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Naturally occurring enhancements to competition for talent in teams

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Abstract

In a laboratory setting, we study team production of group-level public goods, where two teams compete for the resources of a common-member who can benefit from and provide effort in both teams. Intrinsically, the common-member faces divided loyalties. We examine such competition in settings in which the common-member has productive abilities equal to that of the other team members and in which he/she has greater relative potential. In the homogeneous setting, we find evidence that competition increases when the common-member must choose team membership across decision rounds, instead of sharing membership within a round. In the heterogeneous setting, we find the largest increase in team effort when the common-member has sufficient resources to match that of team members in both teams. When the common-member's productivity increases, so his/her capabilities are equivalent to the setting where resources increase, team performance is not equally increased. Further treatments explore possible explanations for these latter findings.

Keywords: public goods; experiment; divided loyalties; competition; group choice; heterogeneity

JEL codes: C72, C91, C92, H41

1. Introduction

Getting teams to work together to provide greater effort is a long-standing issue for firms/practitioners and scientists alike. The primary issue is the incentive to free-ride on the efforts of other team members. As a result, increasing effort in teams has received much attention in the experimental literature. Encouraging explicit competition between teams has been found to reduce free-riding and increase efficiency (e.g., Nalbantian and Schotter, 1997; Chan et al., 2014). More recently, there has been an investigation of the ability of 'competition for talent' to mitigate free-riding in teams. In a laboratory setting, Ramalingam et al. (2019) explore whether *implicit competition* for members with divided loyalties enhances teamwork and increases efficiency. However, they find that such competition may have limited effectiveness in increasing effort in teams. Instead, imposing an additional mechanism – the ability to expel team members – increases the efficacy of competition. In this paper, we focus on *naturally existing* features of teamwork and team members, and investigate their abilities to increase efficiency in team production.

In the environment of Ramalingam et al. (2019), team members' resources were homogeneous in that every team member had the same resource constraint. At least partly due to the limited resources of the team member who could join both teams (herein, the common-member), reciprocity on the part of other team members was a constraint on groups reaching a higher level of efficiency in output. In this sense, reciprocity, interpreted as conditional cooperation in this context, created "winners and losers" and wasted team potential. An implication of this finding is that efficiency improvements may be possible in settings where common-members have the potential for greater relative productivity, increasing the value of gaining the loyalty of the common-member. Motivated by real-life teams such as those found in research collaborations, bands, sports teams, departments/divisions within a firm, etc., we add to the richness of this setting by allowing for differential resource commitment constraints across time, and heterogeneities in abilities across team members. In particular, we refrain from introducing external institutions, instead examining the effectiveness of competition for the resources of team members with divided loyalties in settings that occur naturally.

Our baseline treatment (*CM*) consists of two teams that independently produce their own team output, and share one team member. Team members are homogeneous in their productive capacity. We then study three decision settings that raise the rewards from successfully gaining the loyalty

of the common-member. In the first treatment, the common-member is required to commit to one team at a time, i.e., the common-member is forced to choose one team to which he/she can provide effort at any given time, *while still receiving the benefits from both teams*. This treatment (*Choice*) mirrors situations, such as team sports or bands, where teams are distanced geographically and a common-member can only be in one place at a time, and can therefore contribute time and effort only to the team/band he/she has chosen to travel with. Attracting the common-member's loyalty means the rewards to competition are now potentially his/her full productive capacity. Thus, we expect *Choice* to raise team cooperation above levels observed in the baseline *CM* treatment.

In our second and third treatments, we consider the role of heterogeneity among players. In particular, we study situations where the common-member is more "talented" than other team members (herein dedicated-members). These settings capture realities in many settings where those with divided loyalties are also more experienced and more skilled than other team members. Indeed, it may be that it is their higher skill and ability that allows them to be on multiple teams in the first place. For instance, it is often the best musicians who play in multiple bands and more senior researchers who collaborate on more projects simultaneously. Thus, even when they can contribute to both teams simultaneously, these common-members bring more to the table in each team to which they contribute. Common-members that are more talented are worth competing for.

In the treatment *Endowment*, the common-member has double the endowment of a dedicated-member. In the treatment *Productivity*, the value of the common-member's contributions to team production are doubled.[1] In both of these treatments, relative to *CM*, the value of (attracting) the common-member is higher; the common-member can contribute as much as dedicated-members simultaneously in *both* teams. From the perspective of reciprocity, the resources of the common-members are no longer a binding constraint on the contributions of dedicated-members. More specifically, based on a model of reciprocity (Sugden, 1984), common-members are not 'obliged' to contribute any more than the endowments of the dedicated-members in a single team. However, in both *Endowment* and *Productivity*, common-members have sufficient resources to match the

[1] As explained below, for experimental control purposes, the marginal opportunity cost to the common-member contributing to teams is also increased.

contributions of team members in both teams.[2] This is the channel through which we expect having common-members with more talent will raise overall team level production.

In addition to Ramalingam et al., (2019), there are only a few experimental studies that examine multiple group membership and divided loyalties. Falk et al. (2013) investigate multiple group membership in team production, where all individuals belong to two teams simultaneously, but no two individuals belong in more than one team together. However, no team member has divided loyalties since each member receives separate resource endowments for each team. In McCarter et al. (2014), every member belongs to two teams simultaneously, and receives only one resource endowment to be shared between the teams.[3] Hence, every member has divided loyalties and thus there is no clear competition for any one team member. Moreover, all team members are homogenous in all three studies.

This study adds to the larger literature that examines the issue of increasing effort in teams and possible paths to increasing efficiency.[4] A large section of the literature has focused on organizing contests between teams, with the more efficient teams receiving an additional reward (e.g., Bornstein et al., 1990, and Gunnthorsdottir and Rapoport, 2006). The general consensus is that such explicit competition over *outputs* increases effort in teams (Chen and Lim, 2013, Chan et al., 2014, Guillen et al., 2014). In addition to efficiency enhancing effects, such competition may also have other positive effects such as reducing inequality between teams (Gartenberg and Wulf, 2020).[5]

In contrast, we study implicit competition for resources, a naturally occurring feature of teamwork. In many workplace settings, some members of teams perform multiple tasks, and thus have a choice of which task(s) to focus their efforts on. We examine competition for the common-member's efforts when there are natural constraints on task/team choice and heterogeneities

[2] Unlike Falk et al. (2013) – see next paragraph – common-members do not receive separate resources for each team. They could contribute all their resources to one team if they so choose.

[3] A complementary body of literature studies provision choices across multiple public goods (e.g., Cherry and Dickinson, 2008; Bernasconi et al., 2009; Chan and Wolk, 2020). An additional body explores provision within a hierarchy of public goods, i.e., local vs. global public goods (e.g., Blackwell and McKee, 2003). In these strands of the literature, individuals all belong to the same group and thus do not experience a setting of divided loyalties across groups.

[4] See Ostrom et al. (1992) and Fehr and Gächter (2000) for earlier works, and Chaudhuri (2011) for a recent review.

[5] Goette et al. (2012) find that such inter-group competition, while increasing effort in teams, may have the negative consequence of increasing conflict *between* groups.

among members. Further, we highlight the role played by the level of returns to competition in this setting.

Our results show that the size of rewards from competition are crucial determinants of the efficiency-enhancing effects of such competition. When a common-member must choose group membership, other team members compete harder for his/her loyalties; their efforts are higher than when they share the common-member. They respond especially more cooperatively when their group is chosen by the common-member.

When common-members have greater ability than other team members, the issue is more nuanced. In particular, the effects on competition depends crucially on the source of the greater ability. When common-members have greater resources at their disposal, members of both teams are spurred to compete for them, thus leading to significant increases in efficiency. On the other hand, when a common member's contributions are more valuable, but have the same resources as others, competition for the common-member is muted.

Section 2 presents the benchmark game setting *CM,* experimental procedures, and contrasts behavior with treatment *Choice*. Section 3 contrasts behavior in *CM* with that found in treatments *Endowment* and *Productivity*. Section 4 concludes. Appendix A in the Electronic Supplementary Material presents additional analyses and Appendix B contains our experimental instructions.

2. Study 1 – Enhancing competition through group choice: *CM* and *Choice*

2.1 The *CM* decision setting

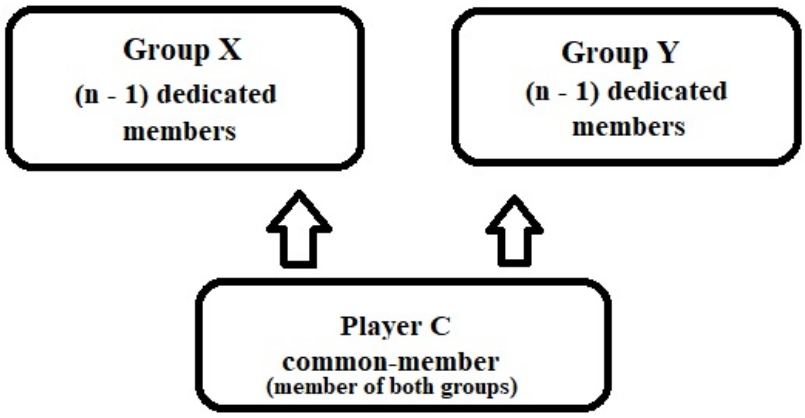
In each decision period in *CM*, each group of n team members participates in providing a group good that yields homogenous returns to each group member, regardless of their contribution. In this sense, the group good is a team level public good.[6] Each individual receives an endowment $e > 0$ that he/she can allocate between a group account ($0 \leq g_i \leq e$) and a private account ($e - g_i$). The return from the private account is 1 while the return to the individual from the group account (the group good) is a fraction m ($0 < m < 1 < mn$) of the total allocation to the group account by all

[6] This description of *CM* follows that presented in Ramalingam et al. (2019).

members of the group, $G = \sum_j g_j$.[7] As is standard in the literature, herein we refer to allocations to the group account as *contributions*.

Team members participate in groups that are paired – Group X and Group Y. Each group consists of (n – *1*) dedicated-members who belong only to that group, and one common-member who belongs to both groups. Figure 1 describes the interaction structure in the game.

Figure 1. Structure of interaction with divided loyalties



Each of the 2(n – 1) + 1 members receives an endowment of $e > 0$. Note that the common-member does not receive an additional endowment for belonging to multiple groups. Within the stage game, contributions to the group good by members of Groups X and Y impact only their group. Each dedicated-member can contribute to, and receive returns from, the group good in his/her group alone. The common-member can contribute to, and receives returns from, the group good in Groups X and Y.

The payoff of a dedicated-member *i* who belongs to Group $k \in \{X, Y\}$ is given by

$$(e - g_{ik}) + m \sum_{j \in k} g_{jk}.$$

In both groups, *j* includes the common-member. The payoff of the common-member, *c*, is given by

$$(e - g_{cX} - g_{cY}) + m \sum_{j \in X} g_{jX} + m \sum_{l \in Y} g_{lY}.$$

[7] The team level public good is equivalent to a linear (VCM) public good.

In the stage game, the self-interested Nash equilibrium is zero contribution by all group members, while the social optimum is 100% contribution by all. Any split of the common-member's endowment to the group goods between the two groups is optimal. Models of reciprocity have been used to explain and predict positive contributions in voluntary contribution games (Sugden, 1984; Falk and Fischbacher, 2006). Ramalingam et al. (2019) apply the theory of reciprocity (Sugden, 1984) in the above setting. Here we outline the theory in a less formal manner and discuss how it applies to our treatments.

Sugden's (1984) '*principle of reciprocity*' states that, *in each possible subgroup* that a team member can be in (with at least one other person), he/she faces two constraints on contributions. He/she must contribute at least the minimum of: (i) at least as much as he/she would like everyone in the subgroup to contribute, as long as the others are contributing the same[8], or (ii) the minimum contribution by members of the subgroup. In a decision setting with common-membership and two groups, a dedicated member faces these constraints in the single group in which he/she is a member. The common-member faces these constraints within each group. Note that for the common-member, the *other* members of any subgroup must belong to the same group (X or Y).

Ramalingam et al. (2019) identify that competition between teams with reciprocal members can increase contributions to team public goods. However, they also identify a limit to cooperation that can be achieved. In particular, the limited endowment of the common-member (combined with the need to divide it between the two teams) acts as a constraint on reciprocal contributions by other team members, i.e., any contribution by the common-member to one group necessarily reduces his/her maximum possible contribution to the other group by that amount. Reciprocal dedicated-members are then never obliged to contribute more than this reduced amount. However, evidence of competition is observed in that, on average, dedicated-members' contributions are greater than the common-members' contributions. Further, dedicated-members' contributions in some groups are observed to be larger than half of their resource endowment. Given that common-members contribute positive amounts to both groups (Result 2 in Ramalingam et al., 2019), i.e., contributions are not 100% in either group, reciprocal obligations, as defined above, prevents both

[8] Given a marginal per-capita return (MPCR) of 0.6 in our linear experimental VCM setting, the preferred contribution is 100% of endowment (Croson, 2007) for both dedicated- and common-members in *any* possible subgroup (Ramalingam et al., 2019).

teams from achieving full efficiency. The experiments in this paper explore alternative settings that eliminate this constraint.

2.2 Experimental procedures and treatment *CM*

In treatment *CM,* Group X and Group Y consist of two dedicated-members each and one common-member who is a member of both groups, i.e., $n = 3$. Each of the five subjects receives a per-round endowment of 20 tokens. Subjects simultaneously choose how many tokens to contribute to their respective group accounts, retaining the rest of the endowment in their private accounts. Each token retained in the private account yields a return of 1 token to the individual. Each token contributed to the group account yields a return of 0.6 tokens to each group member. Subjects interact repeatedly for 20 decision rounds, and this is public information provided before the first decision round.

Feedback at the end of a round included individual and total contributions to the group account, and a history of only total contributions in past rounds. Group members were identified by ID letters – A, B and C in Group X, and C, D and E in Group Y (C is the common-member). Dedicated- (common-) members receive feedback on their own (both) group(s). Group members were also shown their own payoffs in the round, along with detailed steps showing how their payoffs from team output were calculated. They were not shown the payoffs of other group members. Screenshots of feedback screens are available in Appendix B.II.

All sessions were conducted at a University in the United States using student subjects. Following the procedure used in Ramalingam et al. (2019), we implemented a between-subject design with randomly formed groups that stayed fixed throughout a session.[9] Roles within groups (A – E) were also assigned randomly and stayed fixed. Subjects were given printed instructions and, after 10 minutes, were presented a summary of important features of the game. Subjects had to answer control questions (available in Appendix B.I) to ensure understanding before the experiment began, and a short demographic survey at the end.

The experiment was programmed in z-Tree (Fischbacher, 2007). A total of 60 subjects (12 independent paired-groups of five subjects) participated in *CM*. In all treatments, token earnings were converted to cash at the rate of 30 tokens to US$1. Each session lasted approximately 60

[9] Sessions for each treatment were conducted at different times of the day to minimize systematic timing effects.

minutes. Subjects earned an average of $18.90 (min = $13.37, max = $31.05, st. dev. = $4.20) in *CM.* Subjects were not paid a separate show-up fee.

2.3 Treatment *Choice*

The decision setting *Choice* is identical to *CM* except for one change. Instead of being allowed to make contributions to both groups, in each decision-round the common-member can only make contributions to one group. In the first round, that group is chosen randomly, and both groups are informed of the result of the randomly chosen outcome prior to making contribution decisions. Thereafter, in each decision round, upon observing the results from the prior round, the common-member must choose the group to which he/she can make contributions. Prior to making contributions, dedicated-members in both Groups X and Y are informed of the group chosen by the common-member. The common-member receives returns from both Groups, regardless of which group he/she chooses. Feedback at the end of the round was the same as in *CM*. As in *CM*, dedicated-members are not informed of the contribution decisions in the other group.

A total of 55 subjects (11 independent paired-groups of five subjects) participated in *Choice*. Subjects earned an average of $19.96 (min = $13.25, max = $38.43, st. dev. = $5.83).

Note that, for the group chosen, the common-member has the same endowment as that of dedicated-members and is not faced with using part of that endowment to make contributions in the group not chosen. In this sense, in *Choice* relative to *CM*, conditional cooperation may be more likely to lead to higher contributions for both dedicated-members and the common-member in the group chosen. Further, the competition for the loyalties of the common-member becomes a strategic "race" between groups across decision rounds. The implication is that dedicated-members may be more likely to compete for the resources of the common-member.[10] This leads to Hypothesis 1.

Hypothesis 1: *Relative to CM: a) the competition for the resources of the common-member in Choice will lead to greater aggregate efficiency in provision in group pairs (X and Y) across*

[10] An MPCR = 0.6 maintains the social dilemma for the two dedicated-members in the group not chosen by the common-member in *Choice* (0.6*2 > 1). In terms of the principle of reciprocity, the preferred contribution is still 100% of endowment.

decision rounds; b) in Choice, efficiency will be greater in the group chosen by the common-member.

2.4 Behavior in *CM* and *Choice*

When making comparisons across treatments, unless otherwise stated, p-values are reported from two-sided Wilcoxon *ranksum* tests (RS). When making comparisons within treatments, p-values are reported from two-sided Wilcoxon *signrank* tests (SR). In both cases, an independent observation is the average value of the relevant variable of interest. The number of observations in each *ranksum* test is the combined number of groups/pairs in the treatment comparisons, while *signrank* tests depend on the number of groups/pairs within a treatment. All results are supported by regression analysis. For the sake of brevity, we report the regression results in Appendix A.II.

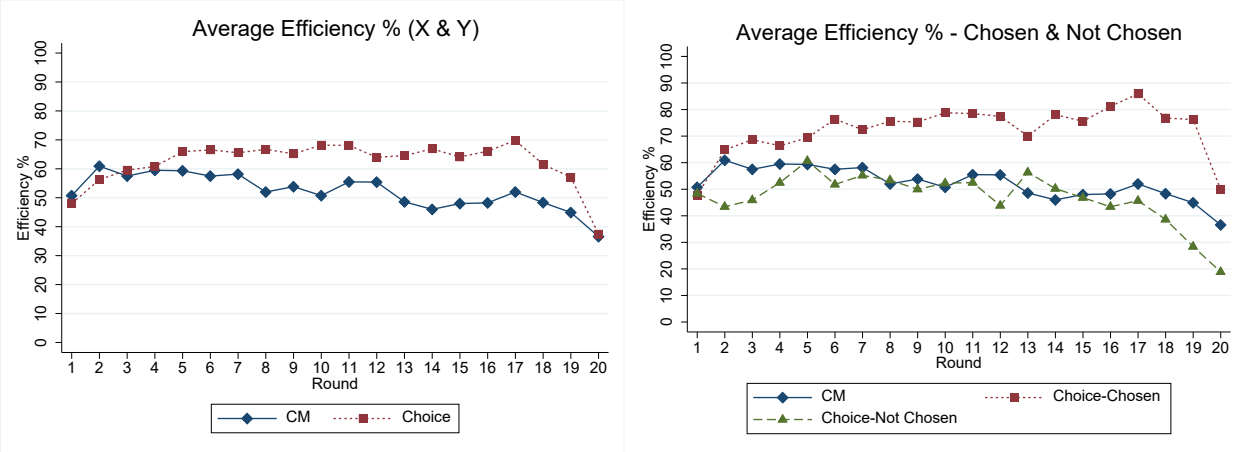
Table 1 reports the mean (over all 20 rounds) **efficiency in provision** achieved by pairs, **measured as the value of total contributions in each round relative to the maximum possible value** (the value of the group account if the full endowment is contributed). In treatment *Choice*, efficiency is also reported based on the endowment contributed in the group chosen by the common-member and the group not chosen. In both *CM* and *Choice*, the total endowment of Group X + Group Y is 100 tokens. In *Choice* the total endowment is 60 tokens in the group chosen by the common-member and 40 tokens in the group not chosen by the common-member. Similarly, the left panel of Figure 2 provides a measurement of efficiency achieved in pairs of teams over time, while the right panel presents efficiency in groups in the two treatments (separated by those chosen and not chosen in *Choice*).

Table 1. *CM* and *Choice*: Summary statistics of efficiency

Treatment	Independent pairs (Subjects)	Mean (St dev)	Group	
			Chosen	Not chosen
CM	12 (60)	52.19% (16.07) [52.19 out of 100]	NA	NA
Choice	11 (55)	62.12% (18.19) [62.12 out of 100]	72.25% (15.02) [43.35 out of 60]	46.92% (28.03) [18.77 out of 40]

Figures in brackets are average token contributions out of the maximum possible contribution.

Figure 2. Average efficiency over time



In support of Hypothesis 1a, efficiency in contributions (Group X + Group Y) is greater in *Choice* than in *CM*, although the difference is not statistically significant (RS p = 0.1960). As shown in the left panel of Figure 2, efficiency across decision rounds is relatively stable for both treatments, with efficiency in *Choice* being somewhat larger than in *CM*. As shown in the right panel of Figure 2, in support of Hypothesis 1b, efficiency is higher in groups in *Choice* chosen by the common-member relative to groups in *CM* (RS p = 0.0138). In addition, efficiency in groups in *Choice* not chosen by the common-member is not statistically different from in those in *CM* (RS p = 0.4790).[11]

Result 1: *In partial support of Hypothesis 1a, efficiency is higher in Choice than in CM, but not significantly so. In support of Hypothesis 1b, efficiency is higher in groups chosen by the common-member in Choice than in CM groups*.

To understand the behavior driving Result 1, we next consider decisions across groups within a pair. We define *LowC* (*HighC*) groups as those with lower (higher) combined contributions by dedicated-members in the **first round**.[12] Averaging across all 20 decision rounds, *LowC* groups in *CM* had lower group contributions than *HighC* groups in 11 out of 12 paired comparisons of five-

[11] Efficiency of groups in *Choice* chosen by the common-member is significantly greater than efficiency in groups in *Choice* not chosen by the common-member (SR p = 0.0164).

