in parentheses are numbers of decision.

A group member could maintain or adjust her/his contribution in the next round after learning the co-group member's contribution in the previous round. Maintaining contribution in the central cell is highly prevalent among group members in *RepFirst* treatment compared to other treatments. The second largest decisions in all treatments involved group members reducing her/his contribution in the current round when the co-group member's decision was lower than her/his contribution in the previous round. The percentage of this reduction is lower compared to the percentage that have taken place in comparison between group members and representatives. The percentage of group members that increase contribution as a response to low contribution in previous round shows more variations across treatments. It is highest among *RepLast*, followed by *SimRep* and lastly *RepFirst*. Of course, the findings from Tables 4.22 to 4.24 would not be able to tease out whether representative or co-group member have more influence on a group member's contribution.

Result 6: Within each group in every treatment, there is a tendency for subjects in both roles to reduce effort/contribution in response to unfavourable inequality. This then translate to a very strong tendency to maintain effort/contribution level in response to equality.

Our PGG is designed to create complementarity between representative and her/his group members. Subjects' decisions exhibited a general tendency within groups to equalise individual contributions and efforts, as a response to within-round decisions by the representative (group members) or a response to unfavourable inequality in the previous round's allocation to the PG. This resulted in between group bifurcation, with some groups decisions converging to either full socially optimal or Nash-equilibrium decisions. This general feature can be found in all treatment over time.

4.6.5 Econometric results

At this point, we are able to establish reciprocity tendencies among subjects within and across rounds by equalizing each other's' effort and contributions. These tendencies have led most groups to converge either to the Nash-equilibrium point or to the socially optimal point. We have also established that the reciprocal tendencies originated from i) the second mover(s)' reaction to the first mover(s) decision(s) within a round and, ii) first mover(s)' reaction to second mover(s) decision(s) in the previous round. This is also applicable for groups in *SimRep* as both the representative and group members become the second movers in relation to their decision in the previous round. The regression in Tables 4.21 and 4.22 contains the main determinants to explain the everyone's decisions in each treatment.

Table 4.21 examines the impacts of groups members' contributions on representatives' efforts. The dependent variable for regression equations in Table 4.21

is the change of representatives' efforts in current round, R_t from previous round, R_{t-1}. For a representative in the *SimRep* and *RepFirst* treatments, the changes are expected as a result of differences in the representative's effort and average contribution by group members in R_{t-1}, and the representatives' characteristics as control variables. On the other hand, the decision of a representative in *RepLast* is a function of; i) differences between effort in R_{t+1} and average contribution of group members in R_t and, ii) the representative's characteristics as control. This regression uses the average contribution value of the group members.

Regressions (1) to (3) in Table 4.21 focused on *SimRep* treatment, regressions (4) to (6) examined *RepFirst*, while column (7) to (9) contains the regression results for *RepLast* treatment. Columns (1) and (4) look at the effects of differences in effort with average contribution in the previous round, R_{t-1}, for *SimRep* and *RepFirst* treatments. On the other hand, column (7) contains the regression results on the effect of differences between effort in the previous round, R_{t-1} and average contribution in the current round, R_t. Columns (1), (4) and (7) contain the main effects of representatives' reactions to average contributions for *SimRep, RepFirst* and RepLast. Regressions in columns (2), (5) and (8) include the effects of representatives' control variables, namely age, gender and using English as their first language. Results (3) contains the combination of the main effects from group members' average contribution controlled for age, gender and language for representatives in *SimRep*. On the other hand, columns (6) and (9) contain the main effects of representative's decisions controlled for the selected control variables.

Table 4.21. Determinants of changes in representative's effort by round

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	SimRep			RepFirst			RepLast		
Diff effort in R_{t-1} & contributions in R_{t-1}	-0.451*** (0.0777)		-0.460*** (0.0738)	-0.673*** (0.159)		-0.699*** (0.168)			
Diff effort in R_{t-1} & contributions in R_t							-0.767*** (0.114)		-0.807*** (0.106)
Control variables									
Age		-0.0261* (0.0137)	0.0304 (0.0430)		0.0144 (0.0457)	-0.184** (0.0784)		-0.0137 (0.00931)	0.124** (0.0432)
Gender		-0.223* (0.127)	-0.358* (0.198)		-0.110 (0.0988)	-0.293 (0.240)		0.106 (0.0706)	-0.210 (0.305)
First language		-0.0980 (0.143)	-0.126 (0.206)		-0.0125 (0.106)	-0.236 (0.233)		-0.0924 (0.0646)	0.101 (0.280)
Constant	0.383 (0.550)	1.739** (0.830)	0.294 (0.911)	0.602 (0.582)	-0.136 (1.251)	5.024** (2.169)	-0.380 (0.678)	0.0332 (0.780)	-2.751*** (0.831)
Observations	380	380	380	361	361	361	361	361	361
R-squared	0.313	0.111	0.319	0.294	0.038	0.304	0.445	0.070	0.463
F-stat	33.63*** (0.0000)	2.89* (0.0623)	15.93*** (0.000)	17.81*** (0.0005)	0.44 (0.7265)	4.61*** (0.0097)	45.67*** (0.0000)	9.63*** (0.0005)	17.26*** (0.000)

Note: Linear regression. Dependent variable is the changes of effort tokens allocated by representative to the Group Investment Account in the current round from the last round. This takes a value between -10 to 10 with negative values indicating representative reducing her/his effort in comparison to the round before. The table reports coefficients with clustered standard errors on groups in parentheses. Diff effort in R_{t-1} & contribution in R_{t-1} is derived by representative's effort minus average contribution in the previous round and it takes a value between 0 and 10. Diff effort in R_{t-1} & contribution in R_t is derived by representative's effort in the previous round minus average contribution in the current round and takes a value between 0 and 10. Age is a discrete numerical variable. Gender variable takes a value of 1 if the representative is a female, and 0 if male. First language variable takes a value of 1 if the representative stated her/his language is English. ***Significant at 1 percent; ** significant at 5 percent; * significant at 10 percent.

The selection of the dependent variable and the main variable of interest in Table 4.21 is designed to tease out between-round reciprocal decisions by representatives in each treatment. For *SimRep* and *RepFirst,* if a representative exerted more effort than the average group member in round R_{t-1} then it is expected that these representatives will adjust their effort downward in R_t. One the other hand, should a representative in *RepLast* exert more effort in the R_{t-1} but found out that in the current round R_t that group members on average have contributed less tokens, that representative will adjust her/his contribution downwards in the current round R_t. These results are statistically strong even after controlling for age, gender and the first language of the subjects.