[12] There are no systematic effects of the group labels (X and Y). Pooling across all pairings in *CM*: mean contribution in Group X = 24.89 tokens (st dev = 12.13), mean contribution in Group Y = 27.30 tokens (st dev = 14.40), SR $p>0.10$. Pooling across all pairings in *Choice*: mean contribution in Group X = 32.50 tokens (st dev = 15.98), mean contribution in Group Y = 29.62 tokens (st dev = 12.66), SR $p>0.10$.

member groups. In *Choice*, *LowC* groups had lower contributions than *HighC* groups in 7 out of 11 pairs.[13]

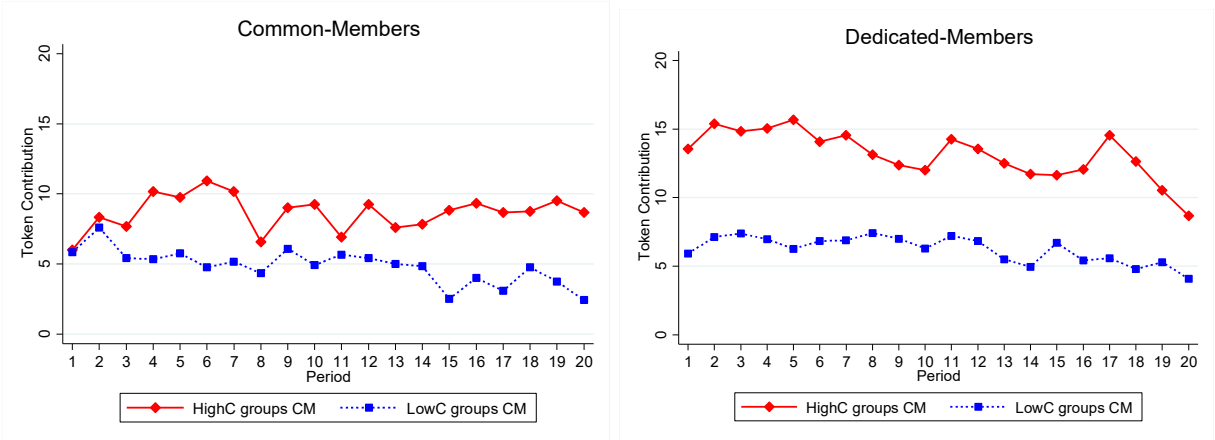
Table 2 reports average contributions by common-members and dedicated-members in *HighC* and *LowC* groups in *CM* and *Choice*. For comparison purposes, and to give more context to the formation of *HighC* and *LowC* groups, mean contributions are reported for rounds 1 and 2, as well as across all rounds. Figure 3 provides further evidence on average contributions, providing time trends across all rounds.[14]

Table 2. Mean individual contributions in *HighC* and *LowC* groups: *CM* vs. *Choice*

	CM				*Choice*			
	Common		Dedicated		Common		Dedicated	
Round	*HighC*	*LowC*	*HighC*	*LowC*	*HighC*	*LowC*	*HighC*	*LowC*
First	6.00	5.83	13.54	5.92	3.00	6.55	12.95	6.27
	(2.00)	(2.48)	(3.59)	(2.79)	(4.36)	(9.13)	(3.24)	(3.86)
Second	8.33	7.58	15.38	7.13	7.00	4.09	13.00	9.59
	(2.23)	(3.03)	(4.03)	(2.95)	(7.73)	(6.64)	(4.73)	(4.60)
All 20	8.65	4.83	13.13	6.22	7.69	6.02	12.94	11.26
	(4.15)	(1.87)	(4.97)	(2.24)	(4.73)	(5.34)	(3.97)	(6.50)

Figure 3. Mean individual contributions in *HighC* and *LowC* groups

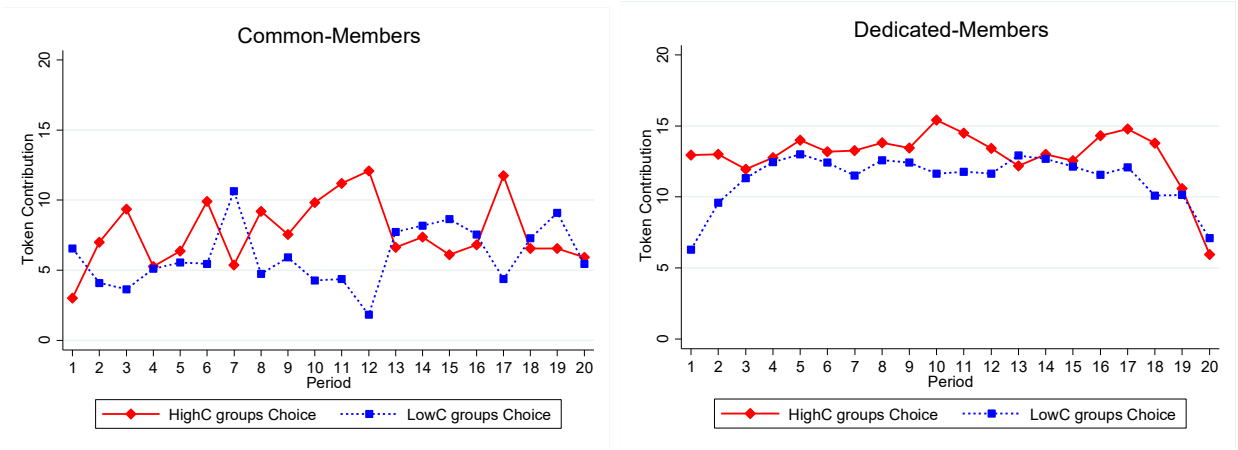
CM



[13] Recall that in *Choice*, the common-member's group was chosen randomly in the first round. Only 5 out of 11 *HighC* groups were randomly chosen by the computer in the first round suggesting the random choice did not have a strong hysteresis effect. An alternative check for the robustness of the definition of *LowC* (*HighC*) is to check the percentage of rounds in which group contributions in the *HighC* group in a pair were greater than or equal to contributions in the *LowC* group in the pair. This percentage was 88% in *CM* and 60% in *Choice*.

[14] Means for common-members in *Choice* include zeros in rounds for groups where the other group was chosen.

Choice



As shown in Table 2 and Figure 3, dedicated-members in *CM* contribute on average more than common-members in *HighC* groups, and this ranking is robust across decision rounds (SR p = 0.0047). This is so despite reciprocal obligations for dedicated-members being lower, in particular equal to the contribution of the common-member. This is evidence that dedicated-members in *HighC* groups exert more effort to compete for the common-member. This ranking only weakly holds for *LowC* groups where average contributions by dedicated-members and common-members are quite similar; they are more equal to the level dictated by reciprocity (SR p = 0.0774). Thus, *LowC* groups do not compete as much for the resources of the common-member. Average contributions of dedicated-members are lower in *LowC* groups than in *HighC* groups (SR p = 0.0037). Further, contributions of common-members are lower in *LowC* groups than in *HighC* groups (SR p = 0.0029). Thus, as found in Ramalingam (2019), we also find that competition in *CM* creates winners and losers.[15]

In *Choice*, except for the first few rounds, dedicated-members in both *HighC* and *LowC* groups contribute at a higher level than common-members (SR p = 0.0044 and 0.0208, respectively). Thus, we find evidence that an increase in rewards (here, access to group allocations equal to the entire endowment of the common-member) enhances competition by dedicated-members in *both* groups. Moreover, groups compete to the same extent – there is no significant difference in the contributions of dedicated-members in *HighC* and *LowC* groups (SR p = 0.3739). Finally, average contributions of the common-member are also similar in *HighC* and *LowC* groups in *Choice* (SR

[15] Note that these inferences are about reciprocity at the level of average behavior. There is likely to be heterogeneity in behavior across pairs or groups.

p = 0.2659). Relative to *CM*, in *Choice* we find evidence that competition between dedicated-members leads to more equitable (and more efficient) outcomes in *HighC* and *LowC* groups.

The contributions of dedicated-members in *LowC* groups are also higher in *Choice* than in *CM*, averaged over all 20 rounds (11.26 vs. 6.22). While this difference, though economically significant, is not statistically significant using a ranksum test (RS p = 0.1239), it is significant using a two-sample t-test (p = 0.0193). However, there is no difference in *HighC* groups in *Choice* and *CM* (RS p = 0.9020). Thus, competition in *Choice* raises efficiency by raising contributions of dedicated-members in *LowC* groups in *Choice* relative to *CM*. Additional analyses reporting decisions by common- and dedicated-members in *Choice* based on the group chosen by common-member is provided in Appendix A.I.

In summary, relative to CM, competition for the common-member in Choice leads to a marginal increase in overall cooperation. The group chosen by the common-member in Choice has significantly greater cooperation than in the group not chosen. Further, competition promotes equality between groups in Choice while it favors HighC groups in CM. This equitable outcome in Choice is achieved by stimulating competition by dedicated-members in LowC groups.

3. Study 2 – Enhancing competition through differences in abilities

3.1 *Endowment* and *Productivity* settings

The decision setting in Endowment

The procedures for conducting treatments in *Endowment* are identical to those of *CM*, except for the following parameter change. In treatment *Endowment*, the common-member's endowment is increased to 40 tokens, matching the sum of the endowments for the dedicated-members in each group.[16] This parameter change is based on results reported in Ramalingam et al. (2019) that the endowment constraint faced by the *CM* appeared to be a limiting factor in increasing competition

[16] Several other studies examining endowment inequality in standard VCM settings have found that inequality reduces contributions compared to settings without inequality within groups (Buckley and Croson, 2006; Reuben and Riedl, 2013). This is primarily due to the enhanced endowment members contributing a lower percentage of their endowment (Hargreaves Heap et al., 2016). However, in our setting the enhanced member is in two groups and dedicated-members from each group can compete for his/her resources. Thus, we anticipate a positive effect on contributions from endowment inequality. Prior research examining contests between unequally endowed teams for an additional reward has shown that competition increases contributions within teams, particularly of the enhanced member within a group (Hargreaves Heap et al., 2015 & 2021).

between groups. That is, suppose the common-member is allocating tokens to both groups. This implies their maximum potential contribution in each group is less than that of the dedicated-members. In this sense, a norm of reciprocal obligations among dedicated-members and the common-member in each group would limit contributions by dedicated-members based on the limited endowment of the common-member. Importantly, the endowment of the common-member in *Endowment* was increased to a level where, if halved, would equal the endowment of dedicated-members in each group. Feedback at the end of the round was identical to that in *CM*.

The 55 subjects (11 independent paired-groups of five subjects) who participated in *Endowment* earned an average of $24.42 (min = $13.85, max = $42.87, st. dev. = $8.36).

The decision setting in Productivity

The procedures for conducting treatments in *Productivity* are identical to those of *CM*, except for the following. In *Productivity,* the value of the contributions made by the common-member to the group account in each group was doubled; i.e., each token contributed by a common-member generated a return of 1.2 tokens for each group member, as opposed to 0.6 tokens by a dedicated-member. For experimental control, the return from the private account received by the common-member was also doubled. That is, the common-member's marginal rate of substitution between the group account and the private account was held constant to that of the dedicated-members (MPCR = 0.6). Without changing the private return, the common-member's marginal rate of substitution would be 1.2, greater than the return from allocations to their account.[17] In summary, doubling the value of contributions made by the common-member enhanced the "talent" of the common-member, enhancing the rationale for competition between the dedicated-members of the two groups. Feedback at the end of the round was the same as in the other treatments. As mentioned above, the feedback explicitly showed the calculation of payoffs. This meant that group members were reminded every round that the common-member's token contributions were doubled to calculate earnings from team production. The experimental instructions and control questions also made all group members aware that the common-member received twice the return for tokens

[17] In a standard VCM game, Kölle (2015) examines heterogeneous capability that is similar to our heterogeneous productivity. However, the enhanced member's MPCR is not kept constant with the non-enhanced members' MPCR and is greater than 1. Thus, the enhanced member in Kölle (2015) has a dominant strategy to contribute. Fellner-Röhling et al. (2020) keep the MPCR constant for enhanced and non-enhanced members by setting the "internal" return from a member's own contribution to zero for all types. That is, each member only receives benefits from the public good from others' contributions.

maintained in their private account.

Importantly, common-members in *Productivity* and *Endowment* are equally talented – in both cases, common-members can contribute up to 40 'effective' tokens to team production. On the other hand, the two competing groups now faced a different challenge in *Productivity* – the outside option for the common-member. That is, relative to dedicated-members, the opportunity cost to the common-member of contributing a token, i.e., the marginal opportunity cost, doubled from 0.4 tokens to 0.8 tokens.

A total of 55 subjects (11 independent paired-groups of five subjects) participated in *Productivity.* Subjects earned an average of $21.33 (min = $11.38, max = $40.79, st. dev. = $6.31).

The treatments that enhance the common-member's talent lead to Hypothesis 2.

Hypothesis 2: *Relative to CM, in both Endowment and Productivity, the competition for the resources of the common-member who has enhanced abilities for provision of the public good in each group, will lead to greater efficiency in public good provision in a pair (X and Y) across decision rounds.*

Another implication of enhancing the common-member's talent in *Endowment* and *Productivity* is that the common-member has the ability to match the value added by each dedicated-member in each group, up to the dedicated-members' capacity to add value.

Hypothesis 3: *Relative to CM, competition raises contributions of dedicated-members in both groups in Productivity and Endowment.*

3.2 Contrasting *CM* with *Endowment* and *Productivity*

Table 3 reports the average efficiency measure for pairs for each treatment, while Figure 4 provides this information across decision rounds. Note that *Productivity* and *Endowment* have the same maximum possible value of contributions to the group account.[18] However, as reported in Table 3 and Figure 4, efficiency is significantly higher in *Endowment* than in *Productivity* (RS p = 0.0053).

[18] As discussed above, efficiency is measured as value of contributions made to the group account relative to the maximum value obtainable from contributions to the group account. The maximum value of the group account in Group X plus Group Y in *Endowment* is 1.8*(40+20+20+20+20) = 216 tokens. The maximum value of the group account in *Productivity* is 1.8*(20+20+20+20) +3.6*(20) = 216 tokens. For comparison, the maximum value of the group account in *CM* (and *Choice*) is 1.8*(20+20+20+20+20) = 180 tokens.

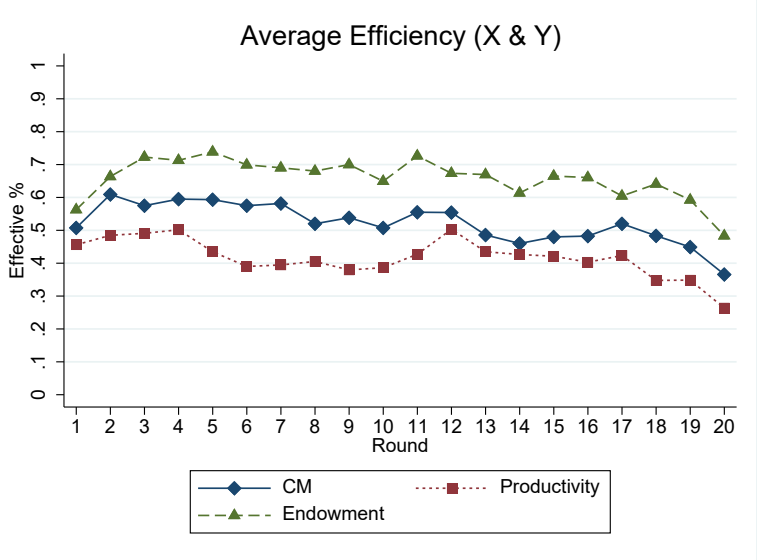
Relative to *CM*, efficiency is weakly lower in *Productivity* (RS p = 0.0648) and weakly higher in *Endowment* (RS p = 0.0848). Thus, we find mixed supported for Hypothesis 2.

Result 2: *In support of Hypothesis 2, efficiency is weakly higher in Endowment than in CM. However, efficiency is weakly lower in Productivity than in CM.*

Table 3. Efficiency in contributions across treatments

Treatment	Independent pairs (subjects)	Mean (St Dev)
CM	12 (60)	52.19% (16.07) [93.94 out of 180]
Productivity	11 (55)	41.62% (14.94) [89.90 out of 216]
Endowment	11 (55)	65.75% (19.24) [142.02 out of 216]

Figure 4. Efficiency across decision rounds



We now consider behavior from the perspective of individuals' contributions to the group account. Parallel to the earlier discussion, we focus on decisions in *LowC* and *HighC* groups.[19] Table 4

[19] Averaging across all 20 decision rounds, *LowC* groups in *Endowment* had lower group contributions than *HighC* groups in 7 out of 11 paired comparisons of five-member groups. In *Productivity*, *LowC* groups had lower contributions than *HighC* groups in 7 out of 11 five-member groups. An alternative check for the robustness of the definition of *LowC* (*HighC*) is to check the percentage of rounds in which the value of group contributions in the

reports average contributions by *HighC* and *LowC* groups, broken down by common-member's and dedicated-members' contributions, in *Endowment* and *Productivity*.[20] As before, mean contributions are reported for rounds 1 and 2, as well as across all rounds. Figure 5 provides time trends across all rounds. For purposes of comparability, contributions by common-members in *Productivity* are doubled to accurately compute their value added (henceforth, effective contributions) to the group.

Table 4. Mean contributions of *HighC* and *LowC* groups: *Endowment* and *Productivity*

	Endowment				*Productivity*			
	Common		Dedicated		Common		Dedicated	
Round	*HighC*	*LowC*	*HighC*	*LowC*	*HighC*	*LowC*	*HighC*	*LowC*
First	13.27	13.18	12.59	7.95	13.27	13.27	9.05	5.05
	(4.98)	(5.13)	(3.25)	(4.90)	(4.92)	(4.92)	(4.04)	(3.07)
Second	15.18	10.91	15.45	11.32	14.91	12.55	9.91	5.45
	(8.91)	(6.25)	(2.70)	(6.08)	(8.69)	(6.33)	(5.79)	(3.84)
All 20	16.01	11.90	15.31	10.19	14.28	9.06	9.33	3.97
	(6.43)	(7.02)	(4.15)	(5.82)	(10.12)	(4.74)	(4.15)	(5.82)

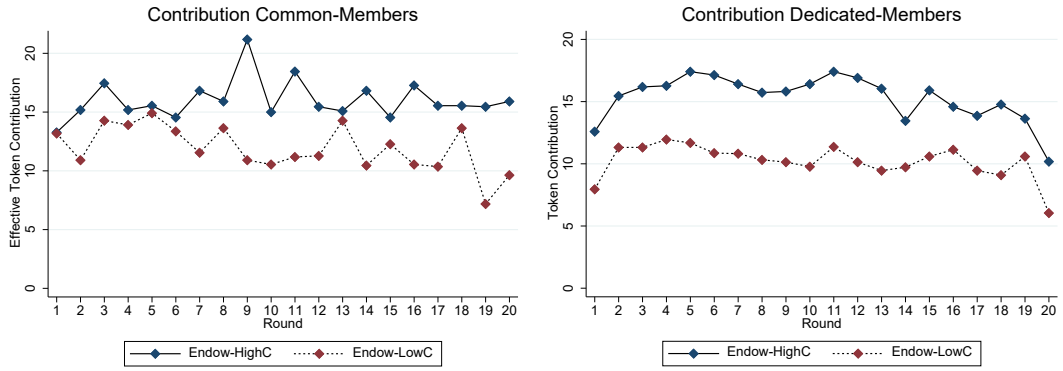
Contributions by common-members in *Productivity* are effective contributions as defined above.

HighC group in a pair were greater than or equal to contributions in the *LowC* group in the pair. This percentage was 75% in *Endowment* and 67% in *Productivity*.

[20] There was one pair in each of *Endowment* and *Productivity* whose group contributions tied in the first round. For these pairs, the rule for classifying *LowC* (*HighC*) was lower (higher) group contributions by dedicated-members in the second round. In addition, there are no systematic effects of the group labels (X and Y). Pooling mean contribution across all pairings: *Productivity* Group X = 14.20 tokens (st dev = 8.65) and Group Y = 24.06 tokens (st dev = 15.68), SR $p>0.10$; *Endowment* Group X = 43.36 tokens (st dev = 14.26) and Group Y = 35.54 tokens (st dev = 19.93), SR $p>0.10$.

Figure 5. Mean individual contributions of *HighC* and *LowC* groups

Endowment



Productivity

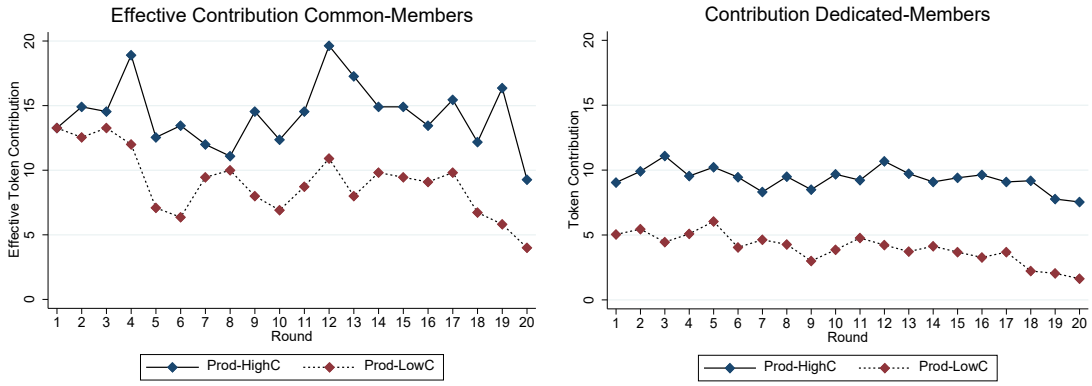


Figure 5 and Table 4 show that contributions of dedicated- and common-members are similar in both *HighC* and *LowC* groups in *Endowment* (*HighC* 15.31 vs. 16.01; *LowC* 10.19 vs. 11.90; SR $p > 0.14$ in both cases). However, in *Productivity*, contributions of dedicated-members are lower than the effective contributions of common-members (*HighC* 9.33 vs. 14.28; *LowC* 3.97 vs. 9.06; SR $p < 0.05$ in both cases). One interpretation of this finding is that dedicated-members in *Productivity* may place greater focus on absolute token contributions as opposed to the value added of contributions, i.e., effective contributions, by the common-member.