Result 7: Changes in representatives' efforts in all treatments are strongly influenced by the previous contributions of group members.

The results in Table 4.22 cover decisions made by both group members in each group. Apart from incorporating the representative's decision, the regression results also incorporate the co-group member's contribution in the previous round, as a group member is informed about her/his co-group member's contribution and this could influence contribution decisions.

Columns (1), (4) and (7) contains the results on group members' reaction to their representative's decisions and their reactions to the decisions of their co-group members in the previous rounds for *SimRep*, *RepFirst* and *RepLast*. For group members in *SimRep* and *RepLast* this involved the difference between their contribution in the previous round and the representative's effort in the previous round, i.e. after everyone received information on the previous round outcome. On the other hand, for group members in *RepFirst* their decisions across multiple rounds have been adjusted by their decision in the previous round and the decision made by their representative in the current round. Similar to Table 4.21, columns (2), (5) and (8) contains the regression results when a group member's decision to change decisions by round against age, gender and using English as the first language. Regression results in columns (3), (6) and (9) show the main effects of, i) differences in contribution and effect, and ii) differences in contribution with co-group member contribution and they are controlled for age, gender and using English as the first language.

Table 4.22. Determinants of changes in a group member's contribution by round

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	SimRep			*RepFirst*			*RepLast*		
Diff contribution in R_{t-1} & Effort in R_{t-1}	-0.238*** (0.0489)		-0.240*** (0.0474)				-0.186*** (0.0425)		-0.188*** (0.0433)
Dif contribution in R_{t-1} & Effort in R_t				-0.145** (0.0616)		-0.146** (0.0598)			
Diff contribution in R_{t-1} & co-group member contribution in R_{t-1}	-0.217*** (0.0527)		-0.220*** (0.0518)	-0.556*** (0.0537)		-0.558*** (0.0508)	-0.311*** (0.0739)		-0.312*** (0.0741)
Control variables									
Age		0.00591 (0.0186)	-0.00984 (0.0351)		0.00110 (0.00217)	0.00150 (0.00849)		-0.00340** (0.00137)	-0.00186 (0.00135)
Gender		-0.0921 (0.0678)	0.170 (0.127)		-0.0418 (0.0606)	-0.222 (0.181)		-0.0659 (0.0808)	0.147 (0.165)
First language		0.0392 (0.0728)	0.0628 (0.149)		-0.00141 (0.00170)	-0.00313 (0.00518)		-0.00175*** (0.000420)	0.000557 (0.000729)
Constant	-0.155 (0.456)	-0.376 (0.393)	-0.237 (0.732)	-0.102 (0.433)	0.437 (0.554)	0.212 (0.429)	-0.0747 (0.503)	0.0142 (0.525)	-0.225 (0.460)
Observations	760	760	760	722	722	722	722	722	722
R-squared	0.271	0.035	0.272	0.448	0.058	0.450	0.314	0.029	0.315
F-stat	48.98*** (0.000)	0.92 (0.4511)	26.33*** (0.000)	73.69*** (0.000)	0.34 (0,7941)	53.66*** (0.000)	24.55*** (0,000)	5.81*** (0.0059)	12.62*** (0.000)

Note: Linear regression. Dependent variable is the change of tokens contributed by group members to the Group Project in the current round from the previous round. This takes a value between -10 and 10 with negative values indicating the group member reduce her/his effort in comparison to the previous round. The table reports coefficients with clustered standard errors on groups in parentheses. Diff contribution in R_{t-1} & effort in R_{t-1} is derived by contribution in the previous round minus effort in current round and it takes a value between 0 and 10. Diff contribution in R_{t-1} & effort in R_t is the difference in tokens of group member's contribution in the previous round and representative's effort in the current round. Diff contribution in R_{t-1} & co-group member contribution in R_{t-1} is the difference in a group member contribution and the contribution of co-group member's contribution in the previous round. Age is a discrete numerical variable. Gender variable takes a value of 1 if the representative is a female, and 0 if male. First language variable takes a value of 1 if the representative stated her/his language is English. ***Significant at 1 percent; ** significant at 5 percent; * significant at 10 percent.

From the regression in Table 4.21, group members in *SimRep* and *RepLast* adjusted their contribution once they found that there is a gap between their contribution and their representative's effort in the previous round, $R_{t-1.}$ Contribution in R_t dropped once a group member realised that she/he has allocated more tokens to the PG than the representative in the previous round, R_{t-1}. The magnitude of adjustment is slightly higher for groups in *SimRep* compared to *RepFirst*.

Another concern with decisions by a group member is the likelihood of her/his decision in the current round, R_t being influenced by the contribution made by the co-group member in the previous round, R_{t-1}. In all regressions in Table 4.21, we solved this by incorporating the differences in contribution made by a group member and her/his co-group member in the previous round, R_{t-1}. A positive value in this variable would mean that a group member contributed more tokens than the co-group member, while a negative value indicates that a group member contributed less tokens than the co-group member in a specific round. In all treatments, a group member would reduce contribution after finding out that she/he had contributed more tokens that the co-group member in the previous R_{t-1}. Therefore, the cooperativeness of the co-group member also influenced contributions.

Other characteristics like age, gender and using English as the first language did not significantly affect a group member's contribution decisions in *SimRep* and *RepFirst*. More mature subjects and subjects that used English as the first language were more likely to reduce their contribution as the rounds progressed for groups in *RepLast*.

Result 8: Changes in group members' contributions in all treatments are determined by her/his previous contributions, the previous effort of the representative, and the previous contribution of the co-group member relative to own contribution.

4.7 Discussion and conclusion

This chapter expanded on the idea of representative leadership introduced in Chapter 2 by extending the game investigated in the lab-in-the-field experiment into a repeated game for 20 rounds, and by using three treatments which differed according to in the order of the representative's and group members' decisions. The public good framework introduced here is shaped by collective action of group members and exertion of effort by the representative. This distinguishes the public good in our game from the standard linear public good game as there is an asymmetry between roles. If the representative makes zero effort, the group members can still produce the public good, but sub-optimally. On the other hand, if the group members make zero contributions, the representative can't produce any public good and her/his effort are totally wasted. Given the special role of the representative in adjusting the social benefit from contributing, it is in the collective interest of group members to produce a public good, provided that they can trust the representative to play her/his role. Therefore, the representative here performed an act of leadership, her/his role provided motivation for others in the group to contribute.

The experiment reported in this chapter varies the order of decision-making between representative and group members to explore the best mechanism to produce the public good with the highest possible benefit. The first round can be used to discover whether, in the *RepFirst* treatment, a representative can motivate group members to contribute by adjusting the return on collective action, and whether, in the *RepLast* trearment, group members can entice the representative's involvement by contributing. These treatments were compared with a *SimRep* treatment in which the representative and group members made decisions simultaneously. In the first round of this treatment, players had information only about the game structure and incentives. The game was then repeated for 20 rounds.

We found that representatives' willingness to play a part in the production of the public good by complementing the group members' collective action varied and sensitive to group members' decisions. At the same time group members are also willing to play their part by contributing and these contributions are sensitive to representative's effort and co-group member's contribution.

Most public good provision was driven by reciprocity between the representative and group members, and vice versa. We found that the order of the representative's decision plays a role in determining the size of public good provision. The first mover(s) in *RepFirst* and *RepLast* motivated reciprocal decisions from second mover(s) in the first round. As the game progressed, the reciprocal tendencies also included between-round reciprocity for all treatments and this created path-dependency, resulting in stability in public good provision over time. As a consequence of this, if a group started off with low public good provision, it was unlikely that provision would improve substantially in the next period. The reciprocal tendencies among representative and group members created a bifurcation effort, i.e.

the majority of groups converged to either the Nash-equilibrium solution of zero effort and contribution, or the socially optimal solution of maximum contribution and effort.

Despite the collective benefits to be gained from contributions by group members and effort by the representative, close to half of decisions in the sequential treatments happened at the Nash-equilibrium solution. This indicates that some behavioural findings from standard public good games are also relevant in explaining the findings of our experiment.

The outcome from the *RepFirst* treatment shows the limit of leading-by-example in this experiment. In round 1, the majority of representatives exerted effort to expand group members' contributions. However, the incidence of reciprocation in round 1 was limited. There are two potential explanations to this, i) group members felt that their representative was failing to maximise the potential benefit they could receive and punished him/her by contributing fewer tokens than the representative's effort; and ii) the failure of the group members to coordinate on matching effort with contribution due to the threat of freeriding by the co-group member. In the subsequent rounds, some representatives started to adjust their effort downwards and this created path dependency in which some groups ended up not engaging with the public good at all.

On the other hand, the temptation to free ride among representatives in *RepLast* is stronger than for representatives in the other treatments. A large proportion of group members in *RepLast* started the experiment by contributing few or no tokens, making it rational for the representative to refuse to engage with the public good in order to preserve her/his individual payoff. This does not prevent a small proportion of representatives from sacrificing personal payoff in order to increase the benefits of low contributing group members, probably with the aim that their group members would match their token allocation in the subsequent period. Once the game progressed and between-round reciprocity entered the decision process, most subjects were reluctant to increase their allocation of tokens to the public good.

A proportion of groups in *SimRep* managed to consistently attain the socially optimal outcome from the public good. The disjunction effect may have enabled these groups to establish representation and cooperation in the earlier rounds which was then maintained by reciprocity; as a result, everyone maximised their individual payoff.

The contribution level hints at the possibility there is disadvantageous inequity aversion among some group members. Particularly in the earlier rounds for all treatments, the representative exerted more than three tokens in effort. In these cases, both group members would maximise their benefit by contributing all their tokens as a collective. Hence, the representative and group members' engagement with the public good could possibly produce asymmetrical social benefits. Instead most group members chose to reciprocate the representative's effort by equalizing tokens contributed or exerted. Reciprocal tendencies among group members may have been motivated by aversion to inequality in earnings, particularly to prevent the representative from receiving a higher individual payoff than them. Despite having the privilege to set the return on public good, the representative does not have power over her/his representative in motivating group members to contribute more. Instead, the results of this chapter points that group members cooperativeness are as important as representative's privilege, indicating the successful representation required complementary collective action from the group members.

Appendix A: Robustness checks and further testing

Table 4.1A. Mean contributions of group members

		Mean contribution		Signrank test	Ave Contribution of A1 & A2	Kruskal-Wallis test	
Treatment	**Obs.**	**GM A1**	**GM A2**			**A1**	**A2**
SimRep	20	4.44	4.21	0.747	4.33	3.558 [0.1683]	2.899 [0.2347]
		(3.76)	(3.66)	[0.4551]	(3.67)		
RepFirst	19	3.42	2.91	1.491	3.17		
		(3.40)	(3.47)	[0.1360]	(3.38)		
RepLast	19	2.01	2.39	-1.832*	2.20		
		(2.54	(2.45)	[0.0670]	(2.45)		

Figures in parentheses are standard deviations. Figures in the subsequent column are the test statistics [p-values] for signrank tests for zero difference between the contributions of Players A1 and A2 within each treatment. The Kruskal-Wallis test is conducted for both labels and found that there are no statistical differences among the same labelled players in each treatment.

Table 4.2A. Effort in selected rounds

		Representative Effort					
Treatment	**Obs.**	**Round 1**	**Round 5**	**Round 10**	**Round 19**	**Round 20**	**Average 20 Rounds**
SimRep	20	5.05	3.7	3.75	3.85	1.9	4.23
		(3.86)	(4.54)	(4.52)	(4.77)	(3.92)	(3.49)
RepFirst	19	5.16	3.42	3.32	2.26	1.16	3.41
		(3.78)	(4.09)	(4.11)	(4.16)	(3.15)	(3.39)
RepLast	19	3.42	1.68	2.37	2.05	0.37	2.27
		(3.40)	(3.04)	(3.79)	(3.64)	(1.61)	(2.57)

Figures in parentheses are standard deviations in the mean effort and contribution columns

Table 4.3A. Group members' contributions in selected rounds

Treatment	Obs.	Round 1	Round 5	Round 10	Round 19	Round 20	Average 20 Rounds
SimRep	40	5.975	4.3	4.28	4.05	2.35	4.33
		(3.53)	(3.99)	(4.23)	(4.67)	(3.97)	(3.67)
RepFirst	38	4.26	3.39	3.13	2.26	0.63	3.17
		(4.17)	(4.25)	(4.20)	(4.09)	(2.28)	(3.40)
RepLast	38	3.87	1.82	1.71	1.58	1.42	2.20
		(3.56)	(2.98)	(2.96)	(3.23)	(2.92)	(2.47)

Figures in parentheses are standard deviations in the mean effort and contribution columns

Table 4.4A Statistical relationship between effort and average contributions by treatments