Dedicated-members' contributions were weakly higher in *HighC* groups than in *LowC* groups in both treatments (*Endowment* 15.31 vs. 10.19, SR $p = 0.0505$; *Productivity* 9.33 vs. 3.97, SR $p = 0.0619$). Contributions to *HighC* groups by common-members (effective contributions for

Productivity) are higher than in *LowC* groups in both treatments, but not significantly higher (*Endowment* 16.01 vs. 11.90; *Productivity* 14.28 vs. 9.06, SR $p > 0.10$ in both cases).

Comparing results from *Endowment* and *Productivity* to *CM* (Table 4 vs. Table 2), we observe the following. In *HighC* groups in *Endowment*, dedicated-members contributed somewhat greater amounts than in *CM* (*Endowment* 15.31 vs. *CM* 13.13, RS $p = 0.1569$) and (weakly) significantly higher amounts in *LowC* groups (*Endowment* 10.19 vs. *CM* 6.22, RS $p = 0.0848$). However, in both *HighC* and *LowC* groups in *Productivity*, dedicated-members contribute lower amounts than dedicated-members in *CM*, (*Productivity* 9.33 vs. *CM* 13.13, RS $p > 0.1757$ for *HighC* groups and *Productivity* 3.97 vs. *CM* 6.22, RS $p = 0.0193$ for *LowC* groups).

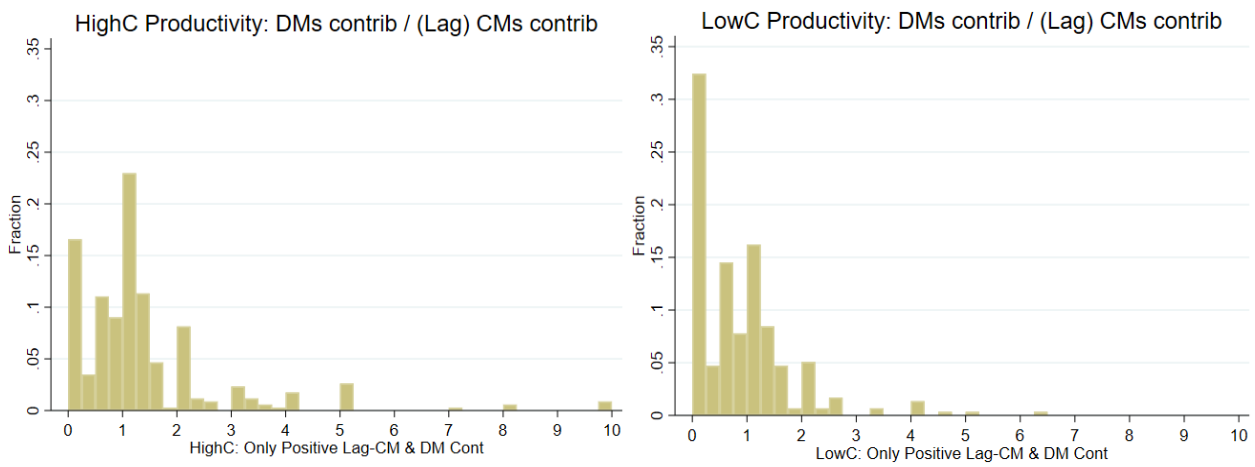
Result 3: *In partial support of Hypothesis 3, competition increases contributions of dedicated-members in both groups in Endowment compared to CM. However, the increase in contributions is only weakly significant in LowC groups. Contrary to Hypothesis 3, contributions of dedicated-members in both groups in Productivity are lower compared to CM. The difference is significant in LowC groups.*

The lower efficiency in *Productivity* compared to *Endowment* is not due to common-members behaving significantly differently between the two treatments. Comparing contributions by common-members in *Endowment* to effective contributions by common-members in *Productivity, HighC* and *LowC* groups are similar in each treatment (*HighC* 16.01 vs. 14.28; *LowC* 11.90 vs. 9.06; RS $p > 0.30$ in both cases). Dedicated-members, however, respond very differently to increases in endowment versus increases in productivity. Compared to dedicated-members in *Endowment*, contributions of dedicated-members in *HighC* and *LowC* in *Productivity* are significantly lower (*HighC* 15.31 vs. 9.33; *LowC* 10.19 vs. 3.97; RS $p < 0.02$ in both cases). Instead of matching value added, average contributions by dedicated-members in *Productivity* more closely match the absolute token contributions of common-members (*HighC* 9.33 vs. 7.14; *LowC* 3.97 vs. 4.53; SR $p > 0.10$ in both cases). Based on this analysis, across the two treatments that enhance the common-member's talent, it appears that dedicated-members in *Productivity* are driving the difference in observed efficiency.

The results above suggest two possible focal behaviors available to dedicated-members in *Productivity,* match either the absolute contributions or effective contributions of the common-member in their groups. Below, we explore the relative prevalence of both matching behaviors.

Figure 6 presents distributions of the ratio of contributions of dedicated-members to the lagged (since current contributions are unknown when making decisions) absolute contribution of common-members in their groups for *HighC* and *LowC* in *Productivity*. In every round in every group, there are two such ratios – one for each dedicated-member in the group, i.e., we do not average contributions for dedicated-members in a group in a round.[21]

Figure 6. Distributions of contributions of dedicated-members relative to lagged absolute contributions of common-members



A ratio of 1 (2) indicates that the dedicated-member matches the absolute (effective) lagged contribution of the common-member. A ratio lower than 1 implies a contribution less than the absolute contribution while a ratio greater than 2 implies a contribution more than the effective contribution of the common-member. A ratio between 1 and 2 indicates intermediate behavior. Table 5 shows the percentage of dedicated members displaying these sorts of behavior.

[21] We do not include observations where the lagged contribution of the common-member was zero since the ratio is undefined in such cases. We present an analysis of the contributions of dedicated-members in these instances in Appendix AIII of the ESM.

Table 5. Distribution of matching behavior by dedicated-members

	HighC		*LowC*	
Ratio	Number	%	Number	%
0	49	14%	85	27%
<1	89	24%	91	29%
1	70	19%	34	11%
>1 & <2	65	18%	55	17%
2	26	7%	14	4%
>2	67	18%	39	12%
Total	366	100%	318	100%

Ratio = contribution of dedicated-member / lagged absolute contribution of common-member.

In both *HighC* and *LowC* groups, the majority of dedicated-members' decisions display a contribution ratio that is less than or equal to 1; i.e., at best, they match the absolute contribution of the common-member. While there are instances where dedicated-members match (or more than match) the effective contributions of the common-member, they are a significant minority of all dedicated-members' contributions. This tendency of dedicated-members renders *Productivity* ineffective in raising contributions relative to levels observed in *CM.* This finding lends support to our earlier conjecture that it is the dedicated-members who drive the lower efficiency in *Productivity*.

Note that while the instructions and control questions informed all group members that common-members earned twice as much from tokens left in their private account, dedicated members were not explicitly prompted, when making decisions, to take into account the fact that common-members faced double the cost of contributions as dedicated-members. Thus, despite knowing the differences in earning capabilities of common-members relative to dedicated-members, it appears that the majority of dedicated-members, when reacting to the contribution decisions by common-members may not have fully incorporated the link between contributions/earnings and the differences in opportunity costs of contributions between common- and dedicated-members. As in naturally occurring settings, having common information does not necessarily imply individuals fully incorporate all relevant information when making decisions.

The above-noted tendencies are more prevalent in *LowC* groups than in *HighC* groups. About 14% of dedicated-members' contributions are zero in *HighC* groups while the figure is about 27% in

LowC groups. Moreover, about 19% of decisions exactly match absolute contributions by common-members (ratio = 1) in *HighC* groups while only 11% match in *LowC* groups. Finally, In *HighC* groups 25% of observations at least match effective contributions (ratio ≥ 2), compared to 16% in *LowC* groups. It thus appears that competition once again leads to winners and losers, and it is mostly the winners (*HighC* groups) who successfully compete for the contributions of the common-member.[22]

Interestingly, one might have conjectured that it would be common-members who would act differently in *Productivity* relative to *Endowment*. That is, as discussed above, in *Productivity*, common-members have twice the marginal opportunity cost of contributions relative to *Endowment*. The opportunity cost (= private return – group return) of contributing a token in *Productivity* (measured in tokens) equals 0.8 (= 2 – 1.2), as opposed to 0.4 (= 1 – 0.6) in *Endowment*. However, our main finding is that dedicated-members in *Productivity* behave differently than their counter-parts in *Endowment*. This finding led to the additional experiments discussed in the next section.

3.3 Additional treatments on the robustness of *Endowment* and *Productivity* treatment effects

Upon reflection, we decided that the resulting differences between *Endowmen*t and *Productivity* could be due to dedicated-members not fully accounting for differences in the marginal opportunity costs of contributions by common-members. However, it is also possible that the result is related to other features of the decision environment, such as the mere presence of a common-member.

To investigate this issue, we conducted two additional treatments. *No-CM-Endowment* and *No-CM-Productivity* are parallel to *Endowment* and *Productivity,* except that there is no common-member. In the both treatments, groups of 3 members participate in the same team public good game, and one of the three members has enhanced capabilities as in *Endowment* or *Productivity*.

[22] Note that, based on norms of reciprocity, contributions by dedicated members in a pair could be influenced by contributions of their counter-parts, as well as the common-member. Thus, if one dedicated member were to focus on the absolute contributions of the common-member, this could influence the other dedicated member to do likewise. In Appendix AIV, we provide a regression analysis designed to explore the magnitude of the response by dedicated-members to changes in contributions of the common-member and the other dedicated-member in their group. We find: a) dedicated-members in *Productivity* and *Endowment* react to the one-period lagged contributions of both the other group members, and b) further evidence in *Productivity* that the magnitude of dedicated-members' response to a change in contributions by common-members is more closely aligned with absolute contributions than effective contributions, with a larger response in *HighC* groups.

In *No-CM-Endowment*, one group member receives an endowment of 40 tokens each round, while the other two receive an endowment of 20. In *No-CM-Productivity*, each individual receives an endowment of 20. For one group member, the value added for each token contribution is doubled to 1.2, and the return from each token kept in his/her private account is also doubled to 2. In both treatments, the team member with enhanced capabilities in chosen randomly, and that team member retains these enhanced capabilities across all decision rounds.

In total, thirty-three subjects (11 independent groups of three subjects) participated in *No-CM-Endowment*. Subjects earned an average of $25.61 (min = $15.22, max = $34.45, st. dev. = $6.05). Thirty-six subjects (12 independent groups of three subjects) participated in *No-CM-Productivity*. Subjects earned an average of $24.63 (min = $15.47, max = $33.99, st. dev. = $5.52).

Figure 7 provides evidence on efficiency across decision rounds. As the figure shows, the trajectory across decisions rounds is different between the two treatments, with average efficiency in *No-CM-Productivity* declining at a somewhat faster rate, especially in later decision rounds. Table 6 reports average efficiency for each treatment, as well as contributions for group members, separated by those with and without either higher endowment or higher productivity in providing the group good. As above, effective contributions for enhanced-members in *No-CM-Productivity* are computed by doubling their token contributions. At the group level, overall efficiency is greater in *No-CM-Endowment* than in *No-CM-Productivity.* However, the difference is not statistically significant (RS p = 0.538).[23]

[23] Group members with enhanced capabilities in the *No-CM* treatments contribute very similar amounts on average (RS p = 0.735). Members with non-enhanced capabilities in *No-CM-Endowment* contribute at a higher level than their counterparts in *No-CM-Productivity*, although the difference is not statistically significant (RS p = 0.140).

Figure 7. Efficiency at group level across decision rounds

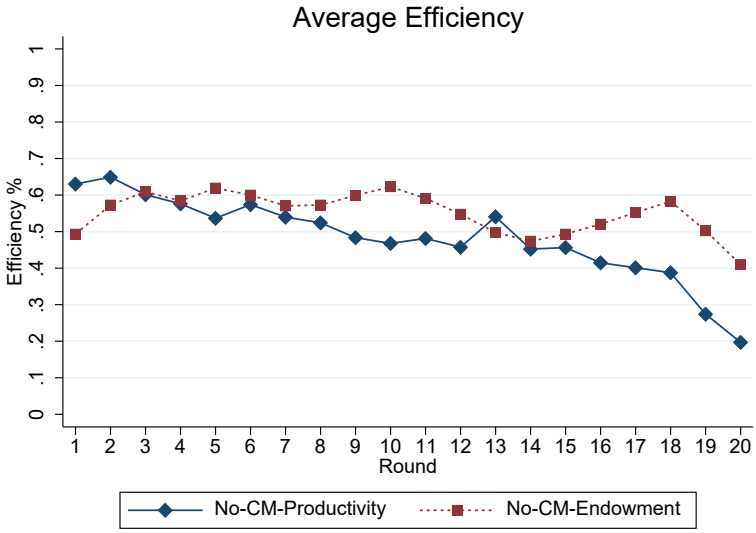


Table 6. Efficiency and contributions across treatments

	Efficiency in Contribution Mean (St Dev)	Members' Contributions Mean (St Dev)	
Treatment	Efficiency at Group Level	Enhanced	Non-Enhanced
No-CM-Endowment	55.07% (25.63)	18.79 (10.33)	12.63 (5.40)
	[79.31 out of 144]		
No-CM-Productivity	48.21% (24.27)	18.62 (11.01)	9.98 (4.50)
	[69.43 out of 144]		

In *No-CM-Endowment*, the enhanced member has an endowment of 40 tokens. In *No-CM-Productivity*, the enhanced member has an endowment of 20 tokens and contributions are doubled in value to yield effective contributions.

Enhanced members' contributions (effective contributions for *No-CM-Productivity*) are significantly greater than non-enhanced members' contributions in each treatment (SR $p < 0.004$ in both cases). On the other hand, from the perspective of percentage of tokens allocated to the group account, non-enhanced and enhanced members in *No-CM-Productivity* contribute similarly (49.89% vs. 46.54%, SR $p = 0.27$). However, non-enhanced members in *No-CM-Endowment* contribute a larger percentage of their maximum possible contribution than do enhanced members (63.17% vs. 46.98%, SR $p = 0.003$).

This last result contributes to the understanding of our earlier results regarding differences in behavior between *Endowment* and *Productivity*, relative to *CM*. On average, enhanced members in *No-CM-Endowment* and *No-CM-Productivity* effectively contribute more than non-enhanced members. When faced with divided loyalties in *Endowment* and *Productivity*, enhanced common-members shift that extra contribution to the other group, treating both groups more equally. However, as *No-CM-Productivity* suggests, group members without enhanced value to their contributions tend to match the token contributions of the enhanced members (9.98 vs. 9.31 tokens (effective = 18.62), RS $p = 0.27$).

In summary, these additional treatments lead us to conclude that the differences observed between *Endowment* and *Productivity* (Section 3.2) are most likely due to behavioral differences in how dedicated-members respond to the differences in the source of enhanced capabilities of the common-member. Specifically, parallel to non-enhanced members in *No-CM-Productivity*, there is evidence that a majority of dedicated-members in treatment *Productivity* focused on the absolute contributions of common-members, suggesting they did not pay sufficient attention to the higher opportunity costs faced by the common-member in contributing to the group account. This lower attention by dedicated-members in *Productivity* led to lower contributions on their part, that did not "match" the value added of the common-member's contributions. On the other hand, average contributions are equal to value added by the enhanced common-member in *Endowment* – thus, matching the contributions of common-members is equivalent to matching the value added by them. This difference in contribution behavior by dedicated-members in *Endowment* and *Productivity* has a significant impact on overall levels of efficiency achieved.

4. Conclusion

This experimental study provides evidence on team productivity in a decision setting where groups compete for the resources of a common-member. Team production takes place through contributions to a group level public good. In the baseline *CM* setting, where the common-member is in both groups and has resources and productivity equal to that of dedicated-members who are only in one group, we find evidence of competition for the resources of the common-member. The average contribution of dedicated-members is higher than that of the common-member. However, there are winners and losers because the common-member contributes more to the group with

initially higher contributions by the dedicated-members. The common-member's limited resources prevent him/her from matching the higher contributions of dedicated-members in both groups which, in accordance with norms of reciprocity, prevents contributions of dedicated members from rising higher. This leads to wasted potential. This study examines behavior in additional experiments that broaden the baseline setting by incorporating naturally occurring features of the decision setting expected to increase competition for the resources of the common-member.

In treatment *Choice*, the common-member chooses one group in which he/she can contribute in a given decision round, while still receiving benefits from both groups. This choice relaxes the resource constraint for the common-member as he/she can now contribute up to the maximum contributions of dedicated-members in the chosen group. Competition for the common-member increases as dedicated-members in both groups increase contributions, even in rounds when their group is not chosen. While total contributions across both groups does not dramatically increase, there are no longer winning and losing groups.

Two additional treatments increase the potential of the common-member to contribute to both groups. This is similar to common-members being more talented than dedicated-members. *Endowment* doubles the resource endowment of the common-member to enable him/her to potentially contribute the maximum contribution of dedicated-members in both groups. *Productivity* holds the resource endowment of the common-member constant, but doubles the value of resources contributed to a group by the common-member. In order to hold the marginal incentives from contribution constant for the common-member, the marginal opportunity cost of the common-member is also doubled in *Productivity*. The striking result in these treatments is that, while efficiency in total contributions increases in *Endowment* relative to *CM*, efficiency in contributions actually decreases in *Productivity*. Examining individual group member decisions reveals that this result can be attributed to a majority of dedicated-members making contributions that focus on the absolute contributions of the common-member in *Productivity*, instead of the effective contributions. Focusing on absolute contributions suggests dedicated members are not fully incorporating the higher opportunity costs that common-members face in making contributions in *Productivity*.

Our results offer insights into the design of work teams in organizations. Providing opportunities for some group members to participate in multiple teams can increase efficiency, but not always.

That is, within an organization, our results suggest that multiple team membership can be valuable under certain restrictions. Organizations could allow, or even force, common-members to choose one team, project, or location to work on at a time. Alternatively, organizations could screen for potential common-members to allow only those with greater skills to work on multiple teams.

Our results, however, point to the possibility that having common-members with higher productivity can be counter-productive in some settings. More specifically, our results point to how greater marginal opportunity costs of contributing for high-skilled workers can undermine overall team productivity through decreased effort by other team members. In an organizational setting, outside of contributing to team projects, members can contribute to other endeavors within or outside the firm. For instance, they may have consulting opportunities or other projects they can work on. Such opportunities are likely to be better for common-members with greater capabilities. Results from *Productivity* suggest dedicated-members, even if informed of these higher opportunity costs, might not fully incorporate these costs into how they interpret the common-member's contribution to their team. Without such appreciation, the competition for contributions of common-members would diminish, leading to lower levels of team productivity. This result points to the importance of both providing common-information among team members regarding heterogeneities and how to interpret and process such differences when making choices.

Although dedicated-members in *Productivity* were provided information regarding the marginal opportunity costs of the common-member, one could imagine that in small group settings, interactions such as face-to-face communication could make the importance of this point more transparent. In that sense, small experimental groups with anonymity and without communication opportunities may have characteristics more similar to larger groups where members are unable to accurately signal important differences among team members in regard to attributes such as opportunity costs.

Finally, our results can be more broadly interpreted concerning the effect of heterogeneity impeding cooperation in groups/teams. Heterogeneities regarding motives for taking (or not taking) actions, as well as the costs of taking actions can hinder our understanding of lack of cooperation by some group/team members. Recent experiences within and across groups in relation to Covid-19 provide important examples. Future experimental work provides a rich setting for gaining a better understanding of how heterogeneities, coupled with asymmetries in

information, combine to influence how group/team members interpret and act on heterogeneities as they make choices regarding cooperation.

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Electronic Supplementary Materials

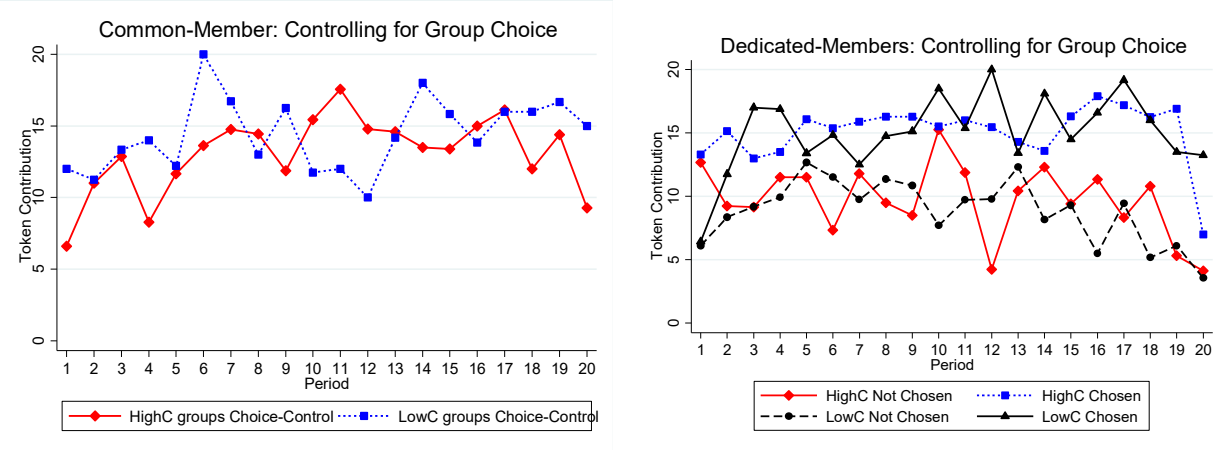
Naturally occurring enhancements to competition for talent in teams

Appendix A: Additional Analyses

Appendix A.I: *Choice* analysis based on common-member's group choice

Figure AI and Table AI provide results on contributions of common- and dedicated-members in the groups chosen and not chosen responded. Unlike Table 2 and Figure 3 in the main paper, means for common-members in *Choice* do NOT include zeros in rounds when the other group was chosen. Recall, the decision in the first round was randomly chosen by the computer. In rounds 2-20, common-members chose the *HighC* group 59% of the time (max 100% and min 0%).[1]

Figure AI. *Choice* mean individual contributions by common-member's group choice



Common-members in *Choice* contributed more to groups they chose than common-members contributed to *HighC* groups in *CM* (RS 13.70 vs. 8.65, p = 0.0116). Dedicated-members contribute more when their group is chosen, in both *HighC* (SR 14.71 vs. 10.13, p = 0.0506) and *LowC* (12.76 vs. 9.35, SR p = 0.0284) groups.[2]

Average contributions by dedicated-members in *LowC* groups not chosen by the common-member in *Choice* are higher than contributions by dedicated-members in *LowC* in *CM*, but not significantly so (RS 9.35 vs. 6.22, p = 0.3559). However, average contributions by dedicated-members in *LowC* groups chosen by the common-member in *Choice* are significantly higher than contributions by dedicated-members in *LowC* groups in *CM* (RS 12.76 vs. 6.22, p = 0.0349). This provides partial support of increased competition in *Choice*.