Treatment	Obs.	R-1	Ave 20 rounds
SimRep	20	0.2098	0.9583***
		(0.3745)	(0.0000)
RepFirst	19	0.5900***	0.9664***
		(0.0078)	(0.0000)
RepLast	19	0.0836	0.8969***
		(0.7336)	(0.0000)

Figures in parentheses are p-value

Table 4.5A. Classification of a subject's decision in a round with respect to counterpart's decision in the previous round

	Allocation in round *t* (e_t or x_t)		
	Decrease	Maintain	Increase
$e_{t-1} < x_{t-1}$ or $x_{t-1} < e_{t-1}$	Free-ride	Free-ride + status quo	Positive reciprocity
$e_{t-1} = x_{t-1}$ or $x_{t-1} = e_{t-1}$	Free-ride	Neutral + Status quo	Set example
$e_{t-1} > x_{t-1}$ or $x_{t-1} > e_{t-1}$	Punish / Negative reciprocity	Set example + status quo	Set example

If a representative decrease effort, x_t, after finding out her/his effort in the previous round is less than the average group member contribution, $e_{t-1} < x_{t-1}$, she/he is free-riding. If a representative maintain effort, x_t, after finding out her/his effort in the previous round is less than the average group member contribution, $e_{t-1} < x_{t-1}$, she/he is maintaining the previous round status quo by free riding. If a representative increase effort, x_t, after finding out her/his effort in the previous round is less than the average group member contribution, $e_{t-1} < x_{t-1}$, she/he is reciprocating group members positively.

Table 4.6A. Determinants of representative's effort (by highest contributor)

VARIABLES Effort (tokens)	(1) SimRep	(2) RepFirst	(3) RepLast
Period	-0.00691	-0.00528	0.0192
	(0.0474)	(0.0203)	(0.0246)
HContribution in R_{t-1}	0.799***	0.699***	
	(0.0623)	(0.101)	
HContribution in R_t			0.616***
			(0.0802)
Gender (female =1)	-0.597	-0.0858	-0.365
	(0.689)	(0.677)	(0.429)
Age	0.137	-0.357	0.266***
	(0.122)	(0.213)	(0.0569)
Constant	-1.986	8.359*	-4.860***
	(2.416)	(4.043)	(1.028)
Observations	380	361	380
R-squared	0.571	0.590	0.569

Note: Linear regression. Dependent variable is the number of effort tokens allocated by representative to the Group Investment Account in the current round. The table reports coefficients with clustered standard errors on groups in parentheses. Effort in R_{t-1} is representative's effort in the previous round and takes a value between 0 and 10. Diff effort in R_{t-1} & contribution in R_{t-1} is derived by representative's effort minus average contribution in the previous round and it takes a value between 0 and 10. Diff effort in R_{t-1} & contribution in R_t is derived by representative's effort in the previous round minus average contribution in the current round and takes a value between 0 and 10. Age is a discrete numerical variable. Gender variable takes a value of 1 if the representative is a female, and 0 if male. First language variable takes a value of 1 if the representative stated her/his language is English. ***Significant at 1 percent; ** significant at 5 percent; * significant at 10 percent.

Table 4.7A. Determinants of representative's effort (by total contribution)

VARIABLES Effort (tokens)	(1) SimRep	(2) RepFirst	(3) RepLast
Period	-0.0445	-0.0381	0.00500
	(0.0444)	(0.0228)	(0.0231)
TContribution in R_{t-1}	0.441***	0.408***	
	(0.0187)	(0.0404)	
TContribution in R_t			0.376***
			(0.0379)
Gender (female =1)	-0.368	-0.100	-0.480
	(0.470)	(0.442)	(0.424)
Age	0.0826	-0.350**	0.260***
	(0.0933)	(0.126)	(0.0513)
Constant	-0.436	8.719***	-4.360***
	(1.757)	(2.620)	(0.962)
Observations	380	361	380
R-squared	0.670	0.678	0.596

Note: Linear regression. Dependent variable is the number of effort tokens allocated by representative to the Group Investment Account in the current round. The table reports coefficients with clustered standard errors on groups in parentheses. Effort in R_{t-1} is representative's effort in the previous round and takes a value between 0 and 10. Diff effort in R_{t-1} & contribution in R_{t-1} is derived by representative's effort minus average contribution in the previous round and it takes a value between 0 and 10. Diff effort in R_{t-1} & contribution in R_t is derived by representative's effort in the previous round minus average contribution in the current round and takes a value between 0 and 10. Age is a discrete numerical variable. Gender variable takes a value of 1 if the representative is a female, and 0 if male. First language variable takes a value of 1 if the representative stated her/his language is English. ***Significant at 1 percent; ** significant at 5 percent; * significant at 10 percent.