[1] The average contribution of dedicated-members in *HighC* groups Chosen and Not Chosen by the common-member (12.42) is not exactly the same as the average contribution by dedicated-members in *HighC* groups reported in Table 2 (12.94). Similarly, the average contribution of dedicated-members in *LowC* groups in Table AI (11.06) is not exactly the same as the average of dedicated-members in *LowC* groups in reported in Table 2 (11.26).
This is due to some groups with no data in Table AI. For instance, in one pair, the common-member never chose the *LowC* group. The dedicated-members in the *HighC* group in this pair were always chosen and the dedicated-members in the *LowC* group were never chosen.

[2] The sample size of these Signrank tests is n = 9 because of two pairs where common-members always chose the same group every round.

Table AI. *Choice* mean individual contributions by common-member's group choice

	Choice						
	Common			Dedicated-Chosen		Dedicated-Not Chosen	
Round	*Chosen Group*	*HighC*	*LowC*	*HighC*	*LowC*	*HighC*	*LowC*
First	9.54 (7.69)	6.60 (4.22)	12.00 (9.38)	13.30 (4.76)	6.42 (3.97)	12.67 (1.63)	6.10 (4.17)
Second	11.09 (6.39)	11.00 (6.95)	11.25 (6.29)	15.14 (4.15)	11.75 (4.43)	9.25 (3.28)	8.36 (4.54)
All 20	13.70 (3.96)	12.93 (4.13)	13.35 (4.14)	14.71 (3.09)	12.76 (6.13)	10.13 (4.91)	9.35 (6.73)

The common-member's contribution in the group not chosen is constrained to be zero. In one pair, the common-member never chose the *LowC* group, and in another pair, the common-member never chose the *HighC* group.

Average contributions by dedicated-members in *HighC* groups not chosen by the common-member in *Choice* are lower than contributions by dedicated-members in *HighC* in *CM*, but not significantly so (RS 10.13 vs. 13.13, p = 0.3559). Average contributions by dedicated-members in *HighC* groups chosen by the common-member in *Choice* are higher than contributions by dedicated-members in *HighC* groups in *CM*, but not significantly so (RS 14.71 vs. 13.13, p = 0.3913).

Figure AII. Common-members' choice & dedicated-members' contributions in a pair in the previous round

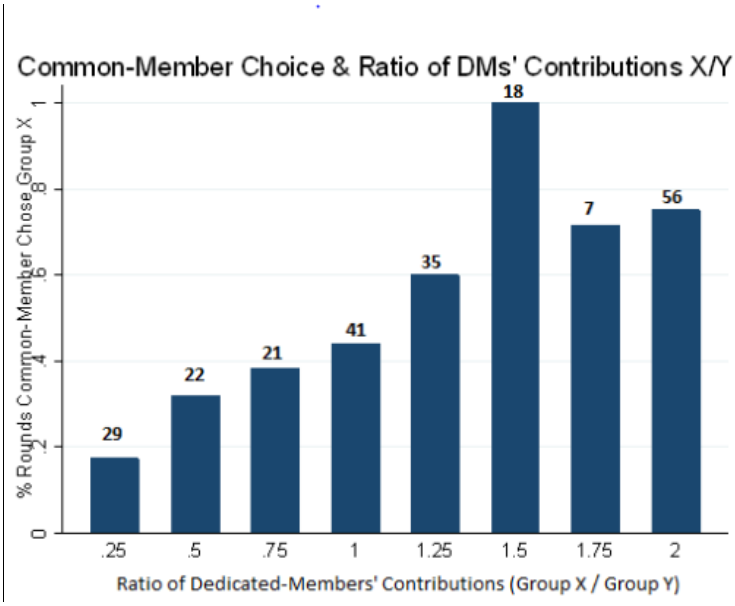


Figure AII illustrates the common-members' group choice as it relates to the fraction of dedicated-members' contributions in each Group in the previous round. When the dedicated-members in Group X contributed more to the group account in the previous round than dedicated-members in Group Y contributed in the previous round, the ratio in the figure is greater than one. The "2" bar

pools data from all ratios greater than or equal to 2. The maximum defined ratio is 30. When the dedicated-members in Group Y contributed zero in the previous round, then this ratio is undefined. Such (28) observations are also lumped in with the "2" bar in Figure AII. The numbers on the top of each bar are the number of observations in that bar. The trend in the figure is clear; the percentage of rounds the CM chooses Group X increases as dedicated-members in Group X increase their contributions relative to that of Group Y.

Table AII. Logit regression: Likelihood of Group X being chosen by the common-member

	Odds Ratios	
	Model 1	Model 2
Dummy: Group X is *HighC* group	3.34*	2.04
	(2.33)	(2.05)
Dummy: Contributions higher in Group X (of dedicated-members) in prev. round	6.79***	----
	(4.55)	
X is *HighC* × Cont. higher in X	0.28	----
	(0.23)	
Ratio of DM's Contributions X/Y	----	2.39***
		(0.68)
X is *HighC* * Ratio of DM's Cont	----	0.90
		(0.14)
Round	0.97	0.96
	(0.03)	(0.04)
Constant	0.61	0.38
	(0.36)	(0.30)

Both Models: N=209. Random effects for 11 independent groups.

Table AII reports a panel logit regression with an indicator for Group X being chosen as the dependent variable. Independent variables for Model 1 include a dummy variable for whether Group X is the *HighC* group, a dummy variable for whether dedicated-members in Group X contributed more than dedicated-members in Group Y in the previous period, an interaction of these variables, and a round variable. Model 2 is the same as Model 1, except the actual ratio of dedicated-members' contributions in Group X / Group Y is used in place of the dummy variable for whether dedicated-members contributed more in Group X. Odds ratios are reported. Odds ratios greater than one indicate a positive correlation between that variable and the likelihood Group X is chosen. Odds ratios less than one indicate a negative correlation between that variable and the likelihood Group X is chosen.

In Model 1, the primary predictor of which group the common-member chooses is the group of dedicated-members who contributed more in the previous round. The likelihood Group X is chosen is weakly higher when Group X is the *HighC* group in a pair. The interaction and the time trend

are not significant. In Model 2, the ratio of dedicated-members' contributions in Group X / Group Y is the primary predictor, consistent with the result from Model 1.

Appendix A.II: Regression analysis to support non-parametric tests

Table AIII. Group-level regressions of efficiency %

	Model 3: *CM* & *Choice*	Model 4: *CM*, *Endowment*, & *Productivity*
Lagged Pair Efficiency (X + Y)	83.33%***	84.46%***
	(2.95%)	(3.11%)
Choice Dummy	1.93%	----
	(1.32%)	
Endowment Dummy	----	-1.91%
		(1.37%)
Productivity Dummy	----	2.45%*
		(1.39%)
Period	-0.51%***	-0.40%***
	(0.12%)	(0.07%)
Constant	13.70%***	11.88%***
	(2.45%)	(2.21%)

Each model reports a group-level random effects regression with *CM* as the omitted treatment dummy. Standard errors are clustered at the group level in each Model. Model 3: 23 clusters & n=437. Model 4: 34 clusters & n=646.

Table AIV. Individual-level regressions of effective contributions

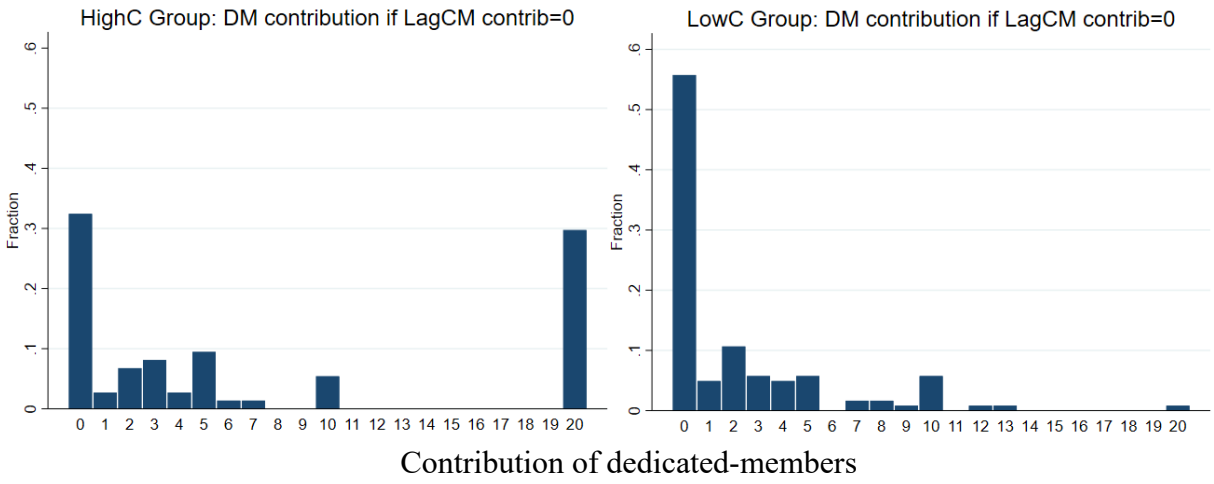
	Model 5: *CM* & *Choice*	Model 6: *CM*, *Endowment*, & *Productivity*
Lagged deviation from average contribution of others	0.02 (0.03)	0.62* (0.03)
Choice Dummy	6.84*** (0.78)	----
Chosen by Common-Member Dummy	5.19*** (1.14)	----
Endowment Dummy	----	4.54*** (1.38)
Productivity Dummy	----	-0.62 (1.15)
HighC Dummy	3.63*** (1.17)	5.79*** (1.12)
Common-Member Dummy	-3.30*** (0.93)	1.38** (0.71)
*HighC**Common	-1.18 (1.10)	-1.05 (1.03)
Period	-0.11*** (0.04)	-0.15*** 0.03
Constant	2.54* (1.39)	7.19*** (1.00)

Each model reports an individual-level random effects panel regression with *CM* is the omitted dummy variable in each Model. Standard errors are clustered at the group level in each model. Model 5: n=2,622 & 23 clusters. Model 6: n=3,876 & 34 clusters.

Appendix A.III: *Productivity*: Contributions of dedicated-members when contribution ratio is undefined

Figure 6 and Table 5 in the main text analyze the ratio of dedicated-members' contributions to lagged absolute contributions of common-members in *Productivity*. As mentioned there, we omitted observations where the lagged contribution of the common-member was zero, since the ratio is undefined in those instances. Here, we focus on those omitted cases. Figure AIII shows the distribution of dedicated-members' contributions in *HighC* and *LowC* groups when the lagged contribution of the common-member was zero. As in Figure 6, we include decisions by both dedicated-members in a group.

Figure AIII. Distribution of contributions of dedicated-members when lagged contribution of the common-member was zero



Note that matching the absolute or effective contribution of the common-member entail the same thing here – zero contribution by dedicated-members. As the figure shows, there is a substantial proportion of cases in which this happens, both in *HighC* (about 33%) and *LowC* (about 55%) groups. However, in both groups, there are instances of positive contributions by dedicated-members – in about 66% of instances in *HighC* groups and about 45% of instances in *LowC* groups. It thus appears that there are attempts to try and attract the common-member *back* to the group when the common-member has abandoned a group in a round. However, such 'abandonment' is very rare - 37 instances in *HighC* groups and 61 instances in *LowC* groups. Such attempts are thus insufficient to raise efficiency in *Productivity*.

Figure AIII tells the same story as Figure 6 when it comes to a comparison between *HighC* and *LowC* groups. A substantially larger fraction of decisions is zero in *LowC* groups than in *HighC* groups (55% vs. 33%). Further, about one-third of contributions are the full 20 tokens in *HighC* groups while the fraction is negligible in *LowC* groups. As seen in the main text, competition is stronger in *HighC* groups than in *LowC* groups, as are contributions.

Appendix A.IV: Relative importance of common- and dedicated-members' contributions

We test if dedicated-members pay greater attention to the contributions of common-members or the other dedicated-members in their group. Table AV presents panel random effects regressions of dedicated-members' contributions in a round on the one-round lagged contribution of the other dedicated-member in the group, the one-round lagged contribution of the common-member in the group, a dummy for the *HighC* group, interactions of the dummy with the lagged contribution variables and a time trend. We report standard errors clustered on independent 5-person pairs. For *Productivity*, we report regressions where the common-member's lagged contribution is measured in absolute and in effective (double the absolute contribution) terms. in *Endowment*, absolute contributions and effective contributions of the common-member are identical. In all cases, dedicated-members' contributions are their absolute token contributions

Table AV. Determinants of contributions of dedicated-members

	Productivity		Endowment
	Absolute	Effective	Absolute
Lagged other DM's contribution	0.172***	0.172***	0.260***
	0.064	0.064	0.075
Lagged CM's contribution	0.132**	0.066**	0.114***
	0.060	0.030	0.037
HighC dummy	1.788	1.788	2.870
	1.760	1.760	2.510
HighC × Lagged other DM's contribution	0.036	0.036	0.049
	0.101	0.101	0.134
HighC × Lagged CM's contribution	0.282***	0.141***	-0.018
	0.078	0.039	0.068
Round	-0.106**	-0.106**	-0.158***
	0.049	0.049	0.031
Constant	3.763***	3.763***	7.961***
	0.956	0.956	1.822
Observations	836	836	836
Chi-sq Test p-value	0.5987	0.0947	0.0299

Notes: Panel RE regressions with standard clustered on independent pairs
CM = common-member; DM = dedicated-member in group
Absolute contributions = effective contributions in Endowment
Chi-sq test is for the null hypothesis Lagged other DM's contribution = Lagged CM's contribution. p-values are for two-sided tests

In *Productivity*, dedicated-members condition their current contributions on the past contributions of both the other dedicated-member and the common-member, whether looking at absolute or effective contributions of the common-member. Post-regression tests show that, in *LowC* groups, dedicated-members pay no more attention to one than the other when focusing on absolute ($p = 0.5987$) or effective ($p = 0.0947$) contributions of the common-member.

Further, the interaction between *HighC* and lagged contributions of the common-member is positive and significant in both regressions. Dedicated-members in *HighC* groups are more likely to track the contributions of the common-member than those in *LowC* groups, thus making higher contributions and attracting the common-member to their group (*HighC* × Lagged CM's contribution coefficient, $p < 0.001$ for absolute & effective contributions of the common-member). Post-regression tests show that, in *HighC* groups, dedicated-members are more responsive to absolute contributions of the common-member ($p = 0.0169$) than the other dedicated-member in the group, but not in effective contributions ($p= 0.9895$). Thus, as reported in the main text, competition favors the winner (the *HighC* group) and even here, dedicated-members display a tendency to match absolute contributions of common-members rather than their effective contributions.

In *Endowment*, dedicated-members once again react to the contributions of the common-member and the other dedicated-member in the group. Post-regression tests show that dedicated-members are more responsive to the other dedicated-member's than the common-member's contribution ($p = 0.0299$ in *LowC* groups; $p = 0.006$ in *HighC* groups). However, as stated in the main text, contributions of the common-member are slightly higher than those of the dedicated-members. Finally, there is no difference between *HighC* and *LowC* groups in the extent to which they react to past contributions of the common-member (*HighC* × Lagged CM's contribution coefficient, $p = 0.792$). Thus, both groups respond to competition, and benefit from it.

Appendix B: Experimental Instructions

CM Instructions

Thank you for coming. This is an experiment about decision-making. Your cash payment will be based on your earnings in the experiment.

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.

The experiment consists of 20 decision rounds. Your total earnings will be the sum of your earnings from all decision rounds.

At the beginning of the experiment, participants will randomly be divided into groups of 3.

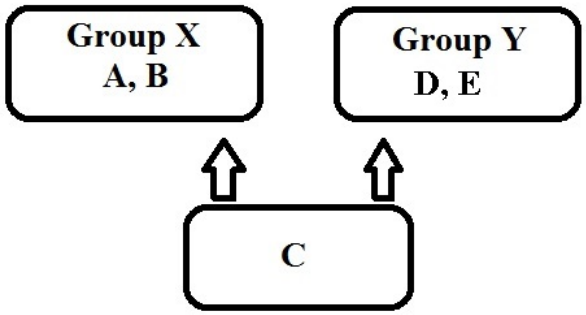
For record keeping purposes, the computer will randomly assign half of the groups with the label Group X and half with the label Group Y. Thus, there will be several groups with the label Group X and several with the label Group Y.

The members of your group will remain the same for the rest of the experiment. In addition, your group will have the same label for the rest of the experiment. Thus, if you are assigned to a Group X, you will be in the same Group X in all 20 decision rounds.

The computer will randomly assign each individual in a Group X an ID letter, either A, B or C. The computer will randomly assign each individual in a Group Y an ID letter, either C, D, or E. The ID letter assigned will not change. Thus, if you are assigned to a Group X and the ID letter A, your ID will be A in all 20 decision rounds. Other than the people conducting this experiment, you are the only person who will know your group label and ID letter.

Your group will also be matched with another group of three people in the lab. If you are in Group X, your group will be matched with a Group Y, and vice versa. **If your ID letter is A or B**, you will be a member of only one group - labeled Group X. **If your ID letter is D or E**, you will be a member of only one group - labeled Group Y. **If your ID letter is C, you will be a member of both groups** (Group X *and* Group Y). That is, person C is the same person in *both* groups. Figure 1 shows the composition of groups in the experiment.

Figure 1. Composition of groups



In summary, the members of each group will remain the same across all decision rounds. Also, in each round, your group will be matched with the same group. This means that you will interact with the same other ***four*** people in your group(s) throughout the experiment. You will not be informed of the identities of the members of your group or the members of the other group.

You will record your decisions privately at your computer terminal.

During the experiment, all decisions are made in tokens (more details are provided below). Your total earnings will also be calculated in tokens. At the end of the experiment, your earnings will be converted to Dollars at the following rate:

30 tokens = $1

You will be paid individually and privately in cash at the end of the experiment.

Decision Task

At the beginning of each round, each member of each group receives an endowment of 20 tokens. If your ID letter is C, you will *also* receive an endowment of 20 tokens each round.

If your ID letter is A, B, D, or E, **in each decision round (rounds 1 through 20),** your task is to allocate your endowment of 20 tokens between your *Private Account* and a *Group Account* in only your group. Each token not allocated to the *Group Account* will automatically remain in your *Private Account*.

If your ID letter is C, **in each decision round (rounds 1 through 20),** your task is to allocate your endowment of 20 tokens among your *Private Account*, a *Group Account* in Group X, and a *Group Account* in Group Y. Each token not allocated to either *Group Account* will automatically remain in your *Private Account*.

Earnings for Group Members

Earnings from your *Private Account* in each round: You will earn one (1) token for each token allocated to your *Private Account*. No one else will earn from your *Private Account*.

Earnings from the *Group Account* in each group in each round: For each token you allocate to the *Group Account*, you will earn 0.6 tokens. Each of the other two members of your group will also earn 0.6 tokens for each token you allocate to the *Group Account*.

Note that, because member C is a member of both groups, **member C receives earnings from both *Group Accounts***, X and Y, in each round. This includes all decision rounds 1-20.

Thus each allocation of 1 token to the *Group Account* yields a total of 1.8 tokens for your group. Your earnings from the *Group Account* are based on the total number of tokens allocated to the *Group Account* by all members in your group. In summary, each member of a group will profit equally from the tokens allocated to the *Group Account* – for each token allocated to the *Group Account*, each member of your group will earn 0.6 tokens regardless of who made the allocation. This means that you will earn from your own allocation to the *Group Account* as well as from the allocations to the *Group Account* of your group members. Earnings from the *Group Account* are calculated in the same manner in *both* groups.

Your total earnings in each round

If your ID letter is A or B:

Your earnings in each round = Earnings from your *Private Account*

+ Earnings from the *Group Account* in your Group X

If your ID letter is D or E:

Your earnings in each round = Earnings from your *Private Account*

+ Earnings from the *Group Account* in your Group Y

If your ID letter is C:

Your earnings in each round = Earnings from your *Private Account*

+ Earnings from the *Group Account* in Group X

+ Earnings from the *Group Account* in Group Y

The following examples show the calculation of earnings in each group in a round. These examples are for illustrative purposes only.

Example 1. Suppose you are in a Group X, your ID letter is B, and you allocated 0 tokens to the *Group Account*. Further suppose that group members A and C also each allocated 0 tokens to the *Group Account*. The total number of tokens in the *Group Account* would be 0.

Your earnings in this round would be 20 tokens (= 20 tokens from your *Private Account* and 0 tokens from the *Group Account*). The earnings of group member A would also be 20 tokens. In this example, the earnings of group member C would be 0 tokens from the *Group Account* in Group X. However, the total earnings of group member C would also depend on decisions in Group Y. This is covered in more detail in Example 4 below.

Example 2. Suppose you are in a Group Y, your ID letter is E, and you allocated 10 tokens to the *Group Account*. Further suppose that group members C and D each allocated 0 tokens to the *Group Account*. The total number of tokens in the *Group Account* would be 10.

Your earnings in this round would be 16 tokens (= 10 tokens from your *Private Account* + 0.6*10 = 6 tokens from the *Group Account*. The earnings of group member D would be 26 tokens (= 20 tokens from the *Private Account* + 0.6*10 = 6 tokens from the *Group Account*). In this example, the earnings of group member C would be 6 tokens from the *Group Account* in Group Y. However, the total earnings of group member C would also depend on decisions in Group X. This is covered in more detail in Example 4 below.

Example 3. Suppose you are in a Group Y, your ID letter is D, and you allocated 20 tokens to the *Group Account*. Further suppose that group members C and E also each allocated 20 tokens to the *Group Account*. The total number of tokens in the *Group Account* would be 60 (40 from you and member E together and 20 from member C).

Your earnings in this round would be 36 tokens (= 0 tokens from your *Private Account* + 0.6*60 = 36 tokens from the *Group Account*). The earnings of group member E would also be 36 tokens. The earnings

of group member C would be 36 tokens from your *Group Account* plus the earnings based on the decisions in Group X. This is covered in more detail in Example 4 below.

Note, if group member C allocates 20 tokens to the *Group Account* in one group, he/she will have no tokens remaining in his/her *Private Account* to allocate to the *Group Account* in the other group

Example 4. **(This example will focus only on the earnings for group member C.)** Suppose your ID letter is C and you allocated 7 tokens to the *Group Account* in Group X and 8 tokens to the *Group Account* in Group Y. Further suppose group members A and B in Group X **each** allocated 13 tokens to the *Group Account*. Additionally, suppose group members D and E in Group Y **each** allocated 12 tokens to the *Group Account*. This means a total of 33 tokens were allocated to the *Group Account* in Group X and 32 tokens were allocated to the *Group Account* in Group Y.

Your earnings in this round would be 44 tokens (= 5 tokens from your *Private Account* + (0.6*33 = 19.8 tokens from the *Group Account* for Group X) + (0.6*32 = 19.2 tokens from the *Group Account* for Group Y)).

Information After Each Decision Round

After all individuals have made their decisions in the round, the computer will tabulate the results. You will be informed of the total allocation to the *Group Account* in your group and the individual allocation decisions of each member of your group, identified by their ID letters (which will remain the same in each round). Your allocation will be shown on top. The other group members' allocations will be listed below, alphabetically by ID letters.

In addition, you will be shown the total allocation to the *Group Account* in your group in all previous rounds. You will **not** be shown the individual allocations of the members of your group in previous rounds.

If your ID letter is A or B, you will see the above information only for your group - Group X. In particular, you will not see C's allocation to the *Group Account* in Group Y.

If your ID letter is D or E, you will see the above information only for your group - Group Y. In particular, you will not see C's allocation to the *Group Account* in Group X.

If your ID letter is C, you will see the above information for *both* groups (Groups X *and* Y). In particular, you will see the allocations to the *Group Account* by A and B in Group X and the allocations to the *Group Account* by D and E in Group Y.

You will also be informed of your *individual* earnings in tokens from the round.

Your earnings from earlier decision rounds cannot be used in future rounds. You will receive a new endowment in each of the 20 decision rounds.

Questions to help you understand the decision task

When everyone has finished reading the instructions, we will ask you a few questions regarding the decisions you will make in the experiment. These questions will help you understand the calculation of your earnings and ensure that you have understood the instructions. You will answer these questions in private on your computer terminal. Once everyone has answered all questions correctly we will begin the experiment.

Choice Instructions

Thank you for coming. This is an experiment about decision-making. Your cash payment will be based on your earnings in the experiment.

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.

The experiment consists of 20 decision rounds. Your total earnings will be the sum of your earnings from all decision rounds.

At the beginning of the experiment, participants will randomly be divided into groups of 3.

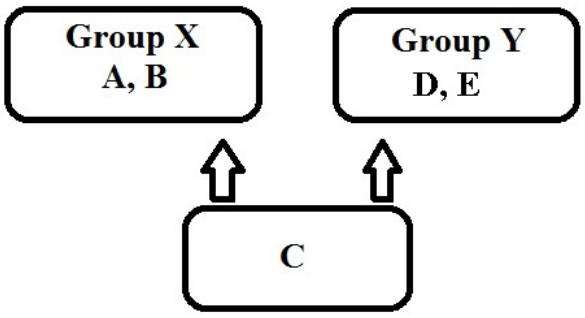
For record keeping purposes, the computer will randomly assign half of the groups with the label Group X and half with the label Group Y. Thus, there will be several groups with the label Group X and several with the label Group Y.

The members of your group will remain the same for the rest of the experiment. In addition, your group will have the same label for the rest of the experiment. Thus, if you are assigned to a Group X, you will be in the same Group X in all 20 decision rounds.

The computer will randomly assign each individual in a Group X an ID letter, either A, B or C. The computer will randomly assign each individual in a Group Y an ID letter, either C, D, or E. The ID letter assigned will not change. Thus, if you are assigned to a Group X and the ID letter A, your ID will be A in all 20 decision rounds. Other than the people conducting this experiment, you are the only person who will know your group label and ID letter.

Your group will also be matched with another group of three people in the lab. If you are in Group X, your group will be matched with a Group Y, and vice versa. **If your ID letter is A or B**, you will be a member of only one group - labeled Group X. **If your ID letter is D or E**, you will be a member of only one group - labeled Group Y. **If your ID letter is C, you will be a member of both groups** (Group X *and* Group Y). That is, person C is the same person in *both* groups. Figure 1 shows the composition of groups in the experiment.

Figure 1. Composition of groups



In summary, the members of each group will remain the same across all decision rounds. Also, in each round, your group will be matched with the same group. This means that you will interact with the same other ***four*** people in your group(s) throughout the experiment. You will not be informed of the identities of the members of your group or the members of the other group.

You will record your decisions privately at your computer terminal.

During the experiment, all decisions are made in tokens (more details are provided below). Your total earnings will also be calculated in tokens. At the end of the experiment, your earnings will be converted to Dollars at the following rate:

30 tokens = $1

You will be paid individually and privately in cash at the end of the experiment.

Decision Task

At the beginning of each round, each member of each group receives an endowment of 20 tokens. If your ID letter is C, you will *also* receive an endowment of 20 tokens each round.

If your ID letter is A, B, D, or E, **in each decision round (rounds 1 through 20),** your task is to allocate your endowment of 20 tokens between your *Private Account* and a *Group Account* in your group. Each token not allocated to the *Group Account* will automatically remain in your *Private Account*.

If your ID letter is C, in the **first decision round**, either Group (X or Y) is chosen **randomly** by the computer. All members (A, B, C, D and E) are informed of the Group (X or Y) chosen randomly by the computer. Your task is then to allocate your 20 tokens between your *Private Account* and the *Group Account* **in the Group randomly chosen by the computer**. You cannot allocate any tokens to the *Group Account* in the Group **not** chosen by the computer in the first round. Each token not allocated to the *Group Account* will automatically remain in your *Private Account*.

After the first round (rounds 2 through 20), **if you are member C**, **you will choose one Group (X or Y).** All members (A, B, C, D and E) are informed of the Group (X or Y) chosen by you. Your task is then to allocate your 20 tokens between your *Private Account* and the *Group Account* **in the Group chosen by you**. You cannot allocate any tokens to the *Group Account* in the Group you did **not** choose in that round. Each token not allocated to the *Group Account* will automatically remain in your *Private Account*.

Earnings for Group Members

Earnings from your *Private Account* in each round: You will earn one (1) token for each token allocated to your *Private Account*. No one else will earn from your *Private Account*.

Earnings from the *Group Account* in each group in each round: For each token you allocate to the *Group Account*, you will earn 0.6 tokens. Each of the other two members of your group will also earn 0.6 tokens for each token you allocate to the *Group Account*.

Note that, because member C is a member of both groups, **member C receives earnings from both *Group Accounts***, X and Y, in each round **regardless** of which group he/she chooses in each round. This includes all decision rounds 1-20.

Thus each allocation of 1 token to the *Group Account* yields a total of 1.8 tokens for your group. Your earnings from the *Group Account* are based on the total number of tokens allocated to the *Group Account* by all members in your group. In summary, each member of a group will profit equally from the tokens allocated to the *Group Account* – for each token allocated to the *Group Account*, each member of your group will earn 0.6 tokens regardless of who made the allocation. This means that you will earn from your own allocation to the *Group Account* as well as from the allocations to the *Group Account* of your group members. Earnings from the *Group Account* are calculated in the same manner in *both* groups.

Your total earnings in each round

If your ID letter is A or B:

Your earnings in each round = Earnings from your *Private Account*

+ Earnings from the *Group Account* in your Group X

If your ID letter is D or E:

Your earnings in each round = Earnings from your *Private Account*

+ Earnings from the *Group Account* in your Group Y

If your ID letter is C:

Your earnings in each round = Earnings from your *Private Account*

+ Earnings from the *Group Account* in Group X

+ Earnings from the *Group Account* in Group Y

The following examples show the calculation of earnings in each group in a round. These examples are for illustrative purposes only and represent situations after round 1, where member C will choose a group X or Y at the beginning of a round.

Example 1. Suppose you are in a Group X, and your ID letter is B. Suppose member C chose Group X at the beginning of the round, and you allocated 0 tokens to the *Group Account*. Further suppose that group members A and C also each allocated 0 tokens to the *Group Account*. The total number of tokens in the *Group Account* would be 0.

Your earnings in this round would be 20 tokens (= 20 tokens from your *Private Account* and 0 tokens from the *Group Account*). The earnings of group member A would also be 20 tokens. In this example, the earnings of group member C would be 0 tokens from the *Group Account* in Group X. However, the total earnings of group member C would also depend on decisions in Group Y. This is covered in more detail in Example 4 below.

Example 2. Suppose you are in a Group Y, and your ID letter is E. Suppose member C chose Group X at the beginning of the round, and you allocated 10 tokens to the *Group Account*. Further suppose that group member D allocated 0 tokens to the *Group Account*. Group member C cannot allocate any tokens to the *Group Account* in your Group in this round, because they chose Group Y at the beginning of the round. The total number of tokens in the *Group Account* would be 10.

Your earnings in this round would be 16 tokens (= 10 tokens from your *Private Account* + 0.6*10 = 6 tokens from the *Group Account*. The earnings of group member D would be 26 tokens (= 20 tokens from the *Private Account* + 0.6*10 = 6 tokens from the *Group Account*). In this example, the earnings of group member C would be 6 tokens from the *Group Account* in Group Y. However, the total earnings of group member C would also depend on decisions in Group X. This is covered in more detail in Example 4 below.

Example 3. Suppose you are in a Group Y, and your ID letter is D. Suppose member C chose Group Y at the beginning of the round, and you allocated 20 tokens to the *Group Account*. Further suppose that group members C and E also each allocated 20 tokens to the *Group Account*. The total number of tokens in the *Group Account* would be 60 (40 from you and member E together and 20 from member C).

Your earnings in this round would be 36 tokens (= 0 tokens from your *Private Account* + 0.6*60 = 36 tokens from the *Group Account*). The earnings of group member E would also be 36 tokens. The earnings of group member C would be 36 tokens from your *Group Account* plus the earnings based on the decisions in Group X. This is covered in more detail in Example 4 below.

Example 4. **(This example will focus only on the earnings for group member C.)** Suppose your ID letter is C, you chose Group X at the beginning of the round, and you allocated 7 tokens to the *Group Account* in Group X. You cannot allocate any tokens to the *Group Account* in Group Y in this round. Further suppose group members A and B in Group X **each** allocated 13 tokens to the *Group Account*. Additionally, suppose group members D and E in Group Y **each** allocated 12 tokens to the *Group Account*. This means a total of 33 tokens were allocated to the *Group Account* in Group X and 24 tokens were allocated to the *Group Account* in Group Y.

Your earnings in this round would be 47.2 tokens (= 13 tokens from your *Private Account* + (0.6*33 = 19.8 tokens from the *Group Account* for Group X) + (0.6*24 = 14.4 tokens from the *Group Account* for Group Y)).

Information After Each Decision Round

After all individuals have made their decisions in the round, the computer will tabulate the results. You will be informed of the total allocation to the *Group Account* in your group and the individual allocation decisions of each member of your group, identified by their ID letters (which will remain the same in each round). Your allocation will be shown on top. The other group members' allocations will be listed below, alphabetically by ID letters.

In addition, you will be shown the total allocation to the *Group Account* in your group in all previous rounds. For each of the previous rounds, you will also be shown which Group was chosen by member C. You will **not** be shown the individual allocations of the members of your group in previous rounds.

If your ID letter is A or B, you will see the above information only for your group - Group X. In particular, you will not see C's allocation to the *Group Account* in Group Y.

If your ID letter is D or E, you will see the above information only for your group - Group Y. In particular, you will not see C's allocation to the *Group Account* in Group X.

If your ID letter is C, you will see the above information for *both* groups (Groups X *and* Y). In particular, you will see the allocations to the *Group Account* by A and B in Group X and the allocations to the *Group Account* by D and E in Group Y.

You will also be informed of your *individual* earnings in tokens from the round.

Your earnings from earlier decision rounds cannot be used in future rounds. You will receive a new endowment in each of the 20 decision rounds.

Questions to help you understand the decision task

When everyone has finished reading the instructions, we will ask you a few questions regarding the decisions you will make in the experiment. These questions will help you understand the calculation of your earnings and ensure that you have understood the instructions. You will answer these questions in private on your computer terminal. Once everyone has answered all questions correctly we will begin the experiment.

Endowment Instructions

Thank you for coming. This is an experiment about decision-making. Your cash payment will be based on your earnings in the experiment.

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.

The experiment consists of 20 decision rounds. Your total earnings will be the sum of your earnings from all decision rounds.

At the beginning of the experiment, participants will randomly be divided into groups of 3.

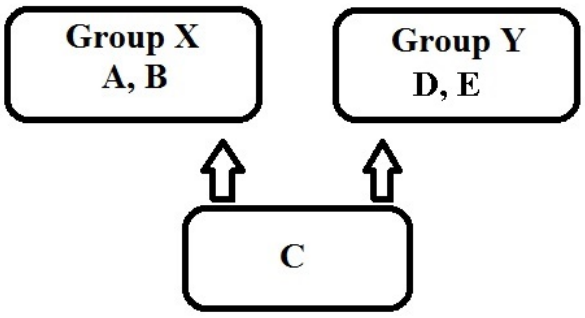
For record keeping purposes, the computer will randomly assign half of the groups with the label Group X and half with the label Group Y. Thus, there will be several groups with the label Group X and several with the label Group Y.

The members of your group will remain the same for the rest of the experiment. In addition, your group will have the same label for the rest of the experiment. Thus, if you are assigned to a Group X, you will be in the same Group X in all 20 decision rounds.

The computer will randomly assign each individual in a Group X an ID letter, either A, B or C. The computer will randomly assign each individual in a Group Y an ID letter, either C, D, or E. The ID letter assigned will not change. Thus, if you are assigned to a Group X and the ID letter A, your ID will be A in all 20 decision rounds. Other than the people conducting this experiment, you are the only person who will know your group label and ID letter.

Your group will also be matched with another group of three people in the lab. If you are in Group X, your group will be matched with a Group Y, and vice versa. **If your ID letter is A or B**, you will be a member of only one group - labeled Group X. **If your ID letter is D or E**, you will be a member of only one group - labeled Group Y. **If your ID letter is C, you will be a member of both groups** (Group X *and* Group Y). That is, person C is the same person in *both* groups. Figure 1 shows the composition of groups in the experiment.

Figure 1. Composition of groups



In summary, the members of each group will remain the same across all decision rounds. Also, in each round, your group will be matched with the same group. This means that you will interact with the same other ***four*** people in your group(s) throughout the experiment. You will not be informed of the identities of the members of your group or the members of the other group.

You will record your decisions privately at your computer terminal.

During the experiment, all decisions are made in tokens (more details are provided below). Your total earnings will also be calculated in tokens. At the end of the experiment, your earnings will be converted to Dollars at the following rate:

30 tokens = $1

You will be paid individually and privately in cash at the end of the experiment.

Decision Task

At the beginning of each round, each member of each group receives an endowment of tokens. If your ID letter is A, B, D, or E, you will receive an endowment of 20 tokens each round. If your ID letter is C, you will receive an endowment of 40 tokens each round.

If your ID letter is A, B, D, or E, **in each decision round (rounds 1 through 20),** your task is to allocate your endowment of 20 tokens between your *Private Account* and a *Group Account* in only your group. Each token not allocated to the *Group Account* will automatically remain in your *Private Account*.

If your ID letter is C, **in each decision round (rounds 1 through 20),** your task is to allocate your endowment of 40 tokens among your *Private Account*, a *Group Account* in Group X, and a *Group Account* in Group Y. Each token not allocated to either *Group Account* will automatically remain in your *Private Account*.

Earnings for Group Members

Earnings from your *Private Account* in each round: You will earn one (1) token for each token allocated to your *Private Account*. No one else will earn from your *Private Account*.

Earnings from the *Group Account* in each group in each round: For each token you allocate to the *Group Account*, you will earn 0.6 tokens. Each of the other two members of your group will also earn 0.6 tokens for each token you allocate to the *Group Account*.

Note that, because member C is a member of both groups, **member C receives earnings from both *Group Accounts***, X and Y, in each round. This includes all decision rounds 1-20.

Thus, each allocation of 1 token to the *Group Account* yields a total of 1.8 tokens for your group. Your earnings from the *Group Account* are based on the total number of tokens allocated to the *Group Account* by all members in your group. In summary, each member of a group will profit equally from the tokens allocated to the *Group Account* – for each token allocated to the *Group Account*, each member of your group will earn 0.6 tokens regardless of who made the allocation. This means that you will earn from your own allocation to the *Group Account* as well as from the allocations to the *Group Account* of your group members. Earnings from the *Group Account* are calculated in the same manner in *both* groups.

Your total earnings in each round

If your ID letter is A or B:

Your earnings in each round = Earnings from your *Private Account*

+ Earnings from the *Group Account* in your Group X

<u>If your ID letter is D or E</u>:

Your earnings in each round = Earnings from your *Private Account*

+ Earnings from the *Group Account* in your Group Y

<u>If your ID letter is C</u>:

Your earnings in each round = Earnings from your *Private Account*

+ Earnings from the *Group Account* in Group X

+ Earnings from the *Group Account* in Group Y

The following examples show the calculation of earnings in <u>each</u> group in a round. These examples are for illustrative purposes only.

Example 1. Suppose you are in a Group X, your ID letter is B, and you allocated 0 tokens to the *Group Account*. Further suppose that group members A and C also each allocated 0 tokens to the *Group Account*. The total number of tokens in the *Group Account* would be 0.

Your earnings in this round would be 20 tokens (= 20 tokens from your *Private Account* and 0 tokens from the *Group Account*). The earnings of group member A would also be 20 tokens. In this example, the earnings of group member C would be 0 tokens from the *Group Account* in Group X. However, the total earnings of group member C would also depend on decisions in Group Y. This is covered in more detail in Example 4 below.

Example 2. Suppose you are in a Group Y, your ID letter is E, and you allocated 10 tokens to the *Group Account*. Further suppose that group members C and D each allocated 0 tokens to the *Group Account*. The total number of tokens in the *Group Account* would be 10.

Your earnings in this round would be 16 tokens (= 10 tokens from your *Private Account* + 0.6*10 = 6 tokens from the *Group Account*. The earnings of group member D would be 26 tokens (= 20 tokens from the *Private Account* + 0.6*10 = 6 tokens from the *Group Account*). In this example, the earnings of group member C would be 6 tokens from the *Group Account* in Group Y. However, the total earnings of group member C would also depend on decisions in Group X. This is covered in more detail in Example 4 below.

Example 3. Suppose you are in a Group Y, your ID letter is D, and you allocated 20 tokens to the *Group Account*. Further suppose that group members C and E also each allocated 20 tokens to the *Group Account*. The total number of tokens in the *Group Account* would be 60 (40 from you and member E together and 20 from member C).

Your earnings in this round would be 36 tokens (= 0 tokens from your *Private Account* + 0.6*60 = 36 tokens from the *Group Account*). The earnings of group member E would also be 36 tokens. The earnings of group member C would be 36 tokens from your *Group Account* plus the earnings based on the decisions in Group X. This is covered in more detail in Example 4 below.

Note, if group member C allocates 20 tokens to the *Group Account* in one group, he/she will have 20 tokens remaining to allocate between his/her *Private Account* and the *Group Account* in the other group

Example 4. **(This example will focus only on the earnings for group member C.)** Suppose your ID letter is C and you allocated 7 tokens to the *Group Account* in Group X and 8 tokens to the *Group Account* in

Group Y. Further suppose group members A and B in Group X **each** allocated 13 tokens to the *Group Account*. Additionally, suppose group members D and E in Group Y **each** allocated 12 tokens to the *Group Account*. This means a total of 33 tokens were allocated to the *Group Account* in Group X and 32 tokens were allocated to the *Group Account* in Group Y.

Your earnings in this round would be 64 tokens (= 25 tokens from your *Private Account* + (0.6*33 = 19.8 tokens from the *Group Account* for Group X) + (0.6*32 = 19.2 tokens from the *Group Account* for Group Y)).

Information After Each Decision Round

After all individuals have made their decisions in the round, the computer will tabulate the results. You will be informed of the total allocation to the *Group Account* in your group and the individual allocation decisions of each member of your group, identified by their ID letters (which will remain the same in each round). Your allocation will be shown on top. The other group members' allocations will be listed below, alphabetically by ID letters.

In addition, you will be shown the total allocation to the *Group Account* in your group in all previous rounds. You will **not** be shown the individual allocations of the members of your group in previous rounds.

If your ID letter is A or B, you will see the above information only for your group - Group X. In particular, you will not see C's allocation to the *Group Account* in Group Y.

If your ID letter is D or E, you will see the above information only for your group - Group Y. In particular, you will not see C's allocation to the *Group Account* in Group X.

If your ID letter is C, you will see the above information for *both* groups (Groups X *and* Y). In particular, you will see the allocations to the *Group Account* by A and B in Group X and the allocations to the *Group Account* by D and E in Group Y.