Figure 4.1A. Effort and average contribution over time by groups in SimRep

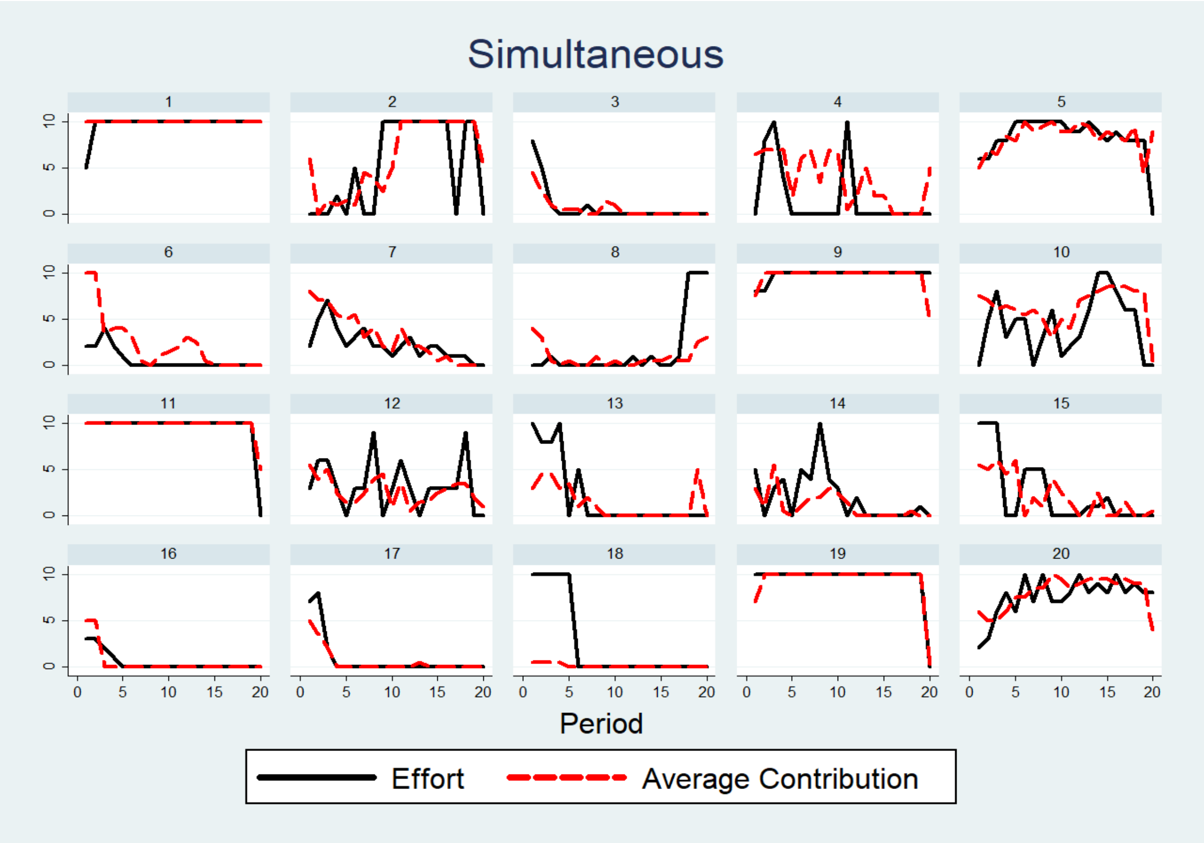


Figure 4.2A. Effort and average contribution over time by groups in RepFirst

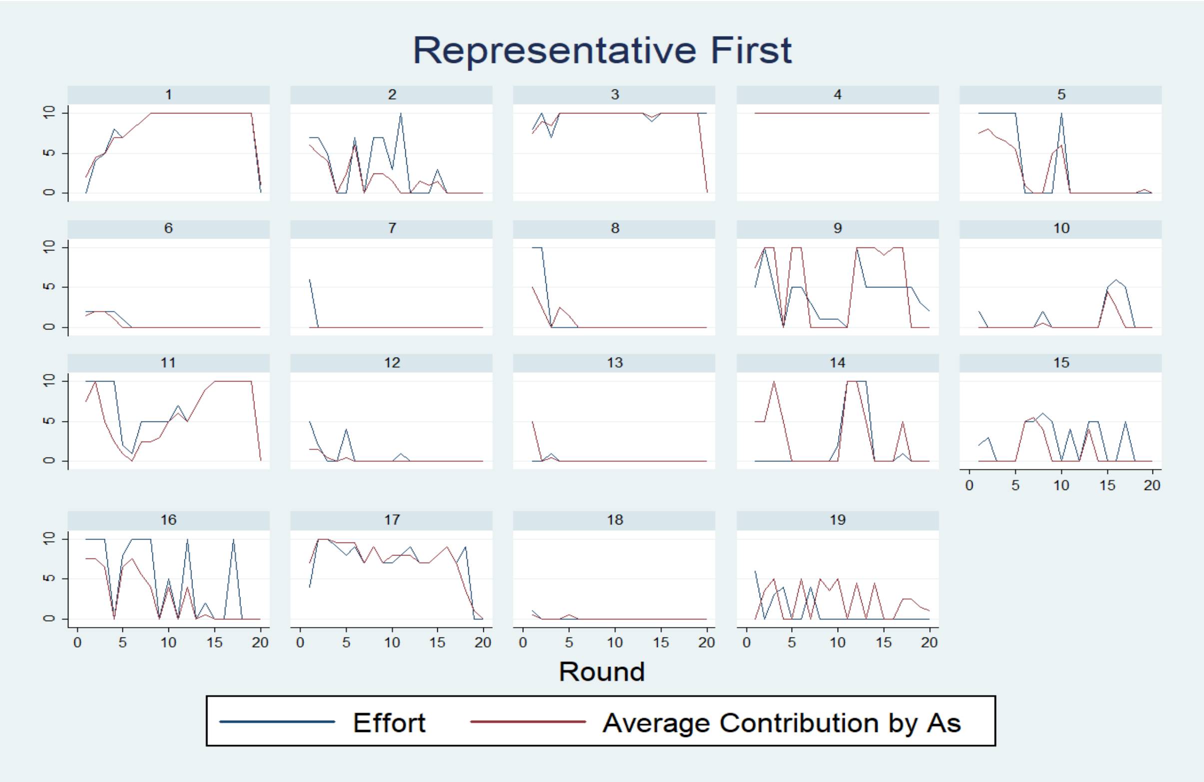


Figure 4.3A. Effort and average contribution over time by groups in RepLast

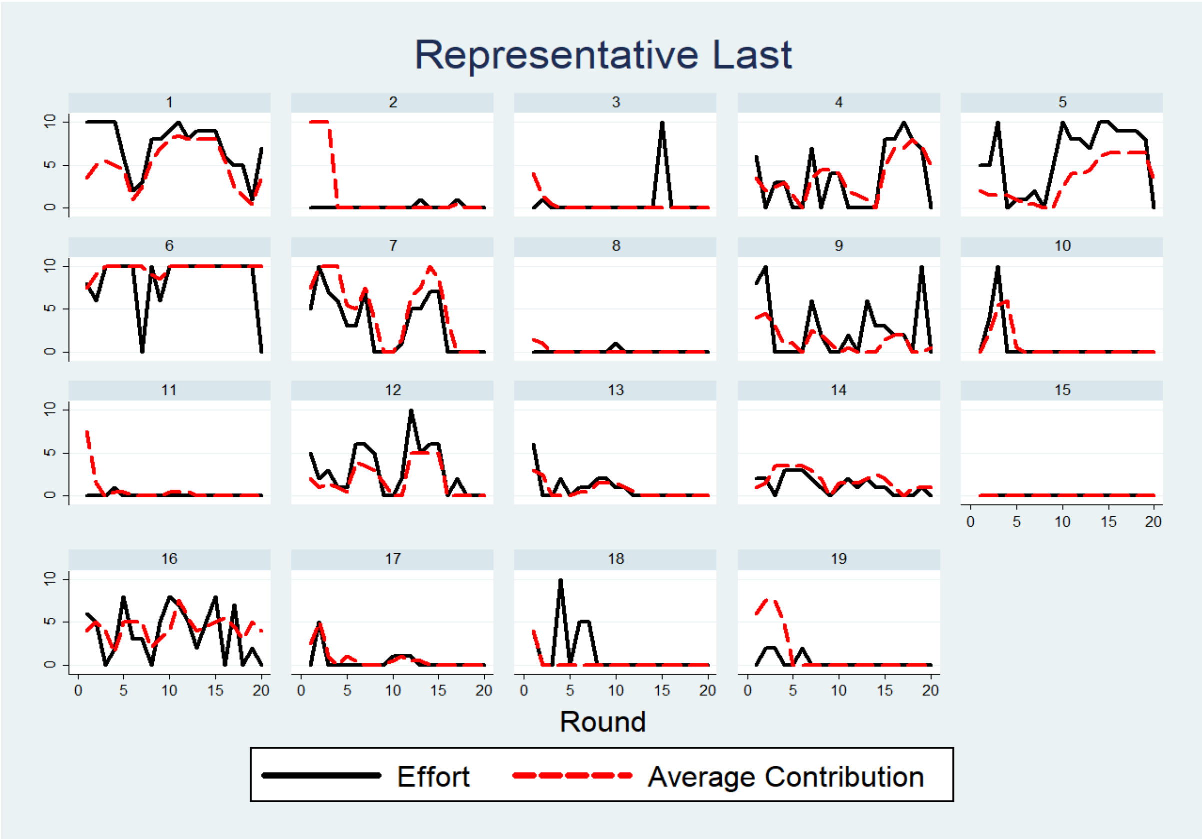
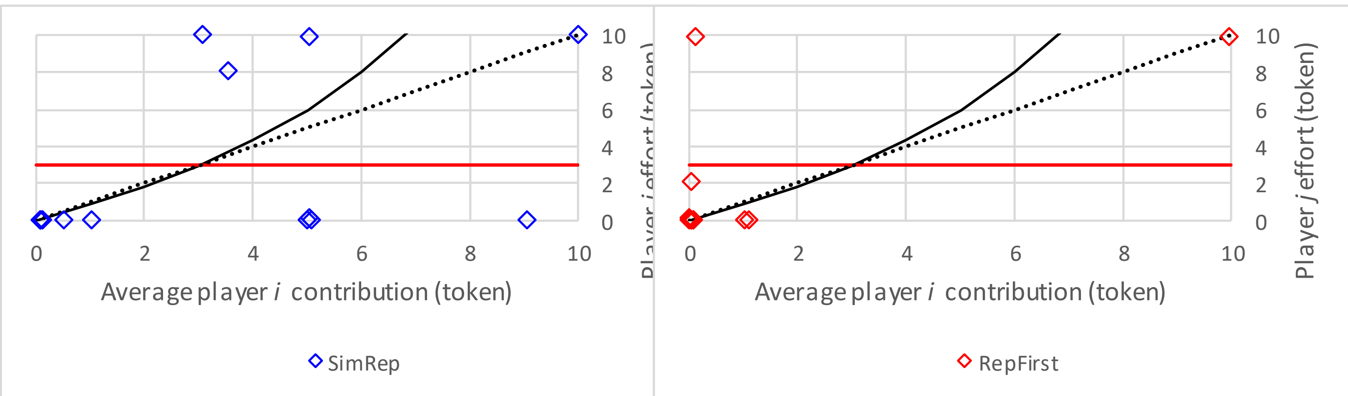


Figure 4.4A. Combinations of effort and average contribution at group level for R-



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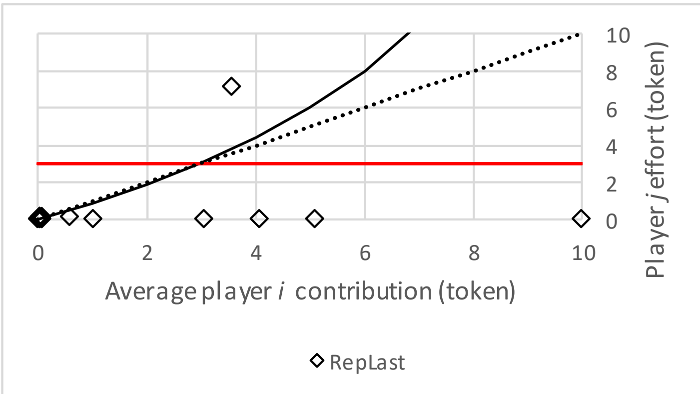


Appendix B: Instructions for the public good game

Instructions

Thank you for coming! This is an experiment about decision-making. You will receive £3 for your participation. If you follow the instructions carefully, you can earn more money depending both on your own decisions and on the decisions of others.

These instructions and your decisions in this experiment are solely your private information. During the experiment you are not allowed to communicate with any of the other participants or with anyone outside the laboratory. Please switch off your mobile phone now. If you have any questions at any time during the course of this experiment, please raise your hand. An experimenter will assist you privately.

Your decisions will be recorded privately at your computer terminal. You will be paid individually and privately in cash at the end of the experiment.

During the experiment all decisions are made in tokens (more details below). Your total earnings will also be calculated in tokens and, at the end of the experiment will be converted to Pounds at the following rate:

20 tokens = £1

The payment that you will receive will be rounded up to the next 10p.

The experiment consists of twenty (20) consecutive decision rounds. Your total earnings will be the sum of your earnings from all these rounds.

At the beginning of the experiment, participants will be randomly divided into groups of three (3) individuals. The composition of the groups will remain the same in each round. This means that you will interact with the same people in your group throughout the experiment. However, you will never be informed of the identities of the others in your group.

Decision situation

You are a member of a group of three participants. In each group, one individual will be randomly assigned the role of Member B. The remaining two individuals will be assigned the roles of Member A1 and Member A2. Your role will be determined by the computer at the beginning of the experiment and will then remain fixed for the rest of the experiment.

[SimRep] *Members A1, A2 and B make their decisions simultaneously. Each member makes a decision without knowing the decisions of the other group members in the round.*

[RepFirst] *Member B in the group makes his/her decision first. After Member B has made his/her decision, Members A1 and A2 make their decisions after being shown the decisions of the anonymous Member B in the group.*

[RepLast] *Member A1 and Member A2 in the group make their decisions first. After Members A1 and A2 have made their decisions, Member B makes his/her decision after being shown the decisions of the anonymous Members A1 and A2 in the group.*

Each of you will have an Individual Project (IP). Your group of three will have a Group Project (GP) ***and*** a Group Investment Account (GIA). The Group Project is different from the Group Investment Account (details below). At the beginning of each round, each member (A1, A2 and B) receives an endowment of **10 tokens** placed in their Individual Projects.

Decision task for Member A1 and Member A2:

[SimRep] *You will make your decision at the same time that Member B makes his/her decision.*

[RepFirst] *You will make your decision after Member B makes his/her decision. Before making your decision, you will be shown the number of tokens Member B has allocated to the Group Investment Account (GIA).*

[RepLast] *You will make your decision before Member B makes his/her decision. Your decisions will be shown to Member B before he/she makes his/her decision.*

Your task is to independently and privately decide how many tokens you would like to allocate to the Group Project (GP) and how many to keep for yourself in your Individual Project (IP). You may allocate a maximum of 10 tokens to the GP. Each token not allocated to the Group Project will automatically remain in your Individual Project. Members A1 and A2 will simultaneously face the same decision situation. **Note that Members A1 and A2 can only allocate tokens to the GP, and NOT to the GIA.**

Decision task for Member B:

[SimRep] *You will make your decision at the same time that Members A1 and A2 make their decisions.*

[RepFirst] *You will make your decision before Members A1 and A2 make their decisions. Your decisions will be shown to Members A1 and A2 before they make their decisions.*

[RepLast] *You will make your decision after Members A1 and A2 make their decisions. Before making your decision, you will be shown the number of tokens Members A1 and A2 have each allocated to the Group Project (GP).*

Your task is to independently and privately decide how many tokens you would like to allocate to the Group Investment Account (GIA) and how many to keep for yourself in your Individual Project (IP). You may allocate a maximum of 10 tokens to the GIA. Each token not allocated to the Group Investment Account will automatically remain in your Individual Project. **Note that Member B can only allocate tokens to the GIA, and NOT to the GP.**

Earnings

Regardless of your role (A1, A2 or B) in the group, your total earnings from the round include earnings from both your Individual Project and Group Project. Earnings from the Individual Project and the Group Project are calculated in the same way for all three members of the group, regardless of role.

Your earnings from the Individual Project in each round

Regardless of your role, you will earn one (1) token for each token allocated to your Individual Project. No other member in your group will earn from your Individual Project.

Your earning from the Group Project in each round

Regardless of your role, your earnings from the Group Project are based on the total number of tokens allocated by Members A1 and A2 to the Group Project and tokens allocated by Member B to the Group Investment Account. Your earnings depend on the value of the tokens in the Group Project.

The value of each token allocated to the Group Project by Members A1 and A2 will be determined by a multiplier that depends on the allocation decision by Member B. The multiplier is equal to [1.2 + 0.1*(Number of tokens allocated to the GIA by Member B)]. Thus, the Value of the Group Project is calculated as follows:

Value of the GP = [Total number of tokens allocated to the GP by Members A1 and A2] × [1.2 + 0.1*(Number of tokens allocated to the GIA by Member B)]

Regardless of role, each member of your group (Members A1, A2 and B) will receive an equal share (**one-third**) of the **Value of the Group Project**. Each member of your group (A1, A2 and B) will receive the **same** earnings from the Group Project, regardless of their individual allocation decisions.

Note that:

(a) The greater the number of tokens allocated to the Group Project by Members A1 and A2, the greater the Value of the Group Project, regardless of whether Member A1 or Member A2 made the allocation.

(b) The greater the number of tokens allocated to the Group Investment Account by Member B, the greater the Value of the Group Project.

Regardless of role, each member will profit equally from the Group Project. This means that you will earn from your own allocation as well as from allocations of other members of your group.

Your total earnings in each round

Your total earnings consist of earnings from your Individual Project and the earnings from the Group Project.

Your earnings in the round = Earnings from your Individual Project + Earnings from the Group Project

The following examples are for illustrative purposes only.

Example 1. Assume that you have been assigned the role of Member A1 and you have allocated 0 tokens to the Group Project. Suppose that Member A2 has also allocated 0 tokens to the Group Project. Thus the total number of tokens in the Group Project in your group is 0 tokens (= 0 + 0). Suppose Member B has allocated 3 tokens to the Group Investment Account. Thus the multiplier is equal to 1.5 [= (1.2 + 0.1*3) = (1.2 + 0.3)]. The Value of the Group Project is 0 tokens [= 0 × 1.5].

Your earnings from this round will be 10 tokens (= 10 tokens from your Individual Project + (1/3 × 0 =) 0 tokens from the Group Project). The earnings of Member A2 will also be 10 tokens (= 10 tokens from his/her Individual Project + (1/3 × 0 =) 0 tokens from the Group Project). The earnings of Member B will be 7 tokens (= 7 tokens from his/her Individual Project + (1/3 × 0 =) 0 tokens from the Group Project).

Example 2. Assume that you have been assigned the role of Member A2 and you have allocated 5 tokens to the Group Project. Suppose that Member A1 has also allocated 5 tokens to the Group Project. Thus the total number of tokens in the Group Project in your group is 10 tokens (= 5 + 5). Suppose Member B has allocated 0 tokens to the Group Investment Account. Thus the multiplier is equal to 1.2 [= (1.2 + 0.1*0) = (1.2 + 0)]. The Value of the Group Project is 12 tokens [= 10 × 1.2].

Your earnings from this round will be 9 tokens (= 5 tokens from your Individual Project + (1/3 × 12 =) 4 tokens from the Group Project). The earnings of Member A1 will also be 9 tokens (= 5 tokens from his/her Individual Project + (1/3 × 12 =) 4 tokens from the Group Project). The earnings of Member B will be 14 tokens (= 10 tokens from his/her Individual Project + (1/3 × 12 =) 4 tokens from the Group Project).

Example 3. Assume that you have been assigned the role of Member B. Suppose Member A1 has allocated 3 tokens to the Group Project. Suppose that Member A2 has allocated 7 tokens to the Group Project. Thus the total number of tokens in the Group Project in your group is 10 tokens (= 3 + 7). Suppose you have allocated 6 tokens to the Group Investment Account. Thus the multiplier is equal to 1.8 [= (1.2 + 0.1*6) = (1.2 + 0.6)]. The Value of the Group Project is 18 tokens [= 10 × 1.8].

Your earnings from this round will be 10 tokens (= 4 tokens from your Individual Project + (1/3 × 18 =) 6 tokens from the Group Project). The earnings of Member A1 will be 13 tokens (= 7 tokens from his/her Individual Project + (1/3 × 18 =) 6 tokens from the Group Project). The earnings of Member A2 will be 9 tokens (= 3 tokens from his/her Individual Project + (1/3 × 18 =) 6 tokens from the Group Project).

After all individuals have made their decisions in the round, each member of the group will be informed of the individual allocations to the Group Project by Members A1 and A2, the allocation to the Group Investment Account by Member B, the Value of the Group Project, and his/her earnings from the round. Individual group members will be identified by their roles, which will remain the same in each round.

The same process will be repeated for a total of 20 rounds. Your earnings from earlier rounds cannot be used in the following rounds. You will receive a new endowment of 10 tokens in each round.

Questions to help you better understand the decision tasks

When everyone has finished reading the instructions, and before the experiment begins, we will ask you a few questions regarding the decisions you will make in the experiment. The questions will help you understand the calculation of your earnings and ensure that you have understood the instructions.

Please answer these questions on your computer terminal. Please type your answer in the box next to the corresponding questions. Once everyone has answered all questions correctly we will begin the experiment.

Practice Questions for all treatments

Question 1

Assume you have been assigned the role of **Member A1** and you have allocated **10** tokens to the Group Project.

Suppose that Member A2 has allocated 0 tokens to the Group Project.

Thus the total number of tokens in the Group Project in your group is 10 tokens (=10+0).

Suppose Member B has allocated 0 tokens to the Group Investment Account.

Thus the multiplier is equal to **1.2** = (1.2+0.1*0) = (1.2+0).

The Value of the Group Project is **12** tokens (10 * 1.2).

Your earnings from this round is the number of tokens in your Individual Project and the tokens received from the Group Project.

Your earnings from your Individual Account is **0** tokens.

Everyone in your group will receive **4** tokens (= 12 /3) from the Group Project.

Please answer the following questions.

a. How much you will earn from this round? ______
b. How much will Member A2 earn from this round? ______
c. How much will Member B earn from this round? ______

Question 2

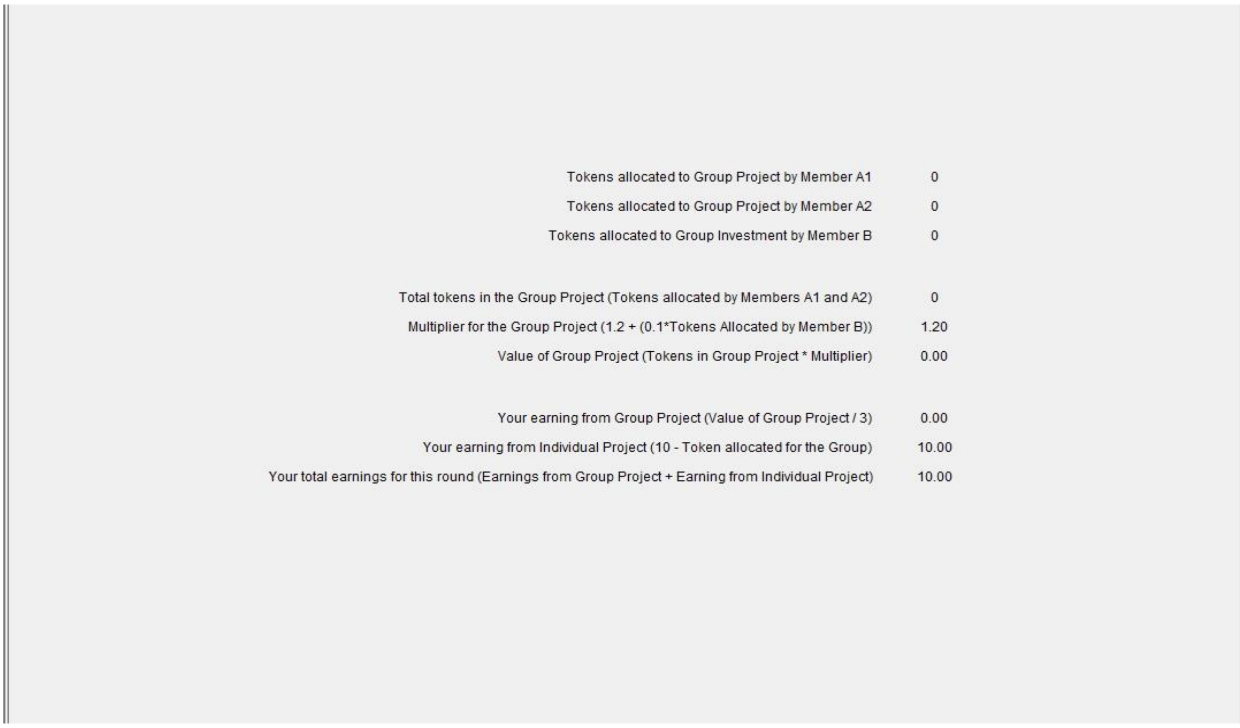
Assume you have been assigned the role of **Member B** and you have allocated **0** tokens to the Group Investment Account.
Thus the multiplier is equal to 1.2 = (1.2 + 0.1*0) = (1.2 + 0)
Support Members A1 and A2 have each allocated 10 tokens to the Group Project.
Thus the total number of tokens in the Group Project is 20 tokens (= 10+10).
The Value of the Group Project is **24** tokens = (20 * 1.2)

Your earnings from this round is the number of tokens in your Individual Project and tokens received from the Group Project.
Your earnings from your Individual Account is **10** tokens (= 10 tokens – 0 tokens).
Everyone in the group will receive **8** tokens (= 24/3) from the Group Project.

Please answer the following questions.

a. How much will you earn from this round? ____
b. How much will Member A1 earn from this round? ____
c. How much will Member A2 earn from this round? ____

Figure 4.5A. End of round screen shot (sample)



Tokens allocated to Group Project by Member A1 <Member A1 decision (A)>

Tokens allocated to Group Project by Member A2 <Member A2 decision (B)>

Tokens allocated to Group Investment Account by Member B <Member B decision (C)>

Total tokens in the Group Project (Tokens allocated by Members A1 and A2 <(A)+(B)>

Multiplier for the Group Project (1.2+(0.1*<(C)>)) <1.2+0.1*(C)>

Value of Group Project (Tokens in Group Project * Multiplier) <[(A)+(B)] *(1.2+0.1*(C)>

Your earnings from Group Project (Value of Group Project / 3) <(D)>

Your earnings from Individual Project (10 – Tokens allocated for the Group) <(E)>

Your total earnings for this round (Earnings from Group Project + Earnings from Individual Project <(D)+(E)>

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