You will also be informed of your *individual* earnings in tokens from the round.

Your earnings from earlier decision rounds cannot be used in future rounds. You will receive a new endowment in each of the 20 decision rounds.

Questions to help you understand the decision task

When everyone has finished reading the instructions, we will ask you a few questions regarding the decisions you will make in the experiment. These questions will help you understand the calculation of your earnings and ensure that you have understood the instructions. You will answer these questions in private on your computer terminal. Once everyone has answered all questions correctly we will begin the experiment.

Productivity Instructions

Thank you for coming. This is an experiment about decision-making. Your cash payment will be based on your earnings in the experiment.

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.

The experiment consists of 20 decision rounds. Your total earnings will be the sum of your earnings from all decision rounds.

At the beginning of the experiment, participants will randomly be divided into groups of 3.

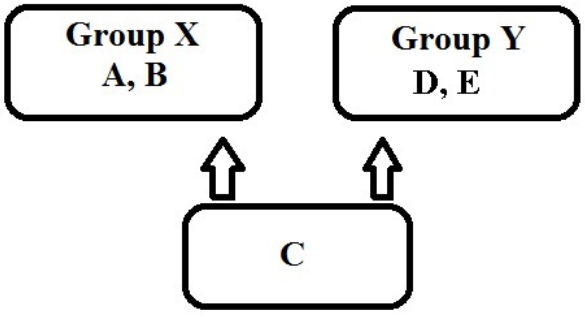
For record keeping purposes, the computer will randomly assign half of the groups with the label Group X and half with the label Group Y. Thus, there will be several groups with the label Group X and several with the label Group Y.

The members of your group will remain the same for the rest of the experiment. In addition, your group will have the same label for the rest of the experiment. Thus, if you are assigned to a Group X, you will be in the same Group X in all 20 decision rounds.

The computer will randomly assign each individual in a Group X an ID letter, either A, B or C. The computer will randomly assign each individual in a Group Y an ID letter, either C, D, or E. The ID letter assigned will not change. Thus, if you are assigned to a Group X and the ID letter A, your ID will be A in all 20 decision rounds. Other than the people conducting this experiment, you are the only person who will know your group label and ID letter.

Your group will also be matched with another group of three people in the lab. If you are in Group X, your group will be matched with a Group Y, and vice versa. **If your ID letter is A or B**, you will be a member of only one group - labeled Group X. **If your ID letter is D or E**, you will be a member of only one group - labeled Group Y. **If your ID letter is C, you will be a member of both groups** (Group X *and* Group Y). That is, person C is the same person in *both* groups. Figure 1 shows the composition of groups in the experiment.

Figure 1. Composition of groups



In summary, the members of each group will remain the same across all decision rounds. Also, in each round, your group will be matched with the same group. This means that you will interact with the same other ***four*** people in your group(s) throughout the experiment. You will not be informed of the identities of the members of your group or the members of the other group.

You will record your decisions privately at your computer terminal.

During the experiment, all decisions are made in tokens (more details are provided below). Your total earnings will also be calculated in tokens. At the end of the experiment, your earnings will be converted to Dollars at the following rate:

30 tokens = $1

You will be paid individually and privately in cash at the end of the experiment.

Decision Task

At the beginning of each round, each member of each group receives an endowment of 20 tokens. If your ID letter is C, you will *also* receive an endowment of 20 tokens each round.

If your ID letter is A, B, D, or E, **in each decision round (rounds 1 through 20),** your task is to allocate your endowment of 20 tokens between your *Private Account* and a *Group Account* in only your group. Each token not allocated to the *Group Account* will automatically remain in your *Private Account*.

If your ID letter is C, **in each decision round (rounds 1 through 20),** your task is to allocate your endowment of 20 tokens among your *Private Account*, a *Group Account* in Group X, and a *Group Account* in Group Y. Each token not allocated to either *Group Account* will automatically remain in your *Private Account*.

Earnings for Group Members

Earnings from your *Private Account* in each round:

If your ID letter is A, B, D, or E, you will earn one (1) token for each token allocated to your *Private Account*. No one else will earn from your *Private Account*.

If your ID letter is C, you will earn two (2) tokens for each token allocated to your *Private Account*. No one else will earn from your *Private Account*.

Earnings from the *Group Account* in each group in each round:

If your ID letter is A, B, D, or E, for each token you allocate to the *Group Account*, you will earn 0.6 tokens. Each of the other two members of your group will also earn 0.6 tokens for each token you allocate to the *Group Account*.

If your ID letter is C, for each token you allocate to the *Group Account*, you will earn 1.2 tokens. Each of the other two members of your group will also earn 1.2 tokens for each token you allocate to the *Group Account*.

Thus each allocation of 1 token to the *Group Account* yields a total of 1.8 tokens for your group if the allocation is made by A or B (in Group X) or by D or E (in Group Y). The allocation of 1 token to the *Group Account* yields a total of 3.6 tokens for your group if the allocation is made by C.

Note that, because member C is a member of both groups, **member C receives earnings from both *Group Accounts***, X and Y, in each round. This includes all decision rounds 1-20.

Your earnings from the *Group Account* are based on the total number of tokens allocated to the *Group Account* by all members in your group. In summary, each member of a group will profit equally from the tokens allocated to the *Group Account* – for each token allocated to the *Group Account* by A, B, D or E, each member of your group will earn 0.6 tokens regardless of who made the allocation. Similarly, for each token allocated to the *Group Account* by C, each member of your group will earn 1.2 tokens. This means that you will earn from your own allocation to the *Group Account* as well as from the allocations to the

Group Account of your group members. Earnings from the *Group Account* are calculated in the same manner in *both* groups.

Your total earnings in each round

If your ID letter is A or B:

Your earnings in each round = Earnings from your *Private Account*

+ Earnings from the *Group Account* in your Group X

If your ID letter is D or E:

Your earnings in each round = Earnings from your *Private Account*

+ Earnings from the *Group Account* in your Group Y

If your ID letter is C:

Your earnings in each round = Earnings from your *Private Account*

+ Earnings from the *Group Account* in Group X

+ Earnings from the *Group Account* in Group Y

The following examples show the calculation of earnings in each group in a round. These examples are for illustrative purposes only.

Example 1. Suppose you are in a Group X, your ID letter is B, and you allocated 0 tokens to the *Group Account*. Further suppose that group members A and C also each allocated 0 tokens to the *Group Account*. The total number of tokens in the *Group Account* would be 0.

Your earnings in this round would be 20 tokens (= 20 tokens from your *Private Account* and 0 tokens from the *Group Account*). The earnings of group member A would also be 20 tokens. In this example, the earnings of group member C would be 0 tokens from the *Group Account* in Group X. However, the total earnings of group member C would also depend on decisions in Group Y. This is covered in more detail in Example 4 below.

Example 2. Suppose you are in a Group Y, your ID letter is E, and you allocated 10 tokens to the *Group Account*. Further suppose that group members C and D each allocated 0 tokens to the *Group Account*. The total number of tokens in the *Group Account* would be 10.

Your earnings in this round would be 16 tokens (= 10 tokens from your *Private Account* + 0.6*10 = 6 tokens from the *Group Account*. The earnings of group member D would be 26 tokens (= 20 tokens from the *Private Account* + 0.6*10 = 6 tokens from the *Group Account*). In this example, the earnings of group member C would be 6 tokens from the *Group Account* in Group Y. However, the total earnings of group member C would also depend on decisions in Group X. This is covered in more detail in Example 4 below.

Example 3. Suppose you are in a Group Y, your ID letter is D, and you allocated 20 tokens to the *Group Account*. Further suppose that group members C and E also each allocated 20 tokens to the *Group Account*. The total number of tokens in the *Group Account* would be 60 (40 from you and member E together and 20 from member C).

Your earnings in this round would be 48 tokens (= 0 tokens from your *Private Account* + [0.6*40 + 1.2*20] = 24 + 24 = 48 tokens from the *Group Account*). The earnings of group member E would also be 48 tokens. The earnings of group member C would be 48 tokens from your *Group Account* plus the earnings based on the decisions in Group X. This is covered in more detail in Example 4 below.

Note, if group member C allocates 20 tokens to the *Group Account* in one group, he/she will have no tokens remaining in his/her *Private Account* to allocate to the *Group Account* in the other group

Example 4. **(This example will focus only on the earnings for group member C.)** Suppose your ID letter is C and you allocated 7 tokens to the *Group Account* in Group X and 8 tokens to the *Group Account* in Group Y. Further suppose group members A and B in Group X **each** allocated 13 tokens to the *Group Account*. Additionally, suppose group members D and E in Group Y **each** allocated 12 tokens to the *Group Account*. This means a total of 33 tokens (26 by A and B together, and 7 by you) were allocated to the *Group Account* in Group X and 32 tokens (24 by D and E together, and 8 by you) were allocated to the *Group Account* in Group Y.

Your earnings in this round would be 58 tokens (= 2*5 = 10 tokens from your *Private Account* + (0.6*26 + 1.2*7 = 15.6 + 8.4 = 24 tokens from the *Group Account* for Group X) + (0.6*24 + 1.2*8 = 14.4 + 9.6 = 24 tokens from the *Group Account* for Group Y)).

Information After Each Decision Round

After all individuals have made their decisions in the round, the computer will tabulate the results. You will be informed of the total allocation to the *Group Account* in your group and the individual allocation decisions of each member of your group, identified by their ID letters (which will remain the same in each round). Your allocation will be shown on top. The other group members' allocations will be listed below, alphabetically by ID letters.

In addition, you will be shown the total allocation to the *Group Account* in your group in all previous rounds. You will **not** be shown the individual allocations of the members of your group in previous rounds.

If your ID letter is A or B, you will see the above information only for your group - Group X. In particular, you will not see C's allocation to the *Group Account* in Group Y.

If your ID letter is D or E, you will see the above information only for your group - Group Y. In particular, you will not see C's allocation to the *Group Account* in Group X.

If your ID letter is C, you will see the above information for *both* groups (Groups X *and* Y). In particular, you will see the allocations to the *Group Account* by A and B in Group X and the allocations to the *Group Account* by D and E in Group Y.

You will also be informed of your *individual* earnings in tokens from the round.

Your earnings from earlier decision rounds cannot be used in future rounds. You will receive a new endowment in each of the 20 decision rounds.

Questions to help you understand the decision task

When everyone has finished reading the instructions, we will ask you a few questions regarding the decisions you will make in the experiment. These questions will help you understand the calculation of your earnings and ensure that you have understood the instructions. You will answer these questions in private on your computer terminal. Once everyone has answered all questions correctly we will begin the experiment.

No-CM-Endowment Instructions

Thank you for coming. This is an experiment about decision-making. Your cash payment will be based on your earnings in the experiment.

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.

The experiment consists of 20 decision rounds. Your total earnings will be the sum of your earnings from all decision rounds.

At the beginning of the experiment, participants will randomly be divided into groups of 3.

For record keeping purposes, the computer will randomly assign each individual in a group an ID letter, either A, B or C. Each individual will keep their same ID for the rest of the experiment. Thus, if you are assigned to be individual A in your group, your ID will be A in all 20 decision rounds. Other than the people conducting this experiment, you are the only person who will know your ID letter.

The members of your group will remain the same across all decision rounds. This means that you will interact with the same other ***two*** people in your group throughout the experiment. However, you will never be informed of the identity of the others in your group.

You will record your decisions at your computer terminal.

During the experiment, all decisions are made in tokens (more details are provided below). Your total earnings will also be calculated in tokens. At the end of the experiment, your earnings will be converted to Dollars at the following rate:

30 tokens = $1

You will be paid individually and privately in cash at the end of the experiment.

Decision Task

At the beginning of each round, each member of each group receives an endowment of tokens. If your ID letter is A or B, you will receive an endowment of 20 tokens each round. If your ID letter is C, you will receive an endowment of 40 tokens each round.

In each decision round (rounds 1 through 20), your task is to allocate your endowment of tokens between your *Private Account* and a *Group Account*. Each token not allocated to the *Group Account* will automatically remain in your *Private Account*.

Earnings for Group Members

Earnings from your Private Account in each round: You will earn one (1) token for each token allocated to your *Private Account*. No one else will earn from your *Private Account*.

Earnings from the Group Account in each round:

For each token you allocate to the *Group Account*, you will earn 0.6 tokens. Each of the other two members of your group will also earn 0.6 tokens for each token you allocate to the *Group Account*. Thus, the allocation of 1 token to the *Group Account* yields a total of 1.8 tokens for your group.

Your earnings from the *Group Account* are based on the total number of tokens allocated to the *Group Account* by all members in your group. In summary, each member will profit equally from the tokens allocated to the Group Account – for each token allocated to the *Group Account*, each member of your group will earn 0.6 tokens regardless of who made the allocation. This means that you will earn from your own allocation to the *Group Account* as well as from the allocations to the *Group Account* of your group members.

Your earnings in each round =

Earnings from your Private Account + Earnings from the Group Account

The following examples show the calculation of earnings in each group in a round. These examples are for illustrative purposes only.

Example 1. Suppose your ID letter is B, and you allocated 0 tokens to the *Group Account*. Further suppose that group members A and C also each allocated 0 tokens to the *Group Account*. The total number of tokens in the *Group Account* would be 0.

Your earnings in this round would be 20 tokens (= 20 tokens from your *Private Account* and 0 tokens from the *Group Account*). The earnings of group member A would also be 20 tokens. The earnings of group member C would be 40 tokens (= 40 tokens from the *Private Account* and 0 tokens from the *Group Account*).

Example 2. Suppose your ID letter is A, and you allocated 10 tokens to the *Group Account*. Further suppose that group members B and C each allocated 0 tokens to the *Group Account*. The total number of tokens in the *Group Account* would be 10.

Your earnings in this round would be 16 tokens (= 10 tokens from your *Private Account* + 0.6*10 = 6 tokens from the *Group Account*). The earnings of group member B would be 26 tokens (= 20 tokens from the *Private Account* + 0.6*10 = 6 tokens from the *Group Account*). The earnings of group member C would be 46 tokens (= 40 tokens from the *Private Account* + 0.6*10 = 6 tokens from the *Group Account*).

Example 3. Suppose your ID letter is C, and you allocated 40 tokens to the *Group Account* and that each of the other two group members allocated 20 tokens to the *Group Account*. The total number of tokens in the *Group Account* would be 80 (40 from member A and B together and 40 from you).

Your earnings in this round would be 48 tokens (= 0 tokens from your *Private Account* + 0.6*80 = 48 tokens from the *Group Account*). The earnings of members A and B of your group would also be 48 tokens each.

Information After Each Decision Round

After all individuals have made their decisions in the round, the computer will tabulate the results. You will be informed of the total allocation to the *Group Account* in your group and the individual allocation decisions of each member of your group, identified by their ID letters (which remain the same in each round). Your allocation will be shown on top. The other group members' allocations will be listed below, alphabetically by ID letters.

In addition, you will be shown the total allocation to the *Group Account* in your group in all previous rounds. You will **not** be shown the individual allocations of the members of your group in previous rounds.

You will also be informed of your *individual* earnings in tokens from the round.

Your earnings from earlier decision rounds cannot be used in future rounds. You will receive a new endowment in each of the 20 decision rounds.

Questions to help you understand the decision task

When everyone has finished reading the instructions, we will ask you a few questions regarding the decisions you will make in the experiment. These questions will help you understand the calculation of your earnings and ensure that you have understood the instructions. You will answer these questions in private on your computer terminal. Once everyone has answered all questions correctly we will begin the experiment.

No-CM-Productivity Instructions

Thank you for coming. This is an experiment about decision-making. Your cash payment will be based on your earnings in the experiment.

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.

The experiment consists of 20 decision rounds. Your total earnings will be the sum of your earnings from all decision rounds.

At the beginning of the experiment, participants will randomly be divided into groups of 3.

For record keeping purposes, the computer will randomly assign each individual in a group an ID letter, either A, B or C. Each individual will keep their same ID for the rest of the experiment. Thus, if you are assigned to be individual A in your group, your ID will be A in all 20 decision rounds. Other than the people conducting this experiment, you are the only person who will know your ID letter.

The members of your group will remain the same across all decision rounds. This means that you will interact with the same other ***two*** people in your group throughout the experiment. However, you will never be informed of the identity of the others in your group.

You will record your decisions at your computer terminal.

During the experiment, all decisions are made in tokens (more details are provided below). Your total earnings will also be calculated in tokens. At the end of the experiment, your earnings will be converted to Dollars at the following rate:

30 tokens = $1

You will be paid individually and privately in cash at the end of the experiment.

Decision Task

At the beginning of each round, each member of each group receives an endowment of 20 tokens.

In each decision round (rounds 1 through 20), your task is to allocate your endowment of tokens between your *Private Account* and a *Group Account*. Each token not allocated to the *Group Account* will automatically remain in your *Private Account*.

Earnings for Group Members

Earnings from your Private Account in each round:

If your ID letter is A or B, you will earn one (1) token for each token allocated to your *Private Account*. No one else will earn from your *Private Account*.

If your ID letter is C, you will earn two (2) tokens for each token allocated to your *Private Account*. No one else will earn from your *Private Account*.

Earnings from the Group Account in each round:

If your ID letter is A or B, for each token you allocate to the *Group Account*, you will earn 0.6 tokens. Each of the other two members of your group will also earn 0.6 tokens for each token you allocate to the *Group Account*.

If your ID letter is C, for each token you allocate to the *Group Account*, you will earn 1.2 tokens. Each of the other two members of your group will also earn 1.2 tokens for each token you allocate to the *Group Account*.

Thus, each allocation of 1 token to the *Group Account* yields a total of 1.8 tokens for your group if the allocation is made by A or B. The allocation of 1 token to the *Group Account* yields a total of 3.6 tokens for your group if the allocation is made by C.

Your earnings from the *Group Account* are based on the total number of tokens allocated to the *Group Account* by all members in your group. In summary, each member will profit equally from the tokens allocated to the Group Account – for each token allocated to the *Group Account* by A or B, each member of your group will earn 0.6 tokens. Similarly, for each token allocated to the *Group Account* by C, each member of your group will earn 1.2 tokens. This means that you will earn from your own allocation to the *Group Account* as well as from the allocations to the *Group Account* of your group members.

<u>Your earnings in each round</u> =

Earnings from your *Private Account* + Earnings from the *Group Account*

The following examples show the calculation of earnings in each group in a round. These examples are for illustrative purposes only.

Example 1. Suppose your ID letter is B, and you allocated 0 tokens to the *Group Account*. Further, suppose that group members A and C also each allocated 0 tokens to the *Group Account*. The total number of tokens in the *Group Account* would be 0.

Your earnings in this round would be 20 tokens (= 20 tokens from your *Private Account* and 0 tokens from the *Group Account*). The earnings of group member A would also be 20 tokens. The earnings of group member C would be 40 tokens (= 20*2 tokens from the *Private Account* and 0 tokens from the *Group Account*).

Example 2 Suppose your ID letter is A, and you allocated 10 tokens to the *Group Account*. Further, suppose that group members B and C each allocated 0 tokens to the *Group Account*. The total number of tokens in the *Group Account* would be 10.

Your earnings in this round would be 16 tokens (= 10 tokens from your *Private Account* + 0.6*10 = 6 tokens from the *Group Account*). The earnings of group member B would be 26 tokens (= 20 tokens from the *Private Account* + 0.6*10 = 6 tokens from the *Group Account*). The earnings of group member C would be 46 tokens (= 20*2 = 40 tokens from the *Private Account* + 0.6*10 = 6 tokens from the *Group Account*).

Example 3. Suppose your ID letter is C, and you allocated 20 tokens to the *Group Account* and that each of the other two group members also allocated 20 tokens to the *Group Account*. The total number of tokens in the *Group Account* would be 60 (40 from member A and B together and 20 from you).

Your earnings in this round would be 48 tokens (= 0 tokens from your *Private Account* + [0.6*40 + 1.2*20] = 24 + 24 = 48 tokens from the *Group Account*). The earnings of members A and B of your group would also be 48 tokens each.

Information After Each Decision Round

After all individuals have made their decisions in the round, the computer will tabulate the results. You will be informed of the total allocation to the *Group Account* in your group and the individual allocation decisions of each member of your group, identified by their ID letters (which remain the same in each round). Your allocation will be shown on top. The other group members' allocations will be listed below, alphabetically by ID letters.

In addition, you will be shown the total allocation to the *Group Account* in your group in all previous rounds. You will **not** be shown the individual allocations of the members of your group in previous rounds.

You will also be informed of your *individual* earnings in tokens from the round.

Your earnings from earlier decision rounds cannot be used in future rounds. You will receive a new endowment in each of the 20 decision rounds.

Questions to help you understand the decision task

When everyone has finished reading the instructions, we will ask you a few questions regarding the decisions you will make in the experiment. These questions will help you understand the calculation of your earnings and ensure that you have understood the instructions. You will answer these questions in private on your computer terminal. Once everyone has answered all questions correctly, we will begin the experiment.

Appendix B.I Control quiz questions

CM

1. In each part of this question, assume you are in Group Y and your ID letter is E. Each member of your group has an endowment of 20 tokens. Suppose that no one in your group, including you, allocates any tokens to the Group Account.

a. What would be your earnings (in tokens) from the round?

b. What would be the earnings (in tokens) of group member D from the round?

2. In each part of this question, assume you are in Group X and your ID letter is A. Each member of your group has an endowment of 20 tokens. Suppose each member of your group, including you, allocates 20 tokens to the Group Account.

a. What would be your earnings (in tokens) from the round?

b. What would be the earnings (in tokens) of group member B from the round?

3. In each part of this question, assume you are in Group X and your ID letter is B. Each member of your group has an endowment of 20 tokens. You do <u>not</u> allocate any tokens to the Group Account. Suppose that each other member of your group allocates 20 tokens to the Group Account.

a. What would be your earnings (in tokens) from the round?

b. What would be the earnings (in tokens) of group member A from the round?

4. This example will focus only on the earnings for group member C. Suppose your ID letter is C. Also, suppose you allocate 6 tokens to the Group Account in Group X and 5 tokens to the Group Account in Group Y. Further suppose group members A and B in Group X each allocated 13 tokens to the Group Account. Additionally, group members D and E in Group Y each allocated 12 tokens to the Group Account. This means a total of 32 tokens were allocated to the Group Account in Group X and 29 tokens were allocated to the Group Account in Group Y.

a. What would be your earnings (in tokens) from your Private Account from the round?

b. What would be your earnings (in tokens) from the Group Account in Group X from the round?

c. What would be your earnings (in tokens) from the Group Account in Group Y from the round?

d. What would be your total earnings (in tokens) from the round?

Choice

1. These questions concern member C choosing a group at the beginning of a round to whose Group Account he/she can allocate tokens in that round alone.

a. At the beginning of the first round, will member C choose a group (X or Y) or will the computer randomly choose a group for member C?

b. At the beginning of each of rounds 2-20, will member C choose a group (X or Y) or will the computer randomly choose a group for member C?

c. If member C chooses Group X at the beginning of a round, could member C choose Group Y at the beginning of a future round if he/she wishes to do so?

2. In each part of this question, assume you are in Group Y and your ID letter is E, and group member C chose Group Y at the beginning of the round. Each member of your group has an endowment of 20 tokens. Suppose that no one in your group, including you, allocates any tokens to the Group Account.

a. What would be your earnings (in tokens) from the round?

b. What would be the earnings (in tokens) of group member D from the round?

3. In each part of this question, assume you are in Group X and your ID letter is A, and group member C chose Group X at the beginning of the round. Each member of your group has an endowment of 20 tokens. Suppose each member of your group, including you, allocates 20 tokens to the Group Account.

a. What would be your earnings (in tokens) from the round?

b. What would be the earnings (in tokens) of group member B from the round?

4. In each part of this question, assume you are in Group X and your ID letter is B, and group member C chose Group Y at the beginning of the round. Each member of your group has an endowment of 20 tokens. You do <u>not</u> allocate any tokens to the Group Account. Suppose that group member A allocates 20 tokens to the Group Account. Group member C cannot allocate tokens to the group account because he/she chose the other group at the beginning of the round.

a. What would be your earnings (in tokens) from the round?

b. What would be the earnings (in tokens) of group member A from the round?

5. This example will focus only on the earnings for group member C. Suppose your ID letter is C and you chose Group X at the beginning of the round. Also, suppose you allocate 6 tokens to the Group Account in Group X. You cannot allocate tokens to the Group Account in Group Y. Further suppose group members A and B in Group X each allocated 13 tokens to the Group Account. Additionally, group members D and E in Group Y each allocated 12 tokens to the Group Account. This means a total of 32 tokens were allocated to the Group Account in Group X and 24 tokens were allocated to the Group Account in Group Y.

a. What would be your earnings (in tokens) from your Private Account from the round?

b. What would be your earnings (in tokens) from the Group Account in Group X from the round?

c. What would be your earnings (in tokens) from the Group Account in Group Y from the round?

d. What would be your total earnings (in tokens) from the round?

Endowment

1. In each part of this question, assume you are in Group Y and your ID letter is E. You and member D each have an endowment of 20 tokens. Member C has an endowment of 40 tokens. Suppose that no one in your group, including you, allocates any tokens to the Group Account.

a. What would be your earnings (in tokens) from the round?

b. What would be the earnings (in tokens) of group member D from the round?

2. In each part of this question, assume you are in Group X and your ID letter is A. You and member B each have an endowment of 20 tokens. Member C has an endowment of 40 tokens. Suppose each member of your group, including you, allocates 20 tokens to the Group Account.

a. What would be your earnings (in tokens) from the round?

b. What would be the earnings (in tokens) of group member B from the round?

3. In each part of this question, assume you are in Group X and your ID letter is B. You and member A each have an endowment of 20 tokens. Member C has an endowment of 40 tokens. You do <u>not</u> allocate any tokens to the Group Account. Suppose that each other member of your group allocates 20 tokens to the Group Account.

a. What would be your earnings (in tokens) from the round?

b. What would be the earnings (in tokens) of group member A from the round?

4. This example will focus only on the earnings for group member C. Suppose your ID letter is C. Also, suppose you allocate 6 tokens to the Group Account in Group X and 5 tokens to the Group Account in Group Y. Further suppose group members A and B in Group X each allocated 13 tokens to the Group Account. Additionally, group members D and E in Group Y each allocated 12 tokens to the Group Account.

This means a total of 32 tokens were allocated to the Group Account in Group X and 29 tokens were allocated to the Group Account in Group Y.

a. What would be your earnings (in tokens) from your Private Account from the round?

b. What would be your earnings (in tokens) from the Group Account in Group X from the round?

c. What would be your earnings (in tokens) from the Group Account in Group Y from the round?

d. What would be your total earnings (in tokens) from the round?

Productivity

1. This question will focus on each group member's earnings from his/her own Private Account.

a. If your ID letter is A or B, for each token you allocate to your Private Account, how many tokens will you earn?

b. If your ID letter is C, for each token you allocate to your Private Account, how many tokens will you earn?

c. If your ID letter is D or E, for each token you allocate to your Private Account, how many tokens will you earn?

2. This question will focus on each group member's earnings from the Group Account in their group.

a. If your ID letter is A or B, for each token you allocate to the Group Account in Group X, how many tokens will you and your group members each earn?

b. If your ID letter is C, for each you allocate to the Group Account in Group X, how many tokens will you and your group members each earn?

c. If your ID letter is C, for each you allocate to the Group Account in Group Y, how many tokens will you and your group members each earn?

d. If your ID letter is D or E, for each token you allocate to the Group Account in Group Y, how many tokens will you and your group members each earn?

3. In each part of this question, assume you are in Group Y and your ID letter is E. Each member of your group has an endowment of 20 tokens. Suppose that no one in your group, including you, allocates any tokens to the Group Account.

a. What would be your earnings (in tokens) from the round?

b. What would be the earnings (in tokens) of group member D from the round?

4. In each part of this question, assume you are in Group X and your ID letter is A. Each member of your group has an endowment of 20 tokens. Suppose each member of your group, including you, allocates 20 tokens to the Group Account.

a. What would be your earnings (in tokens) from the round?

b. What would be the earnings (in tokens) of group member B from the round?

5. In each part of this question, assume you are in Group X and your ID letter is B. Each member of your group has an endowment of 20 tokens. You do not allocate any tokens to the Group Account. Suppose that each other member of your group allocates 20 tokens to the Group Account.

a. What would be your earnings (in tokens) from the round?

b. What would be the earnings (in tokens) of group member A from the round?

6. This example will focus only on the earnings for group member C. Suppose your ID letter is C. Also, suppose you allocate 6 tokens to the Group Account in Group X and 5 tokens to the Group Account in Group Y. Further suppose group members A and B in Group X each allocated 13 tokens to the Group Account. Additionally, group members D and E in Group Y each allocated 12 tokens to the Group Account. This means a total of 32 tokens were allocated to the Group Account in Group X and 29 tokens were allocated to the Group Account in Group Y.

a. What would be your earnings (in tokens) from your Private Account from the round?

b. What would be your earnings (in tokens) from the Group Account in Group X from the round?

c. What would be your earnings (in tokens) from the Group Account in Group Y from the round?

d. What would be your total earnings (in tokens) from the round?

No CM-Endowment

1. In each part of this question, assume your ID letter is B. You and member A each have an endowment of 20 tokens. Member C has an endowment of 40 tokens. Suppose that no one in your group, including you, allocates any tokens to the Group Account.

a. What would be your earnings (in tokens) from the round?

b. What would be the earnings (in tokens) of group member A from the round?

2. In each part of this question, assume your ID letter is A. You and member B each have an endowment of 20 tokens. Member C has an endowment of 40 tokens. Suppose each member of your group, including you, allocates 20 tokens to the Group Account.

a. What would be your earnings (in tokens) from the round?

b. What would be the earnings (in tokens) of group member A from the round?

3. In each part of this question, assume your ID letter is B. You and member A each have an endowment of 20 tokens. Member C has an endowment of 40 tokens. You do not allocate any tokens to the Group Account. Suppose that each other member of your group allocates 20 tokens to the Group Account.

a. What would be your earnings (in tokens) from the round?

b. What would be the earnings (in tokens) of group member A from the round?

4. This example will focus only on the earnings for group member C. Suppose your ID letter is C. Member A and B each have an endowment of 20 tokens. You have an endowment of 40 tokens. Also, suppose you allocate 11 tokens to the Group Account. Further suppose group members A and B each allocated 13 tokens to the Group Account. This means a total of 37 tokens were allocated to the Group Account.

a. What would be your earnings (in tokens) from your Private Account from the round?

b. What would be your earnings (in tokens) from the Group Account from the round?

c. What would be your total earnings (in tokens) from the round?

No CM-Productivity

1. This question will focus on each group member's earnings from his/her own Private Account.

a. If your ID letter is A or B, for each token you allocate to your Private Account, how many tokens will you earn?

b. If your ID letter is C, for each token you allocate to your Private Account, how many tokens will you earn?

2. This question will focus on each group member's earnings from the Group Account in their group.

a. If your ID letter is A or B, for each token you allocate to the Group Account, how many tokens will you and your group members each earn?

b. If your ID letter is C, for each you allocate to the Group Account, how many tokens will you and your group members each earn?

3. In each part of this question, assume your ID letter is B. Each member of your group has an endowment of 20 tokens. Suppose that no one in your group, including you, allocates any tokens to the Group Account.

a. What would be your earnings (in tokens) from the round?

b. What would be the earnings (in tokens) of group member A from the round?

4. In each part of this question, assume your ID letter is A. Each member of your group has an endowment of 20 tokens. Suppose each member of your group, including you, allocates 20 tokens to the Group Account.

a. What would be your earnings (in tokens) from the round?

b. What would be the earnings (in tokens) of group member B from the round?

5. In each part of this question, assume your ID letter is B. Each member of your group has an endowment of 20 tokens. You do <u>not</u> allocate any tokens to the Group Account. Suppose that each other member of your group allocates 20 tokens to the Group Account.

a. What would be your earnings (in tokens) from the round?

b. What would be the earnings (in tokens) of group member A from the round?

6. This example will focus only on the earnings for group member C. Suppose your ID letter is C. Also, suppose you allocate 11 tokens to the Group Account. Further suppose group members A and B each allocated 13 tokens to the Group Account. This means a total of 37 tokens were allocated to the Group Account.

a. What would be your earnings (in tokens) from your Private Account from the round?

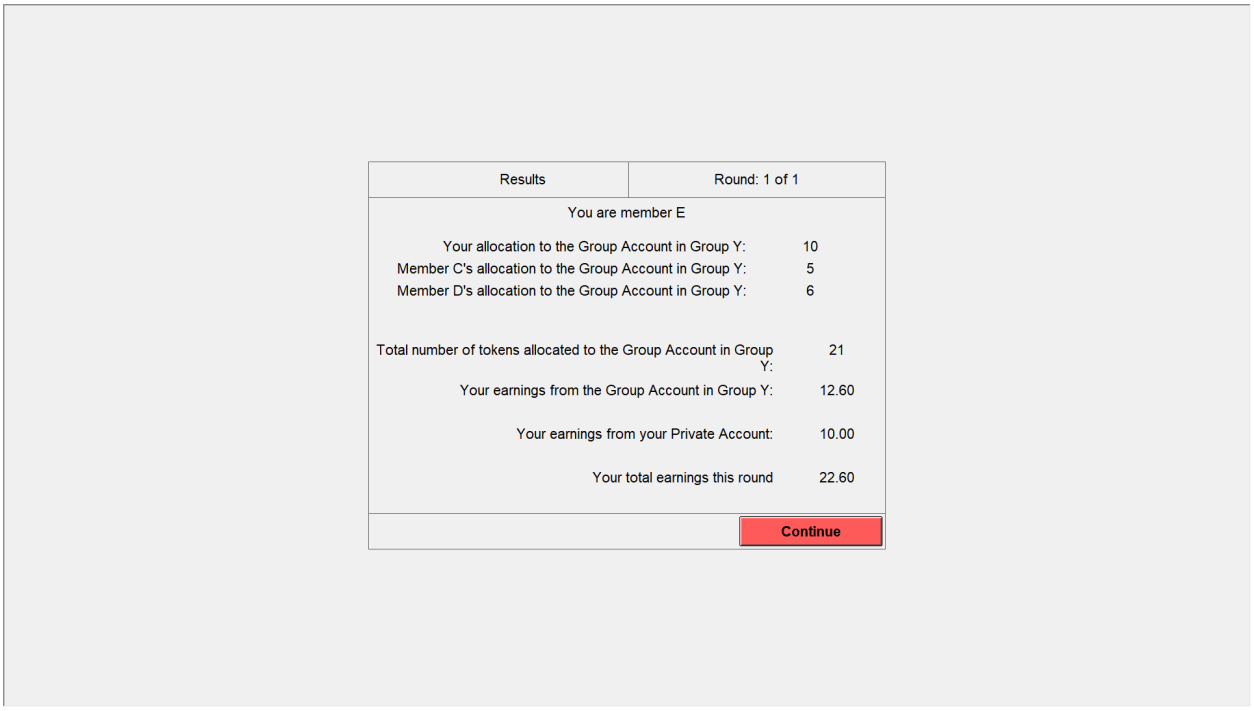
b. What would be your earnings (in tokens) from the Group Account from the round?

c. What would be your total earnings (in tokens) from the round?

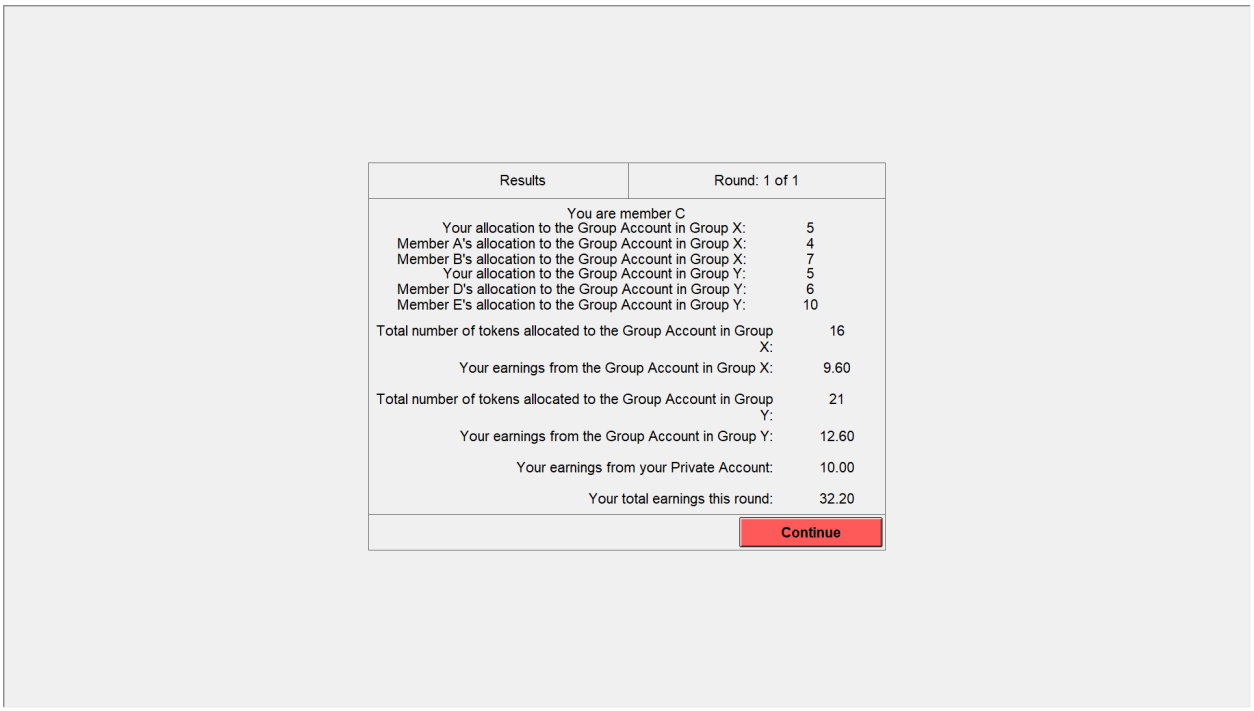
Appendix B.II Screen shots of end-of-round feedback

CM

Dedicated-member:

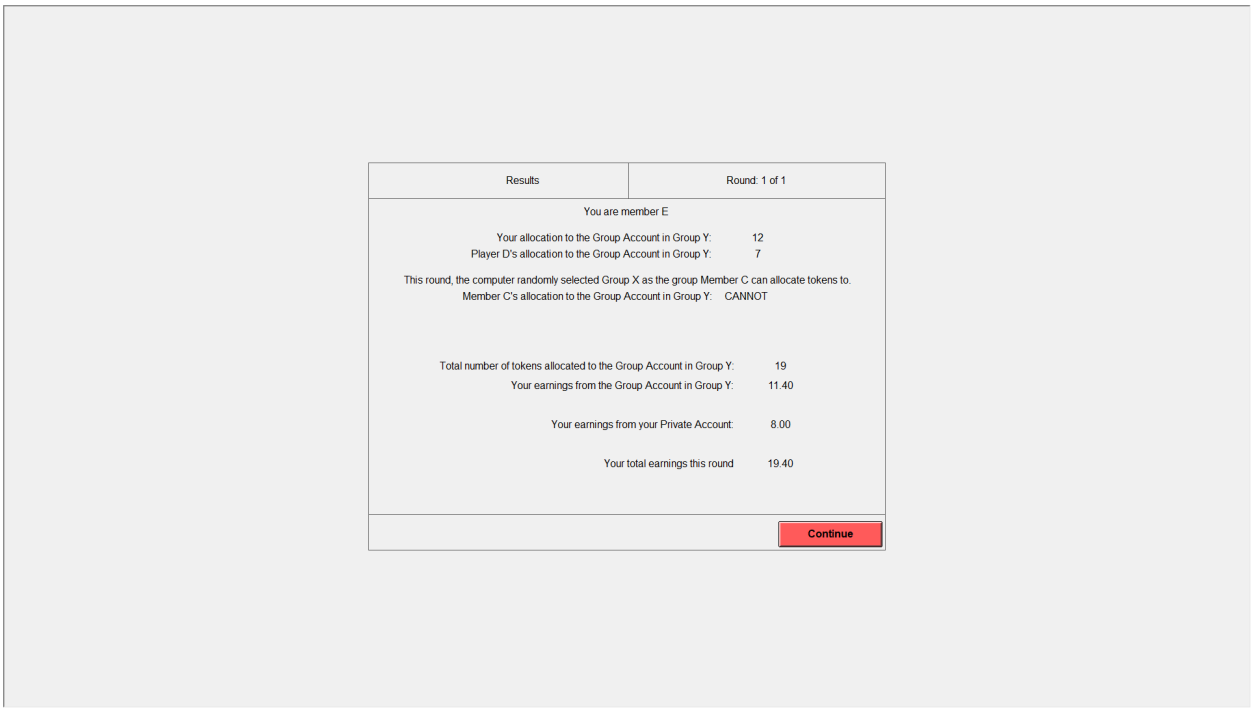


Common-member:

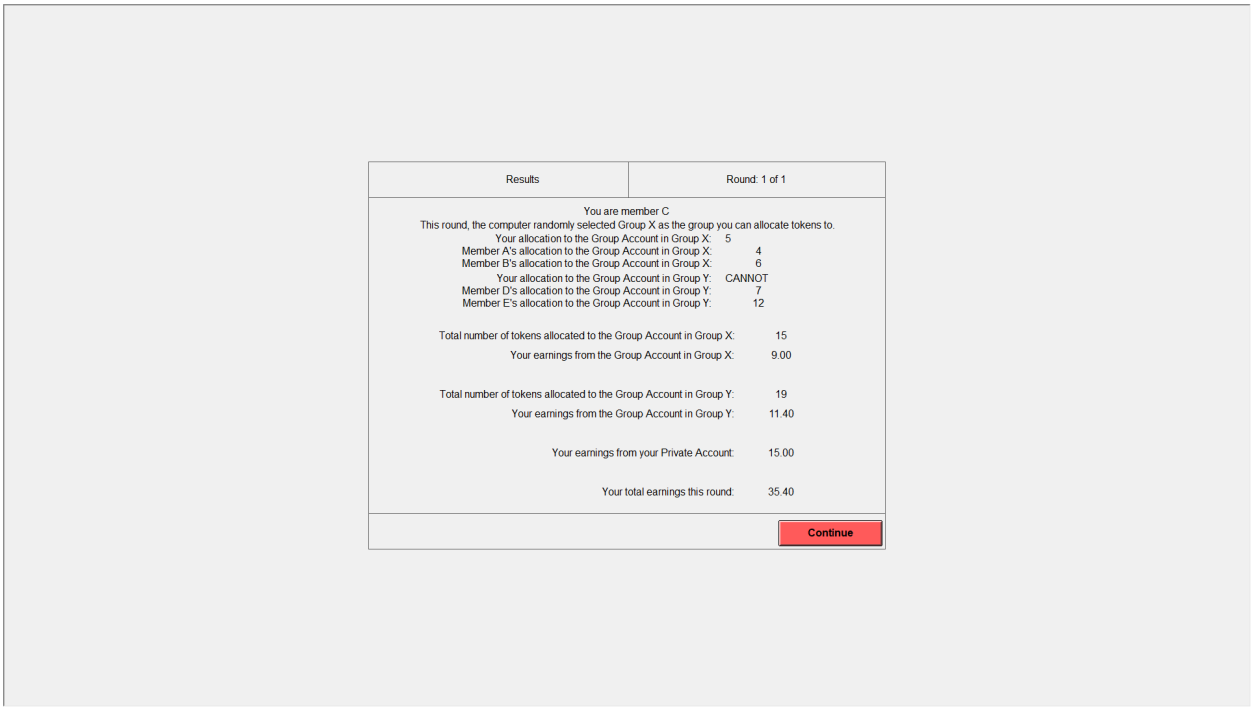


Choice

Dedicated-member:

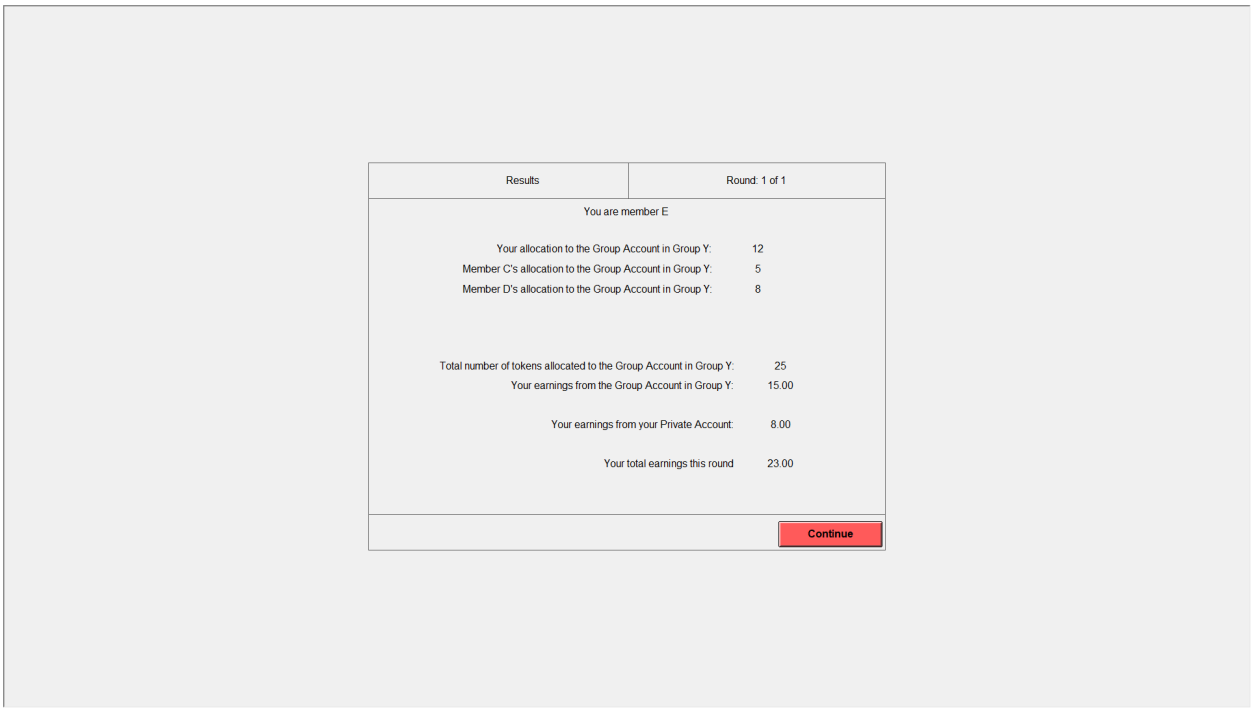


Common-member:

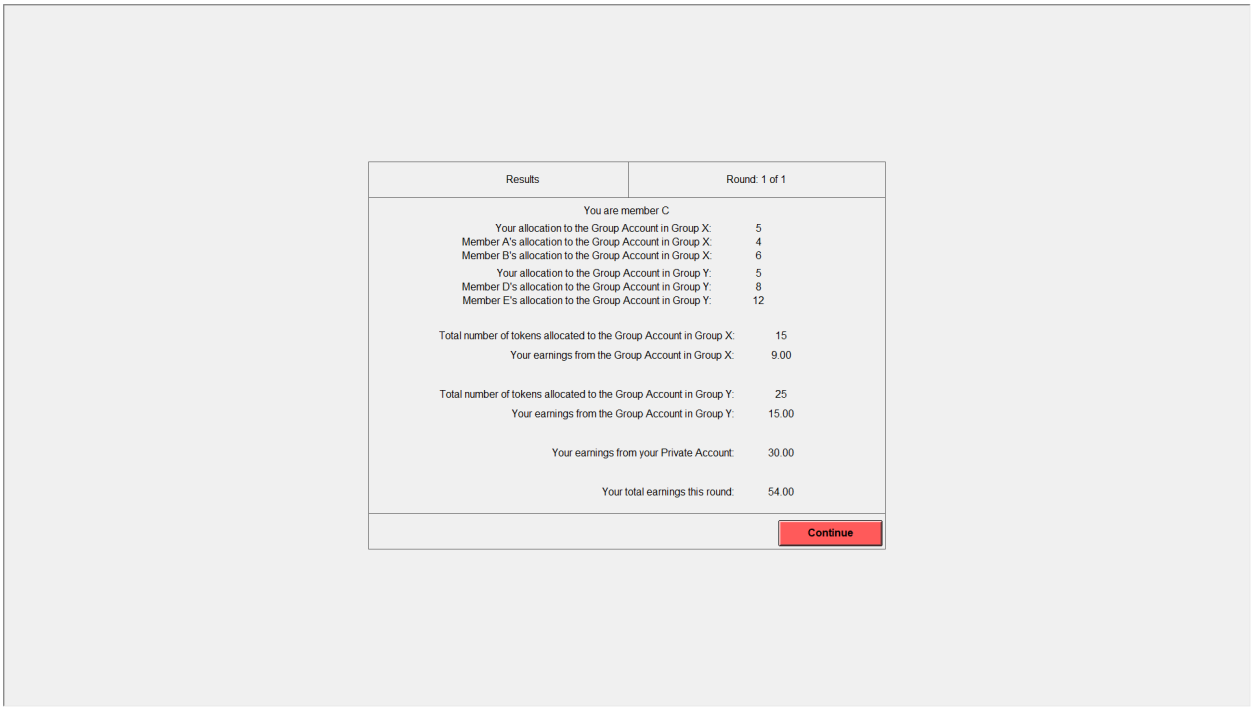


Endowment

Dedicated-member:

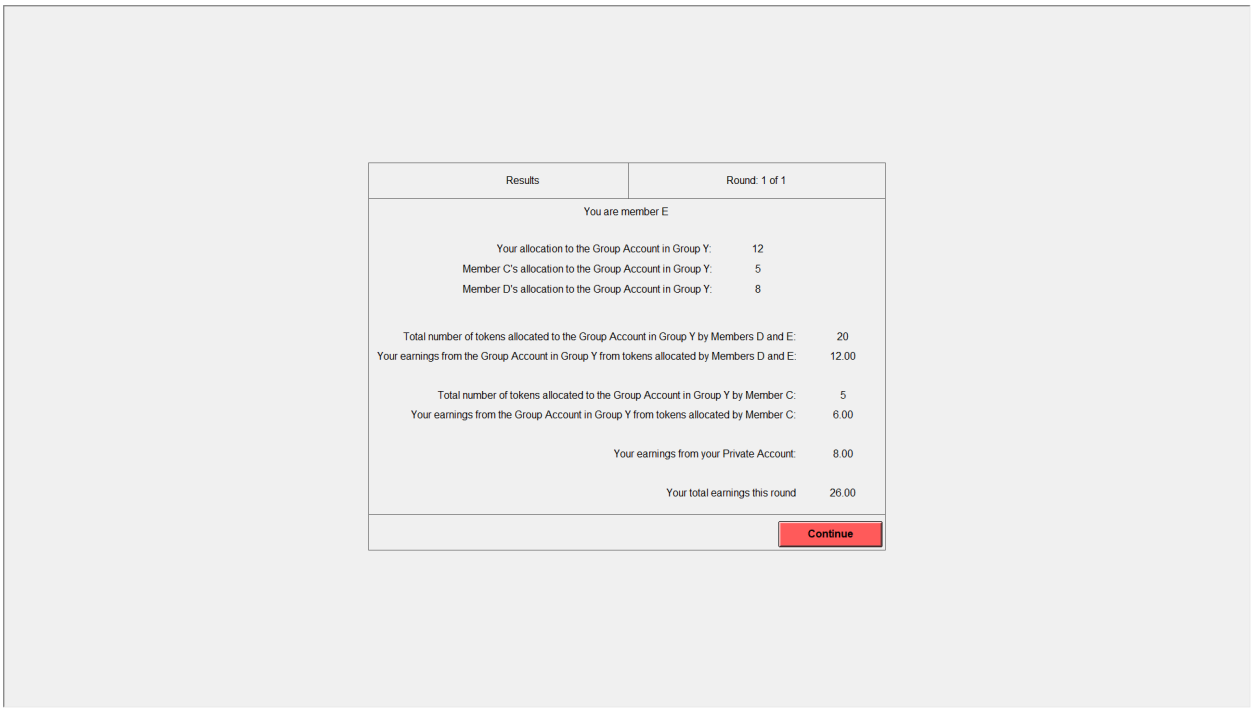


Common-member:



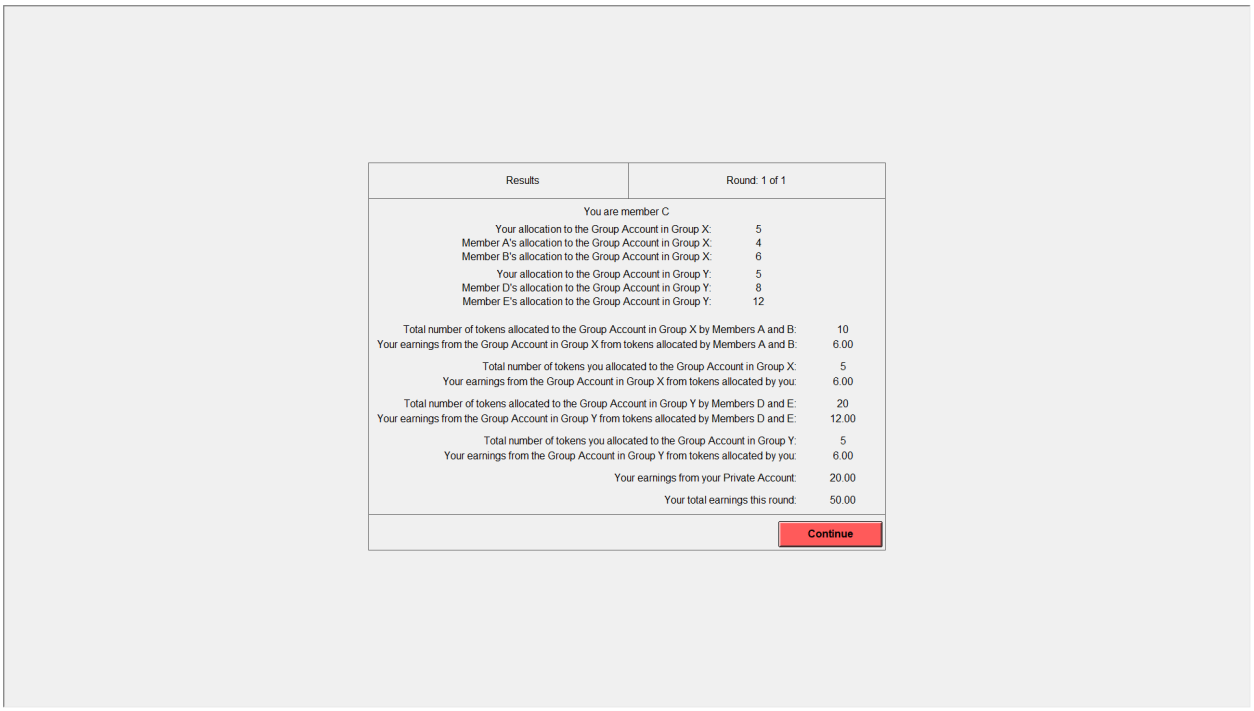
Productivity

Dedicated-member:



Results	Round: 1 of 1
You are member E	
Your allocation to the Group Account in Group Y: 12	
Member C's allocation to the Group Account in Group Y: 5	
Member D's allocation to the Group Account in Group Y: 8	
Total number of tokens allocated to the Group Account in Group Y by Members D and E:	20
Your earnings from the Group Account in Group Y from tokens allocated by Members D and E:	12.00
Total number of tokens allocated to the Group Account in Group Y by Member C:	5
Your earnings from the Group Account in Group Y from tokens allocated by Member C:	6.00
Your earnings from your Private Account:	8.00
Your total earnings this round	26.00
Continue	

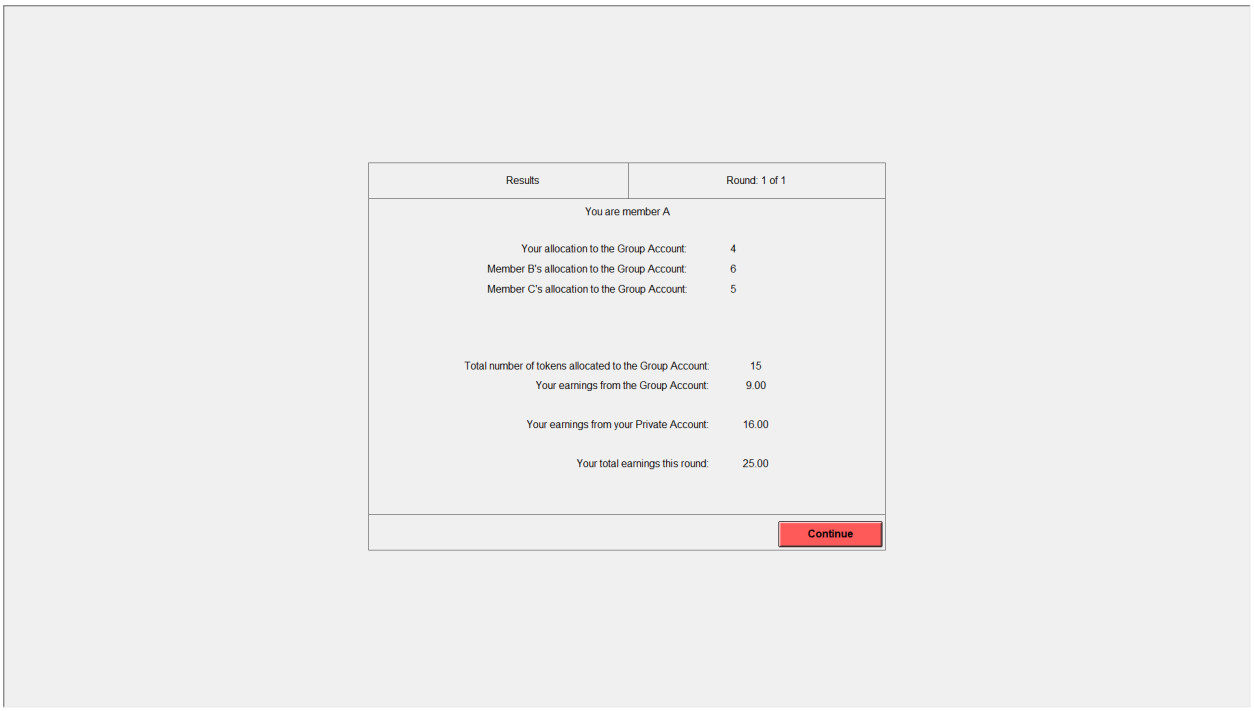
Common-member:



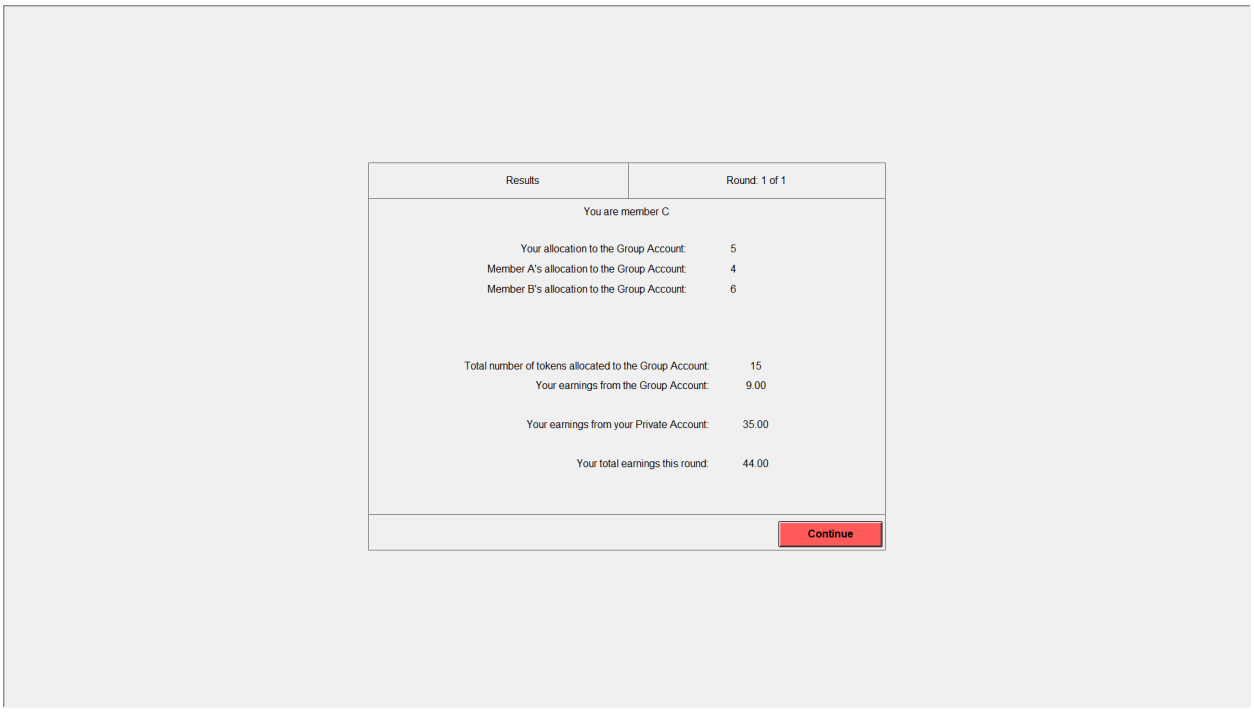
Results	Round: 1 of 1
You are member C	
Your allocation to the Group Account in Group X: 5	
Member A's allocation to the Group Account in Group X: 4	
Member B's allocation to the Group Account in Group X: 6	
Your allocation to the Group Account in Group Y: 5	
Member D's allocation to the Group Account in Group Y: 8	
Member E's allocation to the Group Account in Group Y: 12	
Total number of tokens allocated to the Group Account in Group X by Members A and B:	10
Your earnings from the Group Account in Group X from tokens allocated by Members A and B:	6.00
Total number of tokens you allocated to the Group Account in Group X:	5
Your earnings from the Group Account in Group X from tokens allocated by you:	6.00
Total number of tokens allocated to the Group Account in Group Y by Members D and E:	20
Your earnings from the Group Account in Group Y from tokens allocated by Members D and E:	12.00
Total number of tokens you allocated to the Group Account in Group Y:	5
Your earnings from the Group Account in Group Y from tokens allocated by you:	6.00
Your earnings from your Private Account:	20.00
Your total earnings this round:	50.00
Continue	

No CM-Endowment

Non-enhanced member:

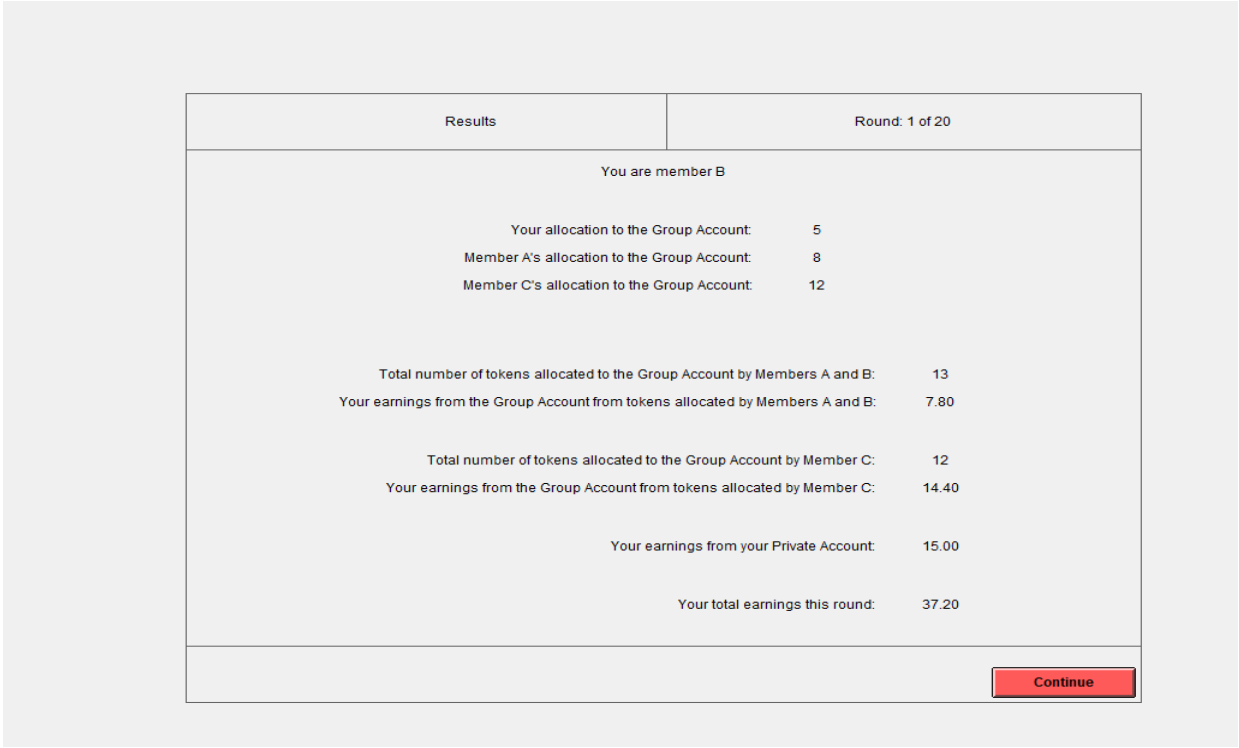


Enhanced member:



No-CM-Productivity

Non-enhanced member:



Enhanced member: