# Normative Conflict & Feuds: The Limits of Self-Enforcement*

Nikos Nikiforakis
Department of Economics
The University of Melbourne
n.nikiforakis@unimelb.edu.au

Charles N. Noussair
Department of Economics
Tilburg University
c.n.noussair@uvt.nl

Tom Wilkening
Department of Economics
The University of Melbourne
tom.wilkening@unimelb.edu.au

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**Abstract**

A normative conflict arises when there exist multiple plausible norms of behavior. In such cases, norm enforcement can lead to a sequence of mutual retaliatory sanctions, which we refer to as a *feud*. We investigate the hypothesis that normative conflict enhances the likelihood of a feud in a public-good experiment. We find that punishment is much more likely to trigger counter-punishment and start a feud when there is a normative conflict, than in a setting in which no conflict exists. While the possibility of a feud sustains cooperation, the cost of feuding fully offsets the efficiency gains from increased cooperation.

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"*[I]nformal enforcement is perilous when the parties to a dispute are likely to disagree on who owes what to whom. Then [informal enforcement] may lead to a feud – an endless echo of reciprocal, and possibly escalating, sanctions*." Ellickson (1991, p.253)

## 1. Introduction

Feuds, long sequences of costly retaliatory actions, are a remarkable phenomenon. They are typically initiated when an individual takes an action to avenge a perceived insult or injustice. In some cases, the cycle of retaliation can escalate to violent physical attacks and even homicide. Considering their cost, feuds are surprisingly common. In recent years, for example, feud-related killings have been reported in Afghanistan (Raghavan, 2007; Walsh, 2005), Albania (Arie, 2003; Pancevski and Hoxha, 2010), Australia (Millar, 2010; Rintoul, 2010), China (WuDunn, 1993), Greece (Murphy, 1999; Nikolopoulos, 2009), India (Bhaumic, 2005), Iraq (Chivers, 2003), Italy (Popham, 2007), Russia (Shuster, 2010), The Philippines (Torres, 2007), Turkey (Birch, 2009), the U.K (BBC News, 2010) and the U.S.A (Xiong, 2010).[1]

Why do feuds occur? Why do individuals take revenge when doing so could have perilous consequences for them? Why do they continue to engage in costly retaliation even when it is obvious that the other party is likely to continue the feud? Presumably there are multiple reasons, including economic, sociological, institutional, neurological, and idiosyncratic factors. In this paper, we focus on one of the potential causes. In particular, we consider the hypothesis that *normative conflict* renders a feud more likely.

A normative conflict arises when there are multiple norms, prescribing different actions as being socially acceptable. In such cases, the use of punishment to enforce one of the norms could provoke counter-punishment and lead to a feud if the individuals concerned disagree about which norm is appropriate. Indeed, one of the most notorious feuds in history, that between the Hatfields of Kentucky and the McCoys of West Virginia, has been attributed to normative conflict (Ellickson, 1991; p.220).

Normative conflict can arise naturally in many situations. Consider for example the production of a public good by a group of individuals. When individuals derive similar benefit from the public good, there may be an expectation that all beneficiaries contribute equally to its provision. However, in many instances, the value of the public good differs among individuals. The difference may be due to personal characteristics, past investments,

[1] These extreme cases are, of course, not the only settings in which feuds can arise. See McGreggor (2007) and The Economist (2010) for discussions of corporate feuds. See Andersson and Pearson (1999) and the references therein, for a discussion of intra-organizational feuds and their negative impact on efficiency.

luck or other factors. In such cases, determining the appropriate level of contribution becomes difficult, and disagreements or tensions between individuals could result.[2]

We test the hypothesis, that normative conflict increases the likelihood of a feud, with a laboratory experiment. Using previous economic experiments as a guide, we construct a social dilemma setting, in which it is feasible for a feud to arise as a consequence of norm enforcement, and for the feud to be sustained if players so choose. We include a treatment in which we have prior reason to suppose that there would be a normative conflict. We also include a control treatment, in which norm enforcement and feuding are possible, but where there is no normative conflict. The addition of this treatment allows us to isolate the impact of a normative conflict on the likelihood and severity of a feud. In a third treatment, a normative conflict could arise from the existence of multiple norms, but feuding is prohibited. This treatment allows us to study the impact of a prohibition of feuding on behavior, outcomes, and overall welfare in a setting with a normative conflict.

The game we use in our experiment is a variant of the voluntary contributions mechanism for public good provision. The game has been used extensively to examine the efficacy of norm enforcement (see, e.g., Chaudhuri, 2011; Gächter and Herrmann, 2009). In our experiment, subjects are assigned to groups of four players. All group members are given the same endowment and must decide how much of it to contribute to the public account. Contributing to the public account generates a positive externality to all other group members and increases efficiency. However, each group member has a dominant strategy to place none of his money in the public account, making the game a social dilemma. Once players make their contributions, individuals observe how much the other members of their group have contributed to the public account and can punish them, reducing each other's earnings at a cost. The duration of the game is determined by the group members' punishment activity. If punishment continues to be disbursed, then as long as some group members have positive earnings, the game continues and individuals can counter-punish. Thus, norm enforcement can be detrimental for efficiency if a feud breaks out.

To introduce normative conflict, two of the four group members are assigned higher returns from the public account than their peers. This induces at least two prominent and

[2] The term *normative conflict* is frequently found in the social psychology and law literature. To our knowledge, the term has not been used previously in economics. However, economists have long discussed the tension between equality and equity – a specific case of normative conflict. Equality refers to the equalization of outputs, while equity typically refers to individual compensation in proportion to one's input. As Hopkins and Kornienko (2010, p.106) write: "Perhaps there is no other economic debate older than that over inequality. While most people agree that some reduction of inequality is desirable, there is no consensus over what is meant by equality, nor over what should be equalized".

plausible norms that individuals may try to adopt and enforce. The first is that all individuals make the same contribution to the public account. This implies that individuals with high returns from the public account earn more than their low-return counterparts. The second norm is that individuals with high returns contribute sufficiently more to the public account so that all group members have equal earnings. To increase the tension between the equal-contributions norm and the equal-earnings norm, prior to playing the public-good game, group members participate in a real-effort tournament. The two best performers within each group of four receive greater returns from contributions to the public account than the other two group members. The rationale for this initial selection process is that, if individuals have worked to earn their higher returns from the public account, it might make them less willing to accept the equal-earnings norm.

Normative conflict raises the issue of norm selection. Ellickson (1991) has hypothesized that the norms that tend to be selected are those that maximize group efficiency net of enforcement costs.[3] In our experiment, if the punishment required to enforce the norm is sufficiently low, this rule would specify that the equal-contributions norm would be selected and each individual would contribute his entire endowment. However, if individuals are sufficiently averse to inequality (Fehr and Schmidt, 1999; Bolton and Ockenfels, 2000), it is plausible that this norm can fail to arise, as it leads to highly unequal payoffs among agents. Young (1998) argues that in such cases individuals will reach a compromise, which in our experiment would imply that low-return types contribute less, but high-return types earn more. As Elster (1989) notes in a discussion of evidence from social psychology, individuals may select social norms in a self-serving manner. In our experiment, this would imply that each type of agent favors the norm that yields him greater earnings: the high-return group members would favor the equal-contributions norm, while their low-return peers would prefer the equal-earnings norm. In a recent study, Reuben and Riedl (2011) provide evidence consistent with the fact that subjects favor norms that yield them greater earnings. We discuss their findings in greater detail in the following section.

We hypothesize that the emergence of feuds is more likely in the presence of normative conflict than in the absence of such a conflict. In previous social dilemma experiments, punishment is predominantly directed at individuals who contribute less than their peers and thus have greater earnings (e.g., Fehr and Gächter, 2000; 2002). However, in our experiment, contributing less than one's peers does not necessarily imply higher earnings. Therefore,

[3] Ellickson (1991) refers to enforcement costs as transaction costs (p.173).

there could be a disagreement about which norm is appropriate. This disagreement may increase the likelihood that punishment is viewed as inappropriate and that the punishment triggers counter-punishment (Denant-Boemont et al. 2007; Nikiforakis, 2008).[4] This counter-punishment, in turn, would be more likely to be interpreted as unjustified, and a sequence of retaliations may ensue.

The results from the experiment support the hypothesis. In the presence of normative conflict, 37 percent of instances of punishment trigger counter-punishment, compared to 14 percent in the absence of normative conflict. As a result, norm enforcement is nearly four times more likely to lead to a feud in the presence of normative conflict than in its absence. Furthermore, in the setting with conflict, feuds are sufficiently costly that the cost of feuding fully offsets the welfare gain from greater cooperation that the punishment mechanism yields. Our results suggest that self-enforcement of cooperation may be more difficult than previously thought, due to the possibility of feuds and their impact.

The rest of the paper is organized as follows. In section 2, we describe the experimental design and procedures. In Section 3, we present the results from the experiment. Section 4 concludes.

## 2. The Experiment

### 2.1 Earlier studies guiding the design

Our experimental design builds on previous studies that have used laboratory experiments to investigate norm enforcement in social dilemmas. In pioneering studies, Yamagishi (1986), Ostrom et al. (1992), and Fehr and Gächter (2000) showed that individuals can sustain cooperation with the use of costly punishment. Despite incurring a substantial cost to themselves, individuals are willing to punish free-riders. A number of subsequent studies have corroborated these results (e.g., Anderson and Putterman, 2006; Carpenter, 2007; Fudenberg and Pathak, 2010; Masclet et al., 2003; Nikiforakis and Normann, 2008; Noussair and Tucker, 2005; Sefton et al., 2007). Behavior in these experiments indicates that most groups quickly adopt the norm of equal contributions, which, in the symmetric environments of these experiments, leads to equal earnings.

[4] Note that there are different profiles of contributions that satisfy each norm. For example, the equal-contributions norm is satisfied for different values of $x$, as long as all group members contribute $x$. The existence of different contribution levels consistent with a given norm does not imply a normative conflict: the norm is for all to contribute the same amount. Given that a group chooses to apply a particular norm, it seems plausible that they would select the contribution profile, consistent with that norm, which maximizes efficiency net of enforcement costs, as suggested by Ellickson (1991). Note that in our experiment the (ex ante) efficient allocation is attained when all individuals contribute their entire endowment to the public account.

A feature of all these studies is that individuals benefit equally from cooperation so that there is no obvious normative conflict. A few studies have allowed individuals to punish in the presence of an asymmetry in either the cost of contribution (Tan, 2008; Noussair and Tan, 2011), in the endowment of players (Reuben and Riedl, 2011), or in the punishment power of group members (Nikiforakis et al., 2010).

The study most closely related to ours is a recent study by Reuben and Riedl (2011). The authors investigate the norms enforced by group members in a public good game under a variety of asymmetries including returns from the public account. The experiment allows only for one round of punishment and thus punishment cannot lead to a feud. Also, individuals are randomly assigned their returns from the public account implying that the tension between the equal-earnings norm and the equal-contribution norm may not be as strong as in our experiment, where returns are assigned based on the relative effort of group members. Nevertheless, their results provide support to our design choices by showing that heterogeneity in returns from the public account creates normative conflict. In particular, Reuben and Riedl (2011) provide evidence from a questionnaire study showing that when individuals receive different returns from the public account, impartial subjects consider both the equal-earnings and the equal-contributions rules as "normatively appealing". Further, in the laboratory experiment they find that high-return group members try to enforce the equal-contributions norm, while their low-return counter-parts the equal-earnings norm. In none of the aforementioned experiments were punished individuals allowed to counter-punish. Denant-Boemont et al. (2007) and Nikiforakis (2008) observe that many individuals are willing to counter-punish those who have previously sanctioned them. However, in these two studies, punishment cannot trigger a feud, as the number of rounds of punishment is exogenously restricted. Nikiforakis and Engelmann (2011) are the first to study punishment behavior when feuds are possible in a public-good game. The manner in which we allow for feuds is similar to theirs, but with two important differences. First, we use a different punishment technology to ensure that all group members are equally able to engage in feuding (see section 2.4). Second, under their design, individuals are homogeneous and thus there is no normative conflict. They find that participants recognize the threat of feuds and employ strategies to avoid their breakout. As a result, feuds are rare. Their results have reinforced our belief that normative conflict would increase the likelihood of feuds.[6]

[6] Hopfensitz and Reuben (2009) study a variant of the trust game and allow subjects to engage in sequences of retaliatory punishment. They observe that some pairs engage in feuding and the threat of feuds helps prevent exploitation of the trust exhibited by the first mover. There are numerous differences between the study of

## 2.2 The encryption task

All sessions are divided into two parts. The first part consists of the Encryption Task (Erkal et al., 2011). The encryption task is used to determine which group members have high returns and which group members have low returns from the public account in the second part of the experiment. The goal of the encryption task is to make the norm of equal contributions, which here implies unequal earnings, more salient, and thereby to sharpen the normative conflict.

The task proceeds as follows. Subjects are given a table assigning a number to each letter of the alphabet. They are then presented with a sequence of different words, which they must encrypt. The words are the same for all players and thus they all face a task of equal difficulty. If a subject encrypts a word correctly, she is presented with a new word. A subject cannot proceed to the next word until he encrypts the word correctly.

The encryption task lasts ten minutes. To minimize selection effects (see the discussion in Erkal et al., 2011), the instructions explain that the two group members with the highest number of encrypted words will be assigned a higher return from a public account in the second part of the experiment. However, the instructions do not explain exactly what these returns will be or what will happen in the second part, though they do indicate that those who perform better on the encryption task would be in an advantageous position in the second part. Ties between individuals for the number of encrypted words are broken randomly.

At the end of the first part of the experiment, subjects are informed about whether they are among the two highest encrypters in their group. No information about the exact number of words that other players encrypted is given until the end of the experiment. After subjects complete the encryption task they are given detailed instructions about the second part of the experiment. The data from the encryption task is presented in the appendix.

The second part of the experiment differs between the three treatments. We describe each of the three treatments in the next three subsections.

## 2.3 The No Feud treatment

No Feud is the simplest of the three treatments. It provides a benchmark, with a normative conflict but no possibility of feuding, against which to compare outcomes in the presence of feud opportunities. The No Feud treatment is a voluntary contribution mechanism, with a linear production technology for the public good. At the beginning of each

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Hopfensitz and Reuben and ours. With regard to punishment, the main differences are that punishment can only be used to retaliate (e.g., third parties cannot punish a counter-punisher to prevent a feud), and that subjects are randomly rematched in every period. This last feature limits the cost of starting a feud.

period, each participant is given an endowment of E$20. All players must decide simultaneously and without communication how much of their endowment to contribute to a public account, $c_i$, where $0 \leq c_i \leq 20$. The remaining $20 - c_i$ stays in player $i$'s private account. In addition to the money that player $i$ keeps, she receives a fixed percentage of the group's total contribution to the public account, $m_i = \{0.3, 0.5\}$. The two group members that encrypted the most words in the first part are assigned $m_i = 0.5$, while the other two subjects are assigned $m_i = 0.3$. The earnings of player $i$ are given by equation (1).

$$\pi_i = 20 - c_i + m_i \sum_{h=1}^{4} c_h \qquad (1)$$

At the end of each period, participants are informed about the group's total contribution to the public account, the contribution of each individual, whether the individual making that contribution is low or high return, and his earnings from the period. In order to track behavior in the experiment across periods, each group member is given a unique identification number (i.e., 1, 2, 3, or 4). The payoff function given in equation (1), the content of the instructions, and the duration of the experiment (10 periods) are common knowledge among participants.

**2.4 The Asymmetric treatment**

The Asymmetric treatment is our main treatment of interest. In this treatment, a normative conflict exists and feuding is permitted. The first stage of each period is identical to a period of the No Feud treatment. However, in the Asymmetric treatment, each period includes one or more subsequent decision stages. In each of these stages, individuals simultaneously decide on how much punishment to assign to each of the other members of their group. The exact number of punishment stages a group enters depends on the individuals' punishment behavior.

In the first punishment stage, after observing the individual contributions to the public account and the associated earnings of each group member, subjects must decide whether, and by how much, they wish to reduce the earnings of each of the other members of their group. To do so, they purchase (punishment) points. Punishment is costly for both the sanctioning and the sanctioned parties. An individual must pay E$1 in order to assign points. This punishment fee allows an individual to assign as many points to as many group members as he wishes, for the remainder of the current period. This cost structure has the feature that the asymmetric returns from the public account do not undermine the ability of a low return type to punish and to engage in a feud. In other words, unlike other punishment mechanisms used previously in the literature, this mechanism allows high and low return individuals to assign the same number of points.[7] Each punishment point reduces the earnings of its recipient by E$1. Let $p_{ij}^s$ denote the number of punishment points that player $i$ assigns to $j$ in punishment stage $s$ (where $i, j = 1, ..., 4; i \neq j$) Player $i$'s earnings at the end of the period are, accordingly,

$$\pi_i^s = 20 - c_i + m_i \sum_{h=1}^{4} c_h - \sum_{s=1}^{S} \sum_{\substack{j=1 \\ j \neq i}}^{4} p_{ji}^s - Punishment\ Fee \quad (2)$$

The maximum number of points that can be assigned to an individual in a given period cannot exceed the recipient's earnings from the first stage, that is, $\sum_{s=1}^{S} \sum_{j=1, j \neq i}^{4} p_{ji}^s \leq \pi_i^1$. Individuals can always assign points even if the fee would make their own earnings negative. This implies that counter-punishment cannot be preempted and that the lowest possible value of $\pi_i^s$ is -1. The number of points that an individual can assign to a player cannot exceed the earnings of a player, after taking into account the reduction in points that the recipient has experienced from punishment in earlier stages of the same period. Thus, if $\pi_i^1 = 20$ and $\sum_{j=1, j \neq i}^{4} p_{ji}^1 = 16$, the maximum number of points that one could assign to $i$ in punishment stage 2 is equal to four.

A period ends and a new one begins if either (*i*) no points are distributed in a given stage or (*ii*) points are distributed, but no player would be allowed to assign any more points if another stage was to follow because they have no remaining period earnings. Note that the punishment fee is only paid once per period. If a new punishment stage is entered, individuals are informed about the number of points each group member assigned to him in the previous stage, the total number of points each group member assigned to him so far in the period, and the number of points each group member assigned to his peers in the previous stage. The presentation format ensures that a player is able to connect this information about a player's punishment behavior with how much the player contributed in stage one (the contribution stage). The payoff functions (1) and (2), the duration of the experiment (10 periods), and the instructions are common knowledge to participants. In order to prevent subjects from making losses, each subject is given a one-off lump-sum payment of E$40 (AU$6).

**2.5 The Symmetric treatment**

The aim of the Symmetric treatment is to provide a benchmark against which to evaluate the impact of normative conflict in the presence of feuding opportunities. The

[7] This punishment technology is markedly different from the one used by Nikiforakis and Engelmann (2011) as well as that employed in previous experiments. The positive punishment fee ensures that self-regarding subjects will never punish, under the usual assumptions of common knowledge of money maximization and rationality. While the direct marginal cost of punishment is zero, the overall cost is endogenous and may be large since counter-punishment is also very cheap.

treatment is similar to the Asymmetric treatment. The main difference is that all individuals receive the same percentage of the group's total contribution to the public account. That is, $m_i$ = 0.4 for all $i$. This value is chosen such that total group earnings under the efficient outcome, when all players contribute their entire endowment to the public account, are the same across treatments.

In order for the treatment to be comparable to the Asymmetric treatment, subjects participated in the real-effort task. They were told that the purpose of this part of the experiment was to determine "whether or not an individual will be allowed to participate in the second part of the experiment. In order to be allowed to continue with the second part, each participant must encode 30 words." This, and the fact that $m_i$ = 0.4 for all $i$, are the only differences between the Symmetric and Asymmetric treatments.

Table 1 summarizes our experimental design.

[Insert table 1 here]

**2.6 Procedures**

The experiment was conducted in the Experimental Economics Laboratory at the University of Melbourne in February 2008. The 192 participants were students from the University of Melbourne, recruited randomly from a pool of more than 2000 volunteers using ORSEE (Greiner, 2004). Each subject took part in only one of the three treatments, and none of the subjects had previously participated in a social dilemma experiment. Each session consisted of 10 periods, under a single treatment.

Upon arrival at the laboratory, participants were seated at partitioned computer terminals and were randomly assigned to groups of four individuals. Participants were not given any information about who the other members of their group were. Group composition remained unchanged throughout the experiment. Subjects were then asked to read a set of instructions.[8]

Before the experiment could begin, each participant was required to answer a number of control questions. The aim of these questions was to help participants understand the game. The experimental sessions lasted approximately 60 minutes for the No Feud treatment and 90 minutes for the Symmetric and Asymmetric treatments. The average payment was AU$39.17 in the No Feud treatment and AU$41.12 in the Symmetric and Asymmetric treatments. These totals include a show-up fee of AU$6 given to prevent participants from

[8] The instructions and the software code are available at http://www.economics.unimelb.edu.au/nnikiforakis/research.

having negative earnings in the treatments with feuding opportunities. At the time of the experiment, the minimum hourly wage was AU$13.74. The average payment (AU$40.38) was equivalent to roughly US$37. The exchange rate between experimental and Australian Dollars was E$1 = A$0.15. The experiments were conducted using zTree (Fischbacher, 2007).

## 3. Experimental Results

The analysis of the experimental data is divided into three parts. In the first part, comprising subsection 3.1, we provide evidence for the existence of normative conflict in the Asymmetric treatment. In the second part, subsection 3.2, we present our main findings regarding the impact of normative conflict and feuding. We first consider the treatment differences with regard to contributions to the public account and group earnings, and report our main findings as results 1 and 2. We then turn to the incidence and severity of punishment, counter-punishment, and feuds. In the third part, subsection 3.3, we make some observations regarding the characteristics of the feuds observed in the experiment.

### 3.1 Establishing the existence of normative conflict

Previous public good experiments with punishment opportunities and homogeneous players have established that the contributions of group members (and hence their earnings) converge over time to a common level within a group (e.g., Fehr and Gaechter, 2000; Nikiforakis, 2010). This, along with the fact that deviations from the average contribution in a group trigger punishment, suggests that groups establish a norm of equal contributions *and* earnings. As described in sections 1 and 2, in the Asymmetric treatment, group members have different returns from the public account. This implies that equal contributions do not translate to equal earnings and could create a normative conflict. On the one hand, there is the norm of equal contributions. On the other hand, there is the norm of equal earnings, which prescribes that high-return group members contribute 2.33 times as much as the low-return individuals. As mentioned in the introduction, Reuben and Riedl (2011) report that respondents in a questionnaire hold conflicting views about which norm should be adopted. In addition, they find that high-return group members enforce the equal-contributions norm, while low-return group member enforce the equal-earnings norm.

Our first task is to examine whether one of the two norms is more salient to participants. For this reason, Figure 1 compares the ratio of contributions by high- and low-return group members in each group in the Asymmetric treatment.[10] Observations close to the 45-degree line are taken to be evidence that groups have adopted the equal-contributions norm (i.e., all contribute the same amount irrespective of their individual returns from the public account). The line below the 45-degree line has a slope of 0.43 (=1/2.33). Observations close to this line are taken as evidence that groups have adopted the equal-earnings norm (i.e., the low-return individuals contribute 43 percent of what the high-return individuals contribute).

If there was no normative conflict, we would expect all observations in Figure 1 to be clustered around one of the two lines. Instead, we observe considerable heterogeneity with regard to the norms adopted across groups. In five groups, all members contribute approximately the same amount. In four of them, all individuals contribute all or almost all of their endowment, which is the efficient norm (ignoring any disutility arising from the existence of unequal earnings). In most groups, however, high-return members contribute more than their low-return peers on average. The average contribution of high-return individuals in periods 6 to 9 in the Asymmetric treatment is E$12.05, while their low-return peers contribute E$8.93 (a ratio of 1.35). The fact that these observations are above the equal-earnings line, however, indicates that the relative contributions of the high-return individuals are not high enough so that earnings are equalized. The difference between the two types is highly significant, according to a two-tailed Wilcoxon, signed-rank test with groups as independent observations ($z$= -3.286, $p$-value < 0.01). The earnings of high-return group members (E$27.93) are significantly higher than those of their low-return counterparts (E$20. 71) ($z$= -3.516, $p$-value < 0.01).

[Insert figure 1 here]

Patterns in punishment assignment provide additional evidence for the existence of normative conflict. As in Reuben and Riedl (2011), if normative conflict exists in the Asymmetric treatment, one would expect some low-return individuals to reduce the earnings of high-return group members when they contribute the same amount as they do, punishing conformity to the equal-contribution norm. Similarly, some high-return individuals might reduce the earnings of low-return individuals when the latter contribute 43% of the amount that they do, punishing conformity to the equal-earnings norm. This is indeed the case. In the

[10] For this exercise, we use only the data from the second half of the experiment as groups typically take a number of periods to converge to a small range of contribution. The last period is dropped to avoid end-game effects. Within-type variance in contributions within groups is low in the periods used. That is, individuals with the same return from the public account within the same group tend to contribute at a similar level.

first half of the experiment, the average contribution of low and high-return individuals when punishment is assigned by low-return group members in the first punishment stage is roughly equal (E$8.82 and E$7.99, respectively). The average contribution of low and high-return individuals when punishment is assigned by high-return group members in the first punishment stage is E$4.98 and E$13.46, respectively.[12]

The observations in this subsection inform the empirical strategy that we follow for the rest of the paper. As suggested in Figure 1, there is a considerable degree of interdependence in the actions within groups. It follows, therefore, that we cannot treat each individual within a group as an independent observation. Following the literature, we report two-tailed, Mann-Whitney tests, with groups as independent observations, when analyzing treatment differences in contributions and earnings.[13]

**3.2 The impact of normative conflict in the experiment**

Figure 2 presents the time profile of average contributions in each treatment. The figure shows that average contributions are greater in the two treatments with punishment, Symmetric and Asymmetric, than in No Feud, in period 1. Afterward, contributions stabilize at an intermediate level in the Asymmetric and Symmetric treatments, whereas cooperation unravels in the No Feud treatment.[14] The average contribution level is about 3 ECU, or 15 percent of endowment, greater in Symmetric than in Asymmetric throughout the time horizon.

Figure 3 presents average earnings over time in each treatment. Average earnings are lower in the Asymmetric than in the Symmetric treatment throughout the experiment. In each treatment, earnings are closer to the E$20, corresponding to the subgame-perfect Nash equilibrium, than they are to the maximum possible average of E$32. Average earnings are E$21.59, E$22.12, and E$23.76 in the Asymmetric, Symmetric and No Feud treatments, respectively. In the No Feud treatment, average earnings are E$24.10 in the first period. Thereafter, earnings decline steadily as cooperation unravels. In the Asymmetric treatment, average earnings start at 12.20, and increase over time, stabilizing around period 6 at roughly

[12] For these calculations we use data only from the first half of the experiments, as this is the time interval where normative conflict would likely be most apparent. The average contribution of low and high-return individuals, when the former did not assign punishment points, was E$8.86 and E$12.15. The average contribution of low and high-return individuals when the latter did not assign punishment points was E$10.95 and E$12.44.

[13] In order to ensure that our treatment effects are not being driven by outliers, we also run clustered versions of the Ranksum test as developed by Datta and Satten (2005), for all tests reported in this paper to ensure robustness. All results reported are robust to these more conservative testing procedures.

[14] One group has been dropped from the analysis. The reason is that one member of this group always reduced the earnings of the other group members to 0 irrespective of their actions. The result was that all group members had earnings of either 0 or -1 in every single period of the experiment.

E$23. The Symmetric treatment follows a similar trajectory, though at a greater level of earnings throughout the time horizon, with the exception of the final period.[15]

[Insert figures 2 & 3 here]

Figures 2 and 3 suggest that normative conflict has a negative effect on contributions and overall earnings. Non-parametric statistical tests, however, indicate that while the reduction in earnings is significant, the decrease in contributions is not.

**Result 1:** *Normative conflict reduces earnings. In particular, earnings are lower in the Asymmetric treatment than in the Symmetric treatment, despite similar contribution levels.*

SUPPORT: We cannot reject the hypothesis that the average contribution is the same in the Symmetric and Asymmetric treatments ($z$=1.447, $p$-value = 0.15). The difference in earnings between Asymmetric and Symmetric is significant at the 10-percent level ($z$ =1.798, $p$-value = 0.07). □

A comparison between the Asymmetric and the No Feud treatments measures the effect of the imposition of a ban on feuding. Result 2 describes the effect of such a prohibition on contributions and earnings.

**Result 2:** *Contributions are greater in the Asymmetric than in the No Feud treatment, but earnings are not significantly different between the two treatments.*

SUPPORT: The average contribution in the Asymmetric treatment is 10.44, while it is 3.53 in No Feud. The difference is significant ($z$=-3.761, $p$-value < 0.01). Despite this, the difference in earnings between Asymmetric and No Feud is not significant ($z$ =0.276, $p$-value = 0.78).[16] □

Result 1 shows that a normative conflict reduces earnings, even though it does not reduce average contributions significantly. This suggests that there is more punishment, some of which may be in the form of feuds, in Asymmetric than in Symmetric. Result 2 shows that

[15] The convergence in earnings in the last period between Asymmetric and Symmetric is likely due to an end-game effect that appears in some sessions. Punishment levels increase in the last two periods in the Symmetric treatment. Nikiforakis and Engelmann (2011) report a similar end-game effect. They attribute it to the fact that, as the experiment nears the end, the maximum length of a feud is reduced and the cost of punishment declines correspondingly.

[16] While the Symmetric treatment differs from No Feud with respect to two factors (the existence of feuding opportunities and heterogeneity in the returns from the public account), for completeness we report that we reject the hypothesis that contributions are the same in the No Feud and Symmetric treatments ($z$ =-4.004, $p$-value <.01), and the hypothesis that earnings are the same in the Symmetric and No Feud ($z$ =-1.641, $p$-value = 0.10). Contributions and earnings are both greater in Symmetric.

banning punishment reduces contributions without changing overall earnings. This would be the case if the reduction in the cost of punishment from the ban roughly offset the lower contributions resulting from the absence of the option to use sanctions to enforce the norms. We next turn to the topic of punishment.

We begin the analysis with first-stage punishment and recipients' subsequent reaction. If our experimental design is successful in generating normative conflict, we would expect to observe more counter-punishment in the Asymmetric than in the Symmetric treatment. Our results regarding treatment differences in first-stage and counter-punishment are stated as result 3.

**Result 3:** *Normative conflict increases the extent of counter-punishment. In particular, while participants assign a similar level of first-stage punishment in the Asymmetric and Symmetric treatments, they are substantially more likely to counter-punish in the second stage of the Asymmetric treatment. The severity of counter-punishment, conditional on its application, is also greater in the Asymmetric treatment.*

SUPPORT: Figure 4 presents the likelihood and severity of first-stage punishment and second stage counter-punishment, in each treatment. The severity refers to the number of points assigned, conditional on the application of punishment. Clearly, first-stage punishment is more likely to trigger counter-punishment in the Asymmetric than in the Symmetric treatment. Thirty-seven percent of all instances of first-stage punishment are followed by counter-punishment in Asymmetric, while only 14 percent of first-stage punishment is retaliated in Symmetric.[17] The difference is highly significant ($p$-value<0.01). Furthermore, counter-punishment is more severe under Asymmetric. Conditional on counter-punishment, the average number of "counter-points" in the Asymmetric treatment, 8.9, is substantially and significantly higher than in the Symmetric treatment, 5.2 ($p$-value< 0.02).[18]

The greater frequency and severity of counter-punishment does not seem to deter the use of first-stage punishment in Asymmetric relative to Symmetric. As can be seen in Figure 4, there is no significant difference, either in the probability of first-stage punishment in the

[17] As a basis of comparison, in the experiment of Nikiforakis (2008), where counter-punishment cannot lead to counter-counter-punishment, 25 percent of all instances of first-stage punishment trigger counter-punishment.

[18] Many participants seem to anticipate that punishment may trigger counter-punishment. Despite the marginal cost of zero for assigning additional punishment points, the modal income reduction in the first punishment stage, conditional on income reduction, is only E$1 in Asymmetric and E$2 in Symmetric. Only 26 and 29 percent of cases of first-stage punishment involved income reduction of more than E$5 in the Asymmetric and Symmetric treatments, respectively. The cautious use of punishment is rational: the average income reduction in the first punishment stage in Asymmetric is E$7.9 when it leads to counter-punishment, and E$4.9 when it does not. That is, harsher first-stage punishment is more likely to trigger counter-punishment.

two treatments ($p$-value=0.26), or in the severity of first-stage punishment ($p$-value=0.80). In light of previous evidence showing that the demand for first-stage punishment is reduced as the threat posed by counter-punishment increases (e.g., Denant-Boemont et al., 2007; Nikiforakis, 2008; Nikiforakis and Engelmann, 2011), the similar levels of investment in first-stage punishment in the Asymmetric and Symmetric treatments, despite the greater risk of reprisal in Asymmetric, can be taken as additional evidence of the existence of normative conflict in the experiment. □

[Insert figure 4 here]

The increased use of counter-punishment in the presence of normative conflict creates favorable conditions for the emergence of feuds. We now examine the impact of normative conflict on feuds. Our definition of a feud is the same as in Nikiforakis and Engelmann (2011). We say that a feud has occurred in period $t$, if there exists a punishment stage $s$ in period $t$, for which $p_{ij}^{s} > 0$, $p_{ji}^{s+1} > 0$, and $p_{ij}^{s+2} > 0$, where $p_{ij}^{s}$ is the number of punishment points that player $i$ assigns to player $j$ in stage $s > 0$. For $s > 1$, we require the additional condition that $p_{ji}^{s-1} = 0$. That is, a feud is defined as an episode in which a punishment is initiated, it is retaliated in the next stage, and the original punishing party sanctions the counter-punisher again in the subsequent stage. We restrict our analysis to within-period feuds, since there is only one case of a multiple-period feud. Our main result is reported as result 4, and confirms the hypothesis that we advanced in section 1, that normative conflicts make feuds more likely. Results 5 and 6 report three more empirical findings that illustrate further the negative impact of normative conflict.

**Result 4:** *Normative conflict substantially increases the likelihood that a feud erupts.*

SUPPORT: Of the 16 groups in the Asymmetric treatment, 12 experienced at least one feud (75 percent). In contrast, only 6 out of 13 groups experienced at least one feud in the Symmetric treatment (46.2 percent). In total, there were 30 feuds in the Asymmetric treatment and 8 in the Symmetric treatment. There were 1.88 feuds per group in the Asymmetric treatment and 0.62 feuds per group in the Symmetric treatment. Five of the 8 feuds in the Symmetric treatment (62.5 percent) occurred in period 1. In contrast, under Asymmetric, only 43.3 percent of the 30 feuds occurred in the first period. □

**Result 5:** *The total demand for punishment across all stages, and the percentage of participants who engage in punishment, is greater in the presence of normative conflict than in its absence.*

SUPPORT: Figure 5 provides an overview of the demand for punishment over all stages, by period. The lines in Figure 5 present the average number of points assigned across all stages in a given period. The average number of points assigned across all stages in the Asymmetric treatment is 4.61. This is more than twice as large as the average number of points assigned in the Symmetric treatment, which is 2.14. The difference is statistically significant ($z$=-5.383; $p$-value < 0.01). Also, the percentage of individuals who paid the punishment fee (E$1) to assign points at least once in the experiment is considerably greater in Asymmetric (85.9 percent) than in Symmetric (63.5 percent). The difference is statistically significant ($p$-value < 0.01). □

[Insert figure 5 here]

**Result 6:** *Participants are more likely to have negative period earnings when there is normative conflict.*

SUPPORT: The lowest possible earnings in a period are E$-1. In 7.34 percent of possible instances in the Asymmetric treatment (47 out of 640), a subject's earnings at the end of the period were E$-1. In contrast, this occurred in only 1.9 percent of cases in the Symmetric treatment (10 out of 520). □

The negative impact of normative conflict on efficiency is also evinced by the number of cases in which a subject's earnings at the end of a period were below E$20. This is the earnings a player would have if it was common knowledge that all group members were selfish, money maximizers. Earnings below E$20 occurred in 28.6 percent of cases (183 out of 640) in the Asymmetric treatment and in only 13.7 percent of possible cases in the Symmetric treatment (71 out 520). The negative impact of normative conflict is perhaps best seen in Figure 6 which presents the evolution of earnings over time for each group. The figure shows how groups in the Asymmetric treatment often shift quickly from high to low earnings, and vice versa. In contrast, this rarely happens in the Symmetric treatment.

[Insert figure 6 here]

Finally, we examine the number of stages used in each of the treatments with feuding opportunities. The bars in Figure 5 present the average number of stages utilized; an average of 1 indicates that all individuals abstained from punishing in a given period, and hence utilized only the first stage. In most periods, both the average number of points assigned and the number of stages utilized are greater in the Asymmetric treatment. While the average number of stages per period is greater in Asymmetric (2.2) than in Symmetric (1.8), the difference is not significant ($z$=-1.340, $p$-value = 0.18). The absence of a significant difference may be due to the higher percentage of individuals with negative earnings, which require them to stop punishing for the period.

### 3.3 Some observations regarding feuds in the experiment

Our experiment is not designed to study factors, other than normative conflict, that may trigger feuds. Nevertheless, we examine the data for recurring patterns which may shed light on what other factors might be associated with feuds. We discuss only feuds in the Asymmetric treatment as there are too few observations in the Symmetric treatment.

First, as expected, 90 percent of the 30 feuds commence with first-stage punishment. In the majority of these cases (77.8 percent), the first-stage punisher had contributed at least as much as the recipient who counter-punished. The average contribution of the first-stage punisher is 11.26, while the average contribution of the counter-punisher is 5.56.

Second, most feuds (70.4 percent) triggered by first-stage punishment are between high-return and low-return group members. This is what we would expect if feuds were fuelled by normative conflict. In particular, roughly one half of the feuds triggered by first-stage punishment involve a high-return group member punishing a low-return peer (48.2 percent) in the first stage. The average contribution of the high-return punisher in these cases is much greater than that of the low-return counter-punisher (13 and 1.9, respectively).[19] This suggests that there exists a real conflict in opinions within some groups regarding what actions should be punished. In line with this, when a low-return group member is the first to punish in a feud and the target is a high-return peer (in 22.2 percent of instances of feuds), the average contribution of the low-return player is lower than that of the high-return (9.41 and 11.23, respectively).

Third, men and women are equally likely to be involved in a feud. Of the 60 individuals involved in the 30 feuds, 53.3 percent are men and 46.7 percent are women. This corresponds almost exactly to the share of the participants that are of each gender; 53.1 percent men and 46.9 percent women. Subjects are equally likely to enter into a feud with an individual of the same gender as with an individual of the other gender. This is not surprising given that individuals could not identify the gender of their peers.

[19] Overall, in 61 of the 85 cases (71.8 percent) of first-stage punishment by high-return group members, the victim was a low-return peer. The average contribution of high-return punishers was E$12.9, and that of low-return recipients was E$3.1 As one may have expected, low-return group members target high-return subjects less frequently (in 59 out of 106 cases; 55.7 percent). The average contribution of high and low-return participants in these cases was E$4.9 and E$6.7, respectively.

Fourth, feuds are typically very costly, and end only when the resources of the feuding parties are exhausted. The majority of feuds (87 percent) result in at least one of the parties having zero or negative earnings for the period. Also, most feuds (65 percent) result in both parties reaching zero or going negative. Thus, once a feud begins, it is rare for the parties to stop it voluntarily.

## 4. Conclusion

There is considerable evidence that feuds are a common phenomenon in everyday life. Given their negative impact on the welfare of those involved the frequency with which feuds are observed seems surprising. In this paper, we presented the results from a laboratory experiment examining whether feuds can result from individual attempting to enforce a given norm of behavior when there is normative conflict. We found that normative conflict increases substantially the likelihood that punishment will trigger counter-punishment and lead to a feud.

Our results should be of interest not only to scholars studying the determinants of feuds, but, given our experimental set up, also to researchers interested in the evolution of cooperation. In recent years, economists and other social scientists have argued that cooperation can emerge spontaneously even in anonymous interactions, if individuals are allowed to punish free riders. However, the bulk of the evidence in favor of this proposition comes from studies in which there is no normative conflict. In the absence of normative conflict, individuals can easily agree on what constitutes appropriate behavior, and what constitutes opportunistic behavior. However, the world outside the laboratory is characterized by diversity. Individuals differ in multiple respects (e.g., wealth, nationality, religion, educational background, and age) making it more difficult to reach consensus about what actions are appropriate. This diversity might enhance the likelihood of a normative conflict.

We find that, as in most previous studies, in the absence of normative conflict, peer punishment increases cooperation rates and welfare, as measured by total group earnings. However, when there is normative conflict, punishment often triggers counter-punishment and leads to feuds. These feuds are very costly for the individuals involved in them. As a result, the cost of feuding fully offsets the efficiency gain from greater cooperation that the ability to punish yields.

As with any empirical finding, generalizations should be made with great care. Although our experiment allows participants to employ a range of complex strategies, by experimental standards, certain forces have been neutralized that may be important in the field. For example, if group members are allowed to communicate, it is possible that they may be able to agree on which actions should be punished and which ones should not. Nevertheless, our results indicate that improving efficiency in the absence of formal institutions may be more difficult than previously thought, as normative conflict appears to arise naturally in many circumstances. Indeed, field evidence suggests that uncoordinated, costly punishment is uncommon outside the laboratory (e.g., Balafoutas and Nikiforakis, 2011; Guala, 2011). Our results suggest that peer punishment may be more efficacious in homogeneous populations, and perhaps even more so in closely-knit groups, where individuals are similar and may thus share a common understanding of what actions should be punished.

Understanding how normative conflict arises, and how to design institutions that minimize the costs associated with the process of norm selection, are interesting topics for future research. Normative conflict creates a coordination problem. However, there may not be a simple solution for this problem. The difficulty arises from the fact that individuals have different preferences over norms, analogously to the difference in preferences players might have over equilibria in a Battle-of-the-Sexes or a Chicken game. As is sometimes the case in games with multiple equilibria, a certain degree of inefficiency may be inevitable in the presence of normative conflict. Self-serving individual biases may further exacerbate the coordination problem. As Elster (1989, p.115) remarks, "[e]ven if the belief in the norm is sincere, the choice of one norm among the many that could be relevant may be an unconscious act dictated by self-interest."

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**APPENDIX: Design Validation and Gender Stratification**

As with any experimental design, evaluation of the treatment effect may be biased if the sample is not fully balanced, despite careful randomization. In the literature on risk, social preferences, and competitive performance, it is often found that males and females respond differently to conflict and incentives.[20] One potential confound with our treatment effects, then, is that the composition of males and females might differ across treatments, and thus could lead to spurious results. To account for this potential confound, we stratified our sample based on gender, maintaining similar group compositions between treatments.[21] There is no difference in the gender composition across any of the treatments. Table A1 presents the number of males and females in each of our treatments as well as the results from the encryption task. As can be seen by comparing the number of males and females in each treatment, males constituted between 53 percent and 54 percent of the sample in each of our three treatments.

In some of their experimental treatments, Erkal et al. (2011) found that male participants encrypted more words than female participants. A second potential confound, then, is that the proportion of males and females in the high-return group may differ. However, as shown in table A1, in our experiment, there is no difference in the proportion of males and females with high and low returns within or across treatments. There is no difference in the number of words encrypted between the Asymmetric and the No Feud treatments. The table presents results from the encryption task used to assign individuals in the high and low-return groups. As can be seen by comparing the average number of words encrypted in the Asymmetric and No Feud treatments, there is no observable difference in the speed of encryption between the two treatments. This result is unsurprising given that the instructions prior to the encryption task were identical for both treatments. Comparing the proportion of males in the high and low-return groups, one can see that there is no selection into the high-return group based on gender. In the Asymmetric treatment, exactly half of both men and women are in the high and low return groups. Thus, gender composition does not appear to be a driver of the differences in behavior between the high and low return groups within a treatment, or between treatments.

[20] See Croson and Gneezy (2009) for a review of the extensive literature on gender.

[21] Just as session-level heterogeneity in gender was a concern, so too was composition of groups within each treatment. In environments with normative conflicts, homogeneous groups might be more likely to be effective at adopting a norm than heterogeneous ones. To account for this, we further stratified groups according to gender in the sessions. Individuals were not informed of this stratification and were not made aware of gender group composition at any point in the experiment. Across all sessions, roughly 25 percent of groups were all female, 25 percent of groups were all male, and the remaining 50 percent of groups were mixed.

# Instructions – Part 1

*These are the instructions for the Asymmetric treatment. The instructions for the other treatments differed only in those parts of the text that specifically corresponded to differences between the treatments. The instructions will be available for download at http://www.economics.unimelb.edu.au/staff/nikosn.*

**General information**

You are now taking part in an economic experiment. If you read the following instructions carefully, you can, depending on your decisions, earn a considerable amount of money. It is therefore important that you take your time to understand the instructions.

The instructions which we have distributed to you are for your private information. Please do not communicate with the other participants during the experiment. Should you have any questions please raise your hand.

During the experiment we shall not speak of Dollars, but of Experimental Currency Units (ECU). Your entire earnings will be calculated in ECUs. At the end of the experiment the total amount of ECUs you have earned will be converted to Dollars at the rate of **1 ECU = 15 cents** and will be immediately paid to you in cash. In addition, we will give you a one-off payment of **$6** (i.e. 40 ECU).

At the beginning of the experiment the participants will be randomly divided into groups of four. You will therefore be in a group with 3 other participants. **The composition of each group will remain the same throughout the experiment.**

The experiment is divided into two parts. Here, we explain the first part of the experiment. Once the first part is finished you will receive detailed information about the second part of the experiment.

**The task**

In the first part, all participants will perform a task. The task is the same for everyone. **You will be presented with a number of words and your task is to encode these words by substituting the letters of the alphabet with numbers using Table 1 on page 4**. The task decision screen is seen in Figure 1.

Example: You are given the word FLAT. The letters in Table X show that F=6, L=3, A=8, and T=19.

Once you encode a word correctly, the computer will prompt you with another word to encode. Once you encode that word, you will be given another word and so on. **This process will continue for 10 minutes** (600 seconds). All group members will be given the same words to encode in the same sequence.

**The purpose of the task**

The relative performance of each individual in the task will influence their earnings in the second part of the experiment. This can happen in the following way. In the second part, each participant will be given an endowment (20 ECU) and will be asked to divide it between a private and a public account. There will be two types of players in your group. We will refer to them as "Type A" and "Type B". Of the four individuals in your group, two will be of type A and two of type B.

The difference between the two types of players is the return they get from the public account. In particular, **Type-A players will have a *higher* return from the public account than Type-B players**. Both types will have the same return from the private account. Information about the exact returns will be given in the second part.

The second part will consist of 10 periods.

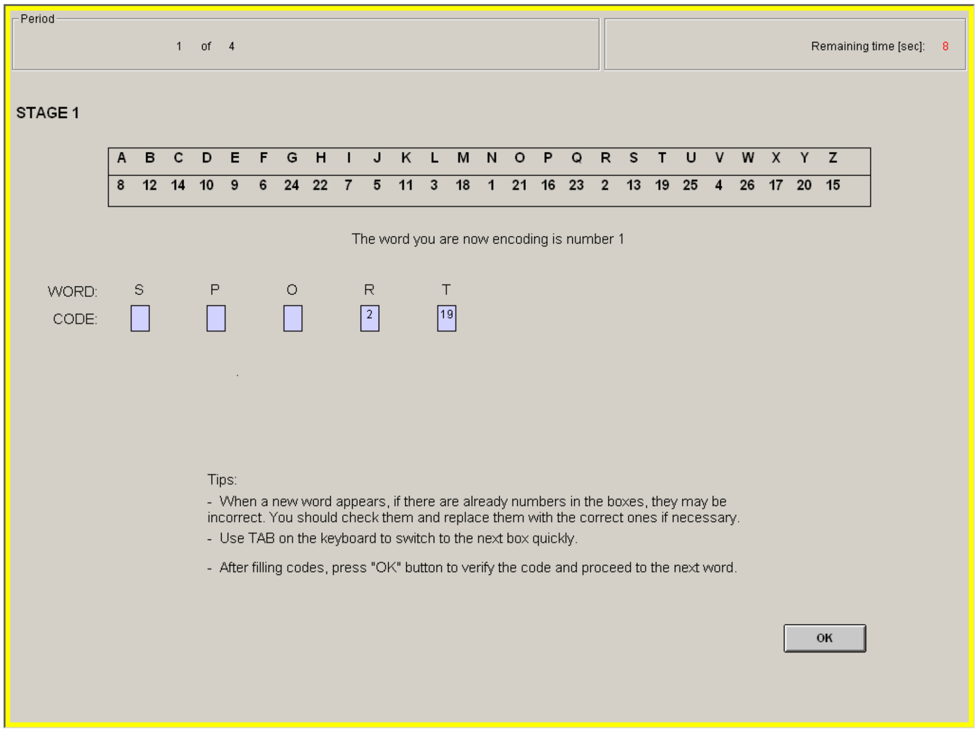



Figure 1

**<u>Relative Performance in Part 1 and Type Allocation</u>**

The allocation of types depends on the relative performance of the individuals in your group. At the end of the Part 1, the computer will rank the members of the group based on the number of words they encoded. **The two group members that rank first and second will be assigned the role of Type-A players**. **That is, the two group members with the highest number of encoded words will be assigned the role of Type-A players**. The two group members that rank third and fourth will be assigned the role of Type-B players. If two or more participants tie, the computer will determine their type randomly.

Once Part 1 is over, you will be informed as to whether you are of Type A or Type B and receive new instructions about the second part. You will not be informed about the precise number of words encoded by each group member until the end of the experiment. This will be done using a screen as the one in Figure 2. Note that certain information has been purposefully omitted from the figure. Note also that the number of words encoded is used for the purposes of this example and should not be taken as evidence of the number of words that one can or should encode. We expect participants to be able to encode more words than the ones in Figure 2 in the allocated time.

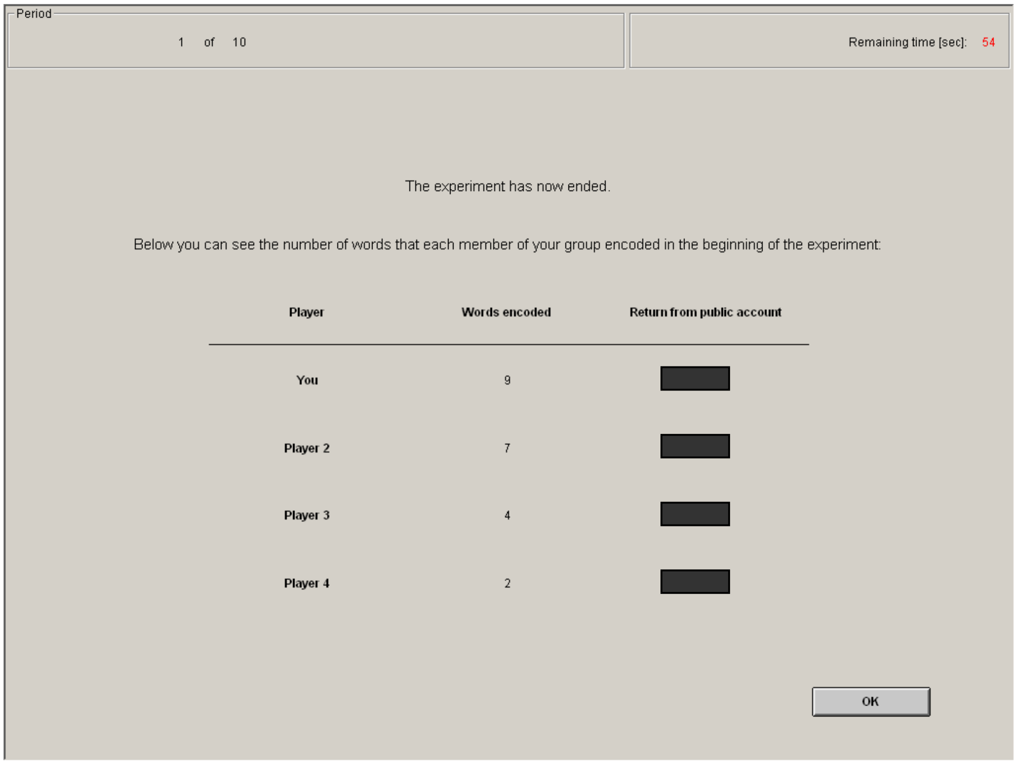



Figure 2

**Table 1**

| Letters | Numbers |
|---|---|
| A | 8 |
| B | 12 |
| C | 14 |
| D | 10 |
| E | 9 |
| F | 6 |
| G | 24 |
| H | 22 |
| I | 7 |
| J | 5 |
| K | 11 |
| L | 3 |
| M | 18 |
| N | 1 |
| O | 21 |
| P | 16 |
| Q | 23 |
| R | 2 |
| S | 13 |
| T | 19 |
| U | 25 |
| V | 4 |
| W | 26 |
| X | 17 |
| Y | 20 |
| Z | 15 |

**Control Questions**

Please answer the following questions. If you have any questions or have answered all questions, please raise your hand and one of the experimenters will come to you. All participants must fill answer the questions below before the experiment can begin.

1. What does the task in the first part determine?

…………………………………………………………………………………………………

2. Consider the following example. Players 1, 2, 3, and 4 encode 5, 10, 12, and 4 words, respectively. In the boxes below tick the player(s) who will be Type-A player in part 2.

□ Player 1
□ Player 2
□ Player 3
□ Player 4

3. Please state whether the following sentences are true or false.

a. Type-A players will have a higher return from the private account in Part 2.

□ True □ False

b. Type-B players will have a higher return from the public account in Part 2.

□ True □ False

# Instructions – Part 2

Recall that at the beginning of the experiment, you were randomly divided into groups of four. **The composition of your groups for this part of the experiment is the same as in Part 1 and will remain the same throughout the remainder of the experiment.**

This part of the experiment will last 10 periods. In the beginning of the experiment, each participant in your group will be randomly given a number for identification (i.e. Player 1, Player 2, Player 3, and Player 4). **Each participant will keep his/her identification number throughout the experiment.** This means that if, for example, you are assigned the role of Player 3 at the beginning of the experiment you will continue to act as Player 3 in future periods. Further, since the group composition remains the same throughout the experiment, the participant assigned the role of Player 1 in the first period will be the same as the participant assigned to Player 1 in all future periods. The same applies for Players 2 and 4.

Based on the number of words that you and the members of your group encoded, you will be assigned as either as either "Type A" or "Type B". **Your type will remain the same throughout the experiment and will influence the value that you receive from the public account as explained below**.

Once the experiment is over the identities of each participant will be kept anonymous. You will be paid in private and at no point will your group or player number be revealed.
No one will know who was in their group or what actions were carried out by each individual.

Each of the 10 periods is divided into a number of stages. Below we discuss the different stages in detail.

**<u>The first stage (The Contribution Stage)</u>**
At the beginning of each of the 10 periods each participant will receive 20 ECU. In the following, we shall refer to this amount as the "endowment". Your task in the first stage is to decide how to use your endowment. **You have to decide how many of the 20 ECUs you want to contribute to a public account** (from 0 to 20) **and how many of them to keep for yourself**. You will be able to make your decision by using a screen as the one in Figure 1 (shown for a Player of Type A). The consequences of your decision are explained in detail on the next page.

Once all the players have chosen their contribution to the public account you will be informed about the group's total contribution, your income from the public account and your payoff in this period through a screen as the one seen in Figure 2. Note that all numbers seen in the figures throughout this set of instructions are used only for illustrative purposes and should NOT be taken as a guide for action.

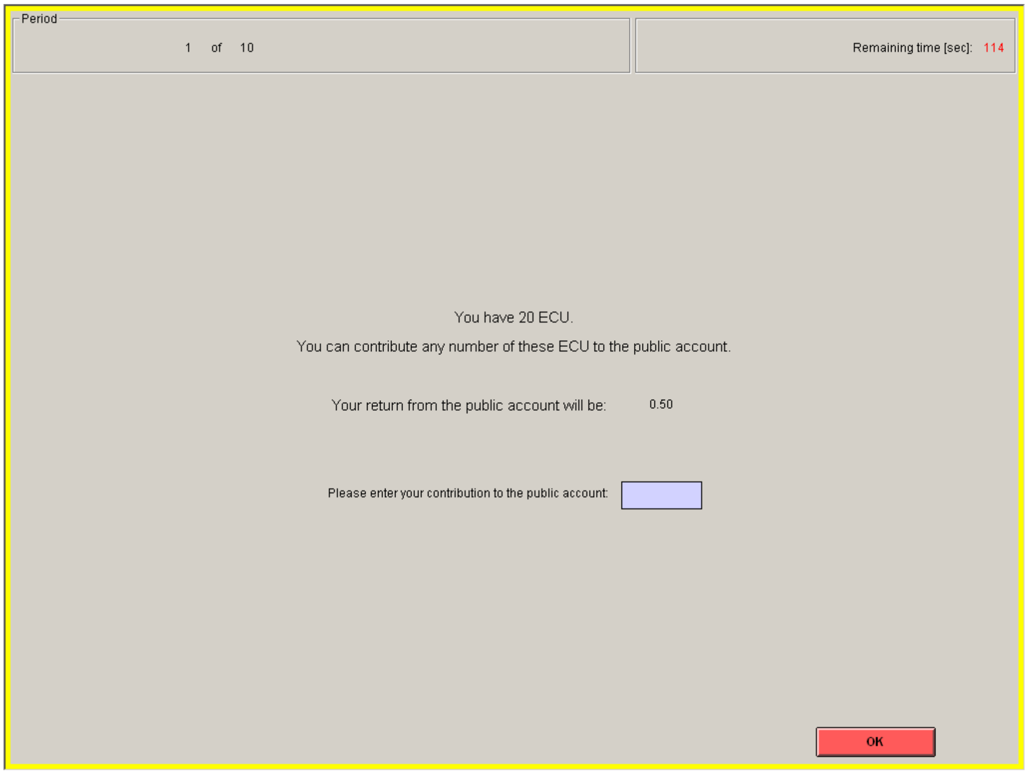


Figure 1 – Contribution stage (for Type-A players)

Your earnings in each period are calculated using a formula that differs based on whether you are a Type-A player or a Type-B player. The earnings of a Type-A player are calculated using the following formula. (If you have any difficulties do not hesitate to ask us.)

| | |
|---|---|
| Earnings at stage 1 = | Endowment of ECUs - Your contribution to the Public Account + 0.5*Total contribution to the Public Account |

The earnings of a Type-B player are calculated using the following formula:

| | |
|---|---|
| Earnings at stage 1 = | Endowment of ECUs - Your contribution to the Public Account + 0.3*Total contribution to the Public Account |

This formula shows that your earnings at the end of the first stage consist of two parts:

1) The ECUs which you have kept for yourself (endowment – contribution)
2) The income from the public account, which equals 50% of the group's total contribution if you are of Type A and 30% of group's total contributions if you are of Type B.

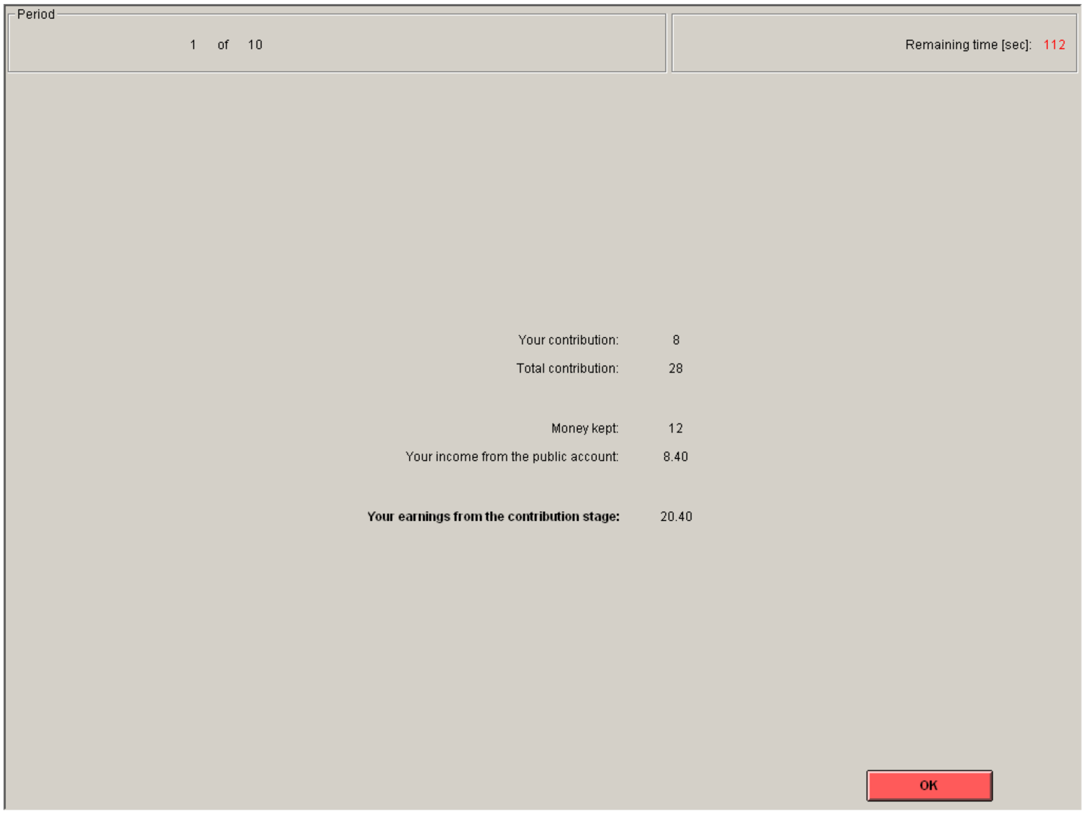


Figure 2 – Feedback screen after Contribution stage

**Example:** Suppose the sum of the contributions of all group members are 60 ECUs. In this case, a Type-A member of the group receives an income from the public account of:
0.5*60 = 30 ECUs. A Type-B member of the group receives an income from the public account of: 0.3*60 = 18 ECUs. If the total contribution to the public account is 9 points, then Type-A members receive 0.5*9=4.5 ECUs from the public account while Type-B members receive 0.3*9 = 2.7 ECUs from the public account.

You always have the option of keeping the ECUs for yourself or contributing them to the public account. Each ECU that you keep raises your end of period income by 1 ECU. Supposing you contributed this point to the public account instead, then the total contribution to the public account would rise by 1 ECU. Your income from the public account would thus rise by 0.5*1=.5 ECU if you are a Type-A member and 0.3*1=0.3 ECU if you are a Type-B member. However, the income of the other group members would also rise by 0.5 or 0.3 ECUs each, so that the total income of the group from the public account would be increased by 2*0.5+2*0.3=1.6 points. Your contribution to the public account therefore also raises the income of the other group members. On the other hand you also earn an income for each point contributed by the other members to the public account. In particular, for each point contributed by any member you earn either 0.3 or 0.5 ECUs depending on your type.

**<u>The second stage (Allocation Stage 1)</u>**
In the second stage you will be informed about how much each group member contributed individually to the public account in the first stage. In this stage you can **reduce or leave equal the earnings of each member of your group by distributing points**. The other group members can also reduce your income if they wish to.

To reduce another player's earnings you will have to distribute points. The fee for assigning points equals 1 ECU irrespective of (a) the number of points you choose to assign and (b) the number of players to which you assign points. That is, you will pay 1 ECU whether you assign 1, 2, 3 or more points to a single player or 1, 2, 3 or more points to two or three players. To assign points you will use a screen as the one seen in Figure 3.

Every point you assign to another player reduces their earnings by 1 ECU. Similarly, your earnings will be reduced by 1 ECU for every point you receive from your group members.

You may distribute as many points as you wish to a given player. However, the total number of points you assign to a given player cannot exceed that player's earnings from the contribution stage.

**Example 1:** Suppose that you give 2 points to player 1. This costs you 1 ECU and reduces player 1's income by 2 ECU.

**Example 2: S**uppose that you give 4 points to player 1 and 3 points to player 2. This costs you 1 ECU and reduces player 1's earnings by 4 ECU and player 2's earnings by 3 ECU.

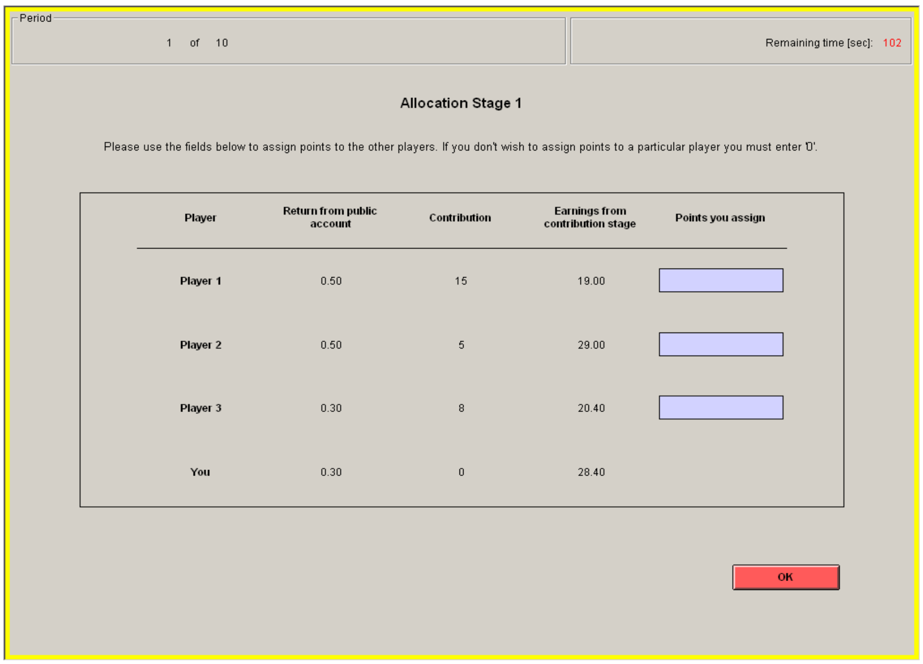


Figure 3 – Allocation stage 1

Your total earnings from the two stages are therefore calculated as follows:

**Total earnings (in ECUs) at the end of the first stage =**

= Earnings from the 1st stage – Points you receive

If the number of points that you receive *across* stages exceeds your first stage earnings, participants cannot assign any more points to you. In addition, **all points exceeding your earnings from the 1st stage will not be counted in determining your earnings from the stage.** The following example illustrates this point.

**Example 2:** Suppose that your earnings at the end of the 1st stage are 10.5 ECU and you are assigned 12 points in total. If you have not assigned points to others, your earnings will be 10.5 – 10.5 = 0 ECU.

Recall that the fee for assigning points equals 1 ECU. Therefore, your earnings in ECU after the second stage can be negative. The lowest possible 'earnings' you can have from a period is -1 ECU. If your earnings are negative at the end of the stage, this will be covered by the 40 ECU that we gave you in the beginning of the experiment.

If none of the members of your group distributes points then the period finishes and the next period begins again with stage one. Otherwise, a third stage will follow.

**<u>The third stage (Allocation Stage 2)</u>**

In the third stage, you will be informed of the points that each person in your group assigned to you and the other members in your group. Similarly, the other members of your group will be informed about how many points you assigned to each of them. In addition, you will be reminded of the earnings each group member had after the contribution stage, and the total points each group member has received in total up to this point. Then you can again **reduce or leave equal the earnings of each member of your group by distributing points**. As in Allocation Stage 1, other group members can also reduce your earnings if they wish to. To assign points you have to use a screen similar to the one seen in Figure 4.

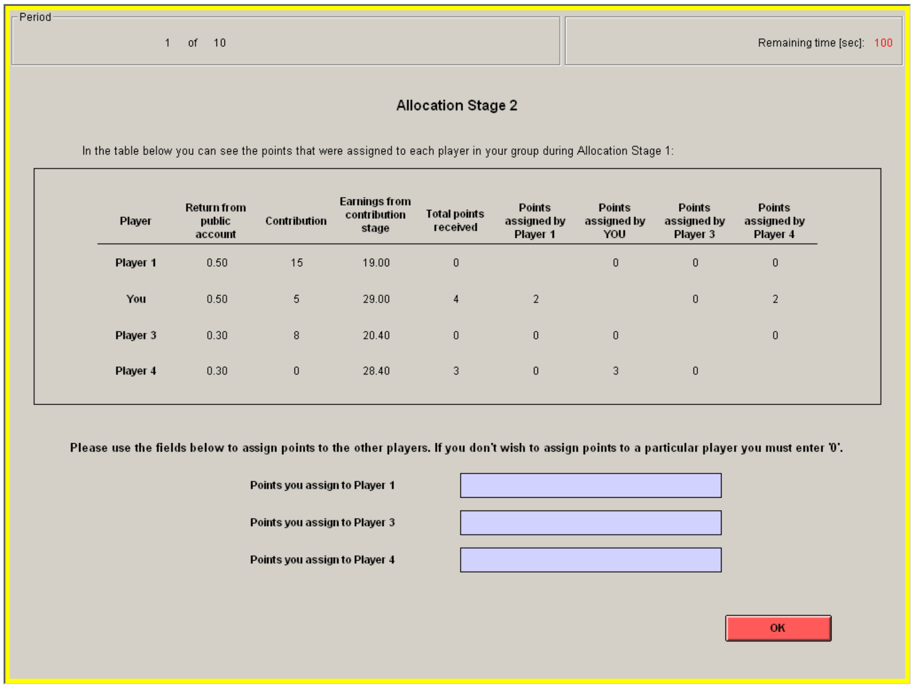
Note that in this stage **you do not have to pay the fee to reduce the earnings of others if you have already assigned points in the previous stage**. You may always assign points even if the fees would make your earnings negative.

The number of points that you can assign to a player can not exceed the earnings of a player taking into account the points that he has already been assigned. Thus, if an individual began with earnings of 20 ECU and was assigned 16 points in allocation stage 1, the maximum number of points you could assign to him/her in allocation stage 2 is 4.

Note that even if your earnings become zero (as a result of being assigned points by others), you will always be able to assign points as long as some individuals have positive earnings.

**Example 3:** Your earnings at the end of stage 1 were 20 ECU. You chose to assign points to player 1 in stage 2. You also chose to assign points to player 1 and 2 in stage 2. No points were assigned to you. Therefore, your earnings will equal 20 – 1 = 19 ECU.

**Example 4:** Assume you are player 2 in Figure 4. Assume also that you have not assigned any points in Allocation Stage 1. Your earnings after the contribution stage were 29 ECU. As you can see in Figure 4, in Allocation Stage 1 players 1 and 4 each assigned 2 points to you. Therefore, your earnings are reduced by 4 ECU. You also assigned 3 points to player 4 which costs you 1 ECU. Therefore, your earnings at the start of allocation stage 2 will be 29 – 4 – 1 = 25 ECU.



Period

1 of 10

Remaining time [sec]: 100

Allocation Stage 2

In the table below you can see the points that were assigned to each player in your group during Allocation Stage 1:

| Player | Return from public account | Contribution | Earnings from contribution stage | Total points received | Points assigned by Player 1 | Points assigned by YOU | Points assigned by Player 3 | Points assigned by Player 4 |
|---|---|---|---|---|---|---|---|---|
| Player 1 | 0.50 | 15 | 19.00 | 0 | | 0 | 0 | 0 |
| You | 0.50 | 5 | 29.00 | 4 | 2 | | 0 | 2 |
| Player 3 | 0.30 | 8 | 20.40 | 0 | 0 | 0 | | 0 |
| Player 4 | 0.30 | 0 | 28.40 | 3 | 0 | 3 | 0 | |

Please use the fields below to assign points to the other players. If you don't wish to assign points to a particular player you must enter '0'.

Points you assign to Player 1

Points you assign to Player 3

Points you assign to Player 4

OK

Figure 4 – Allocation stage 2

If none of the members of your group distributes points then the period finishes and the next period begins again with stage one. Otherwise, a fourth stage will follow.

**<u>Fourth stage (Allocation stage 3) and beyond</u>**

Your **task** in the forth stage and beyond is the **same as in stage 3**. After being informed of the points distributed in your group you will be able to assign further points. The costs of assigning points, as well as the earnings reduction caused by each point remain the same as before. That is, if you have paid the fee to assign points to any player, you will not have to incur a cost to assign further points to any player. As in previous periods, the implications of assigning or receiving points, as well as the restriction on the number of points that can be assigned to each player remain the same as before.

**<u>When does a period end?</u>**

A period ends and a new one begins when one of the following occurs.

- No points are distributed in a given stage.
- Points are distributed, but no player would be allowed to assign any more points if another stage followed. This can happen if the points assigned to all players in the group are equal or greater than their earnings from the first stage.

Below is an example illustrating when a period ends. (As all examples in the instructions, the entries should not be taken as a guide for behavior in the experiment.)

**Example:**

Assume that after the contribution stage, the payoffs are as follows:

**Player 1:** 20 ECU
**Player 2:** 25 ECU
**Player 3:** 30 ECU
**Player 4:** 35 ECU

Assume that players have assigned points in Allocation Stage 1, 2 and 3. Further, assume that after Allocation Stage 3 the total number of points allocated to each player is:

**Player 1:** 16 points
**Player 2:** 27 points
**Player 3:** 30 points
**Player 4:** 32 points

As the number of points assigned to players 2 and 3 is greater or equal to their earnings from the first stage, no further points can be assigned to them. In addition, only the first 25 points will be counted in determining player 2's earnings.

Assume that in Allocation Stage 4 player 4 assigns 4 points to player 1 and no other player assigns points. Hence the total number of points allocated to each player is:
**Player 1:** 20 points
**Player 2:** 27 points
**Player 3:** 30 points
**Player 4:** 32 points

As points were assigned, Allocation Stage 5 will be entered. Notice, however, that now points can only be assigned to player 4, the maximum number of which is 3 as otherwise the total number of points would exceed player 4's earnings from the contribution stage.

If no points are assigned at Allocation Stage 5 or if 3 points are assigned to player 4 the period will end. At the end of the period you will receive a summary of what happened in the period. The format of this summary can be seen in Figure 5.

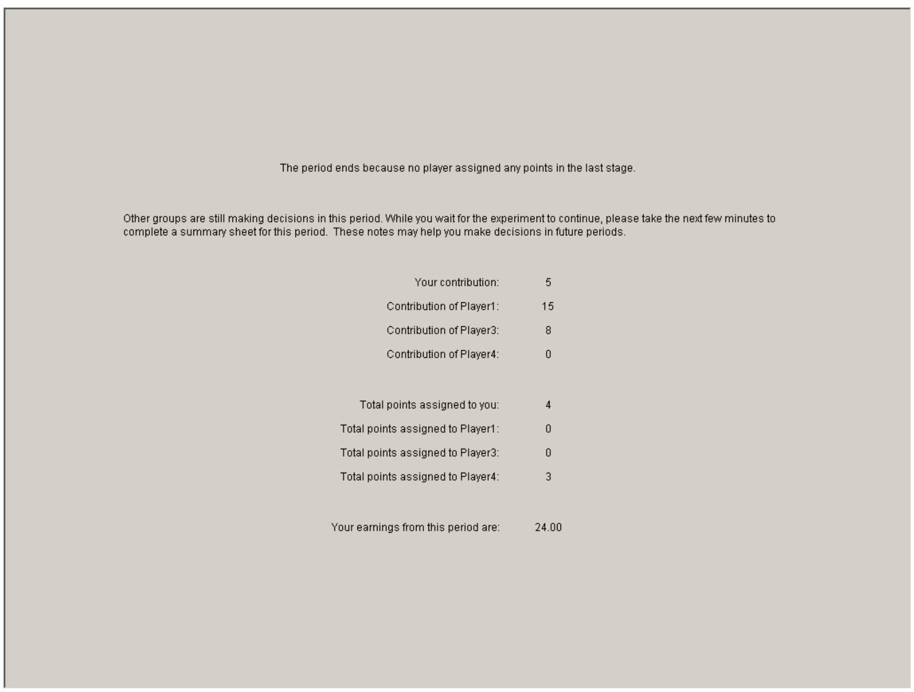



Figure 5 – Summary screen at the end of a period

A paper summary sheet is available for each period on which you can keep track of any events that occurred in a period. These notes will help you make decisions in future periods. If you have any further questions please raise your hand and one of the supervisors will come to help you. Otherwise please answer the control questions.

**Control Questionnaire**

1. Each group member has an endowment of 20 ECUs. Nobody (including you) contributes any ECUs to the public account. How high are:
   a. The earnings of Type-A players after the first stage? ………
   b. The earnings of Type-B players after the first stage? ………

2. Each group member has an endowment of 20 ECUs. You contribute 20 ECUs to the public account. All other group members contribute 20 ECUs each to the public account. Suppose that you are a player of Type-A
   a. Your earnings after the first stage? ………
   b. The earnings of the other Type-A group members?………
   c. The earnings of the Type-B group members? ……….

3. Each group member has an endowment of 20 ECUs. The other three group members contribute together a total of 30 ECUs to the public account. Suppose that you are a player of Type-A. What is:
   a. Your earnings after the first stage if you contribute 0 ECUs to the public account? ……….
   b. Your earnings at the end of the period if you contribute 15 ECUs to the public account? ……….

4. Each group member has an endowment of 20 ECUs. You contribute 8 ECUs to the public account. Suppose that you are a player of Type-B. What is:
   a. Your earnings after the first stage if the other group members together contribute a further total of 7 ECUs to the public account?...............
   b. Your earnings at the end of the period if the other group members together contribute a further total of 22 ECUs to the public account?...............

5. Your earnings from the first period are 25 ECU. How much will your earnings at the end of the second stage be if:
   a. You receive 2 points, but do not assign any yourself? …………..
   b. You receive 2 points and assign 3 points yourself to a single group member?..........

6. Assume you assign 2 points to another group member, no one else in your group assigns any points and all members in your group have a positive payoff. Will another stage follow?
   ……………………………………………………………………………………..
7. Assume no member of your group assigns points including you. Will another stage follow?
   ……………………………………………………………………………………..
8. Assume the earnings of Player 2 after the contribution stage are 25 ECU. Assume also that Player 1 assigns 25 points to Player 2. Will Player 2 be able to assign further points in this period?
   ……………………………………………………………………………………..

**Table 1 – Experimental Design**

| Treatment | Normative Conflict | Feuding Opportunities | Number of Groups |
|---|---|---|---|
| No Feuds (NF) | Yes | No | 18 |
| Asymmetric (ASYM) | Yes | Yes | 16 |
| Symmetric (SYM) | No | Yes | 13 |

**Figure 1 – Contributions by player type in the Asymmetric treatment**

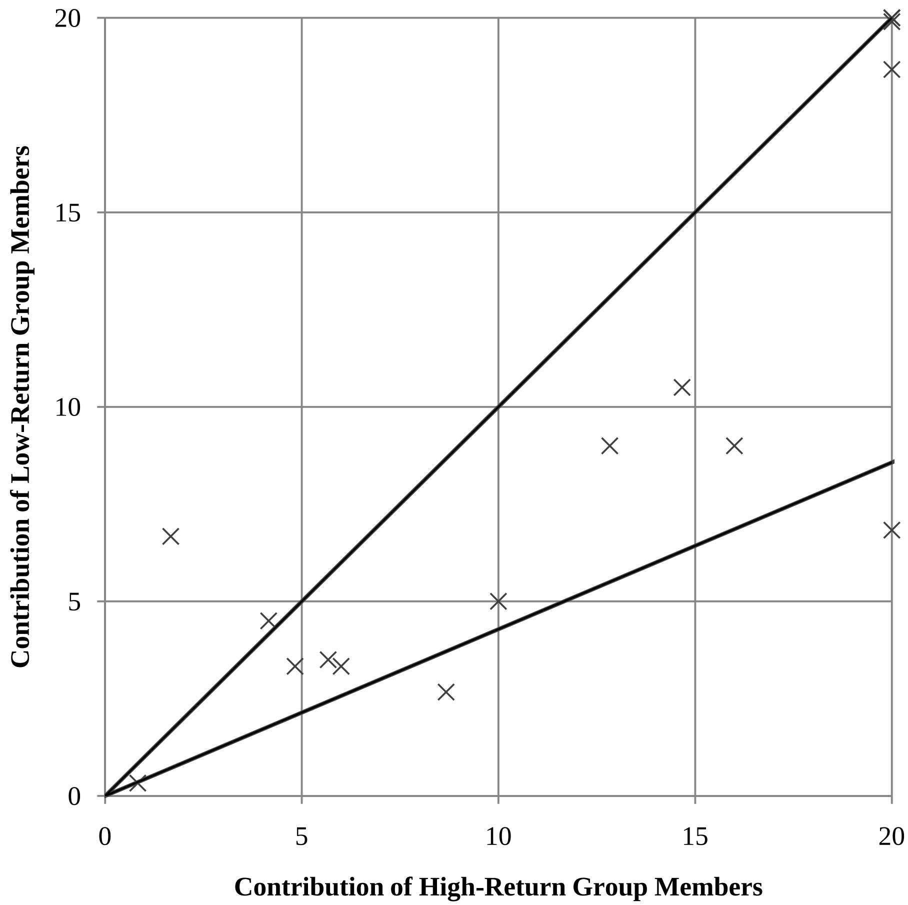


**Figure 2 – Average contributions by treatment**

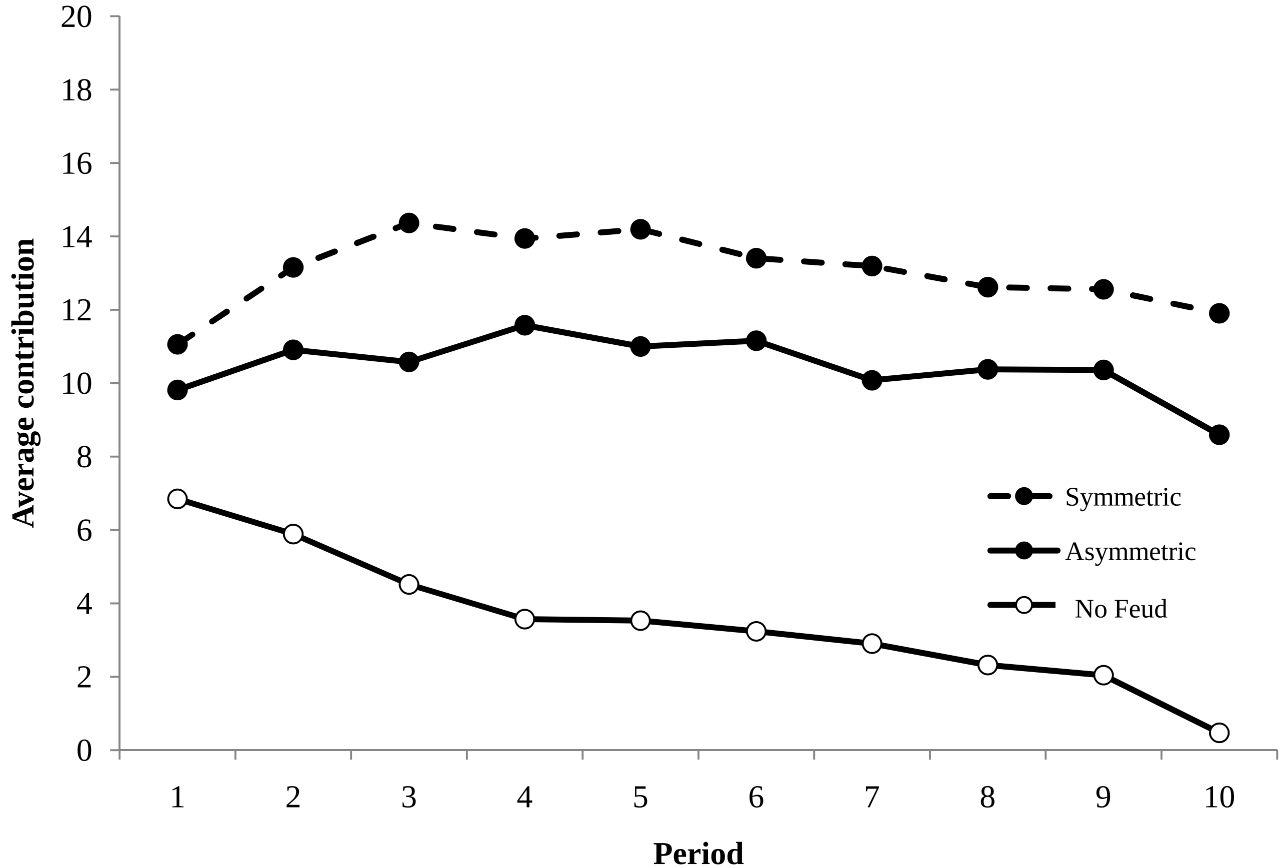


**Figure 3 – Average earnings by treatment**

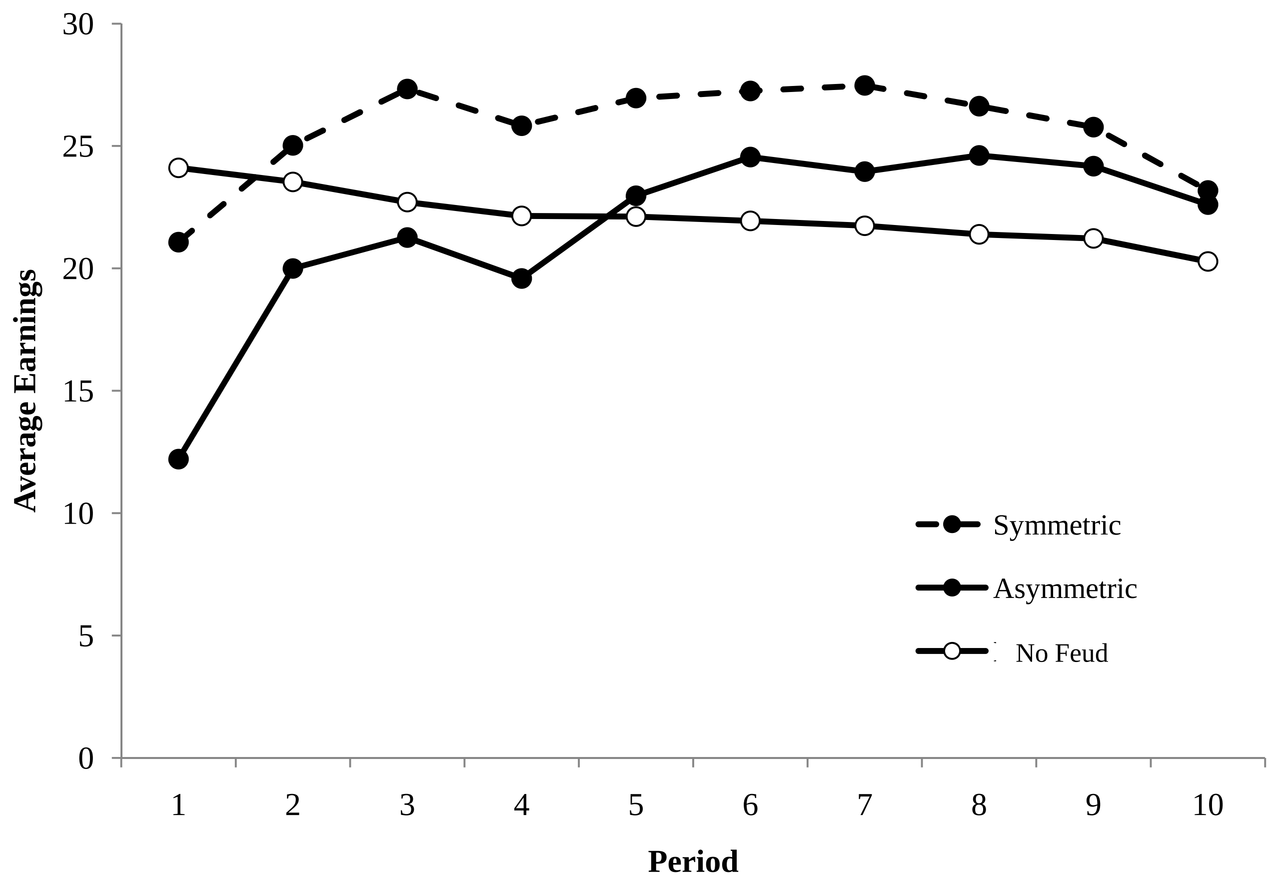


**Figure 4 – Punishment and counter-punishment**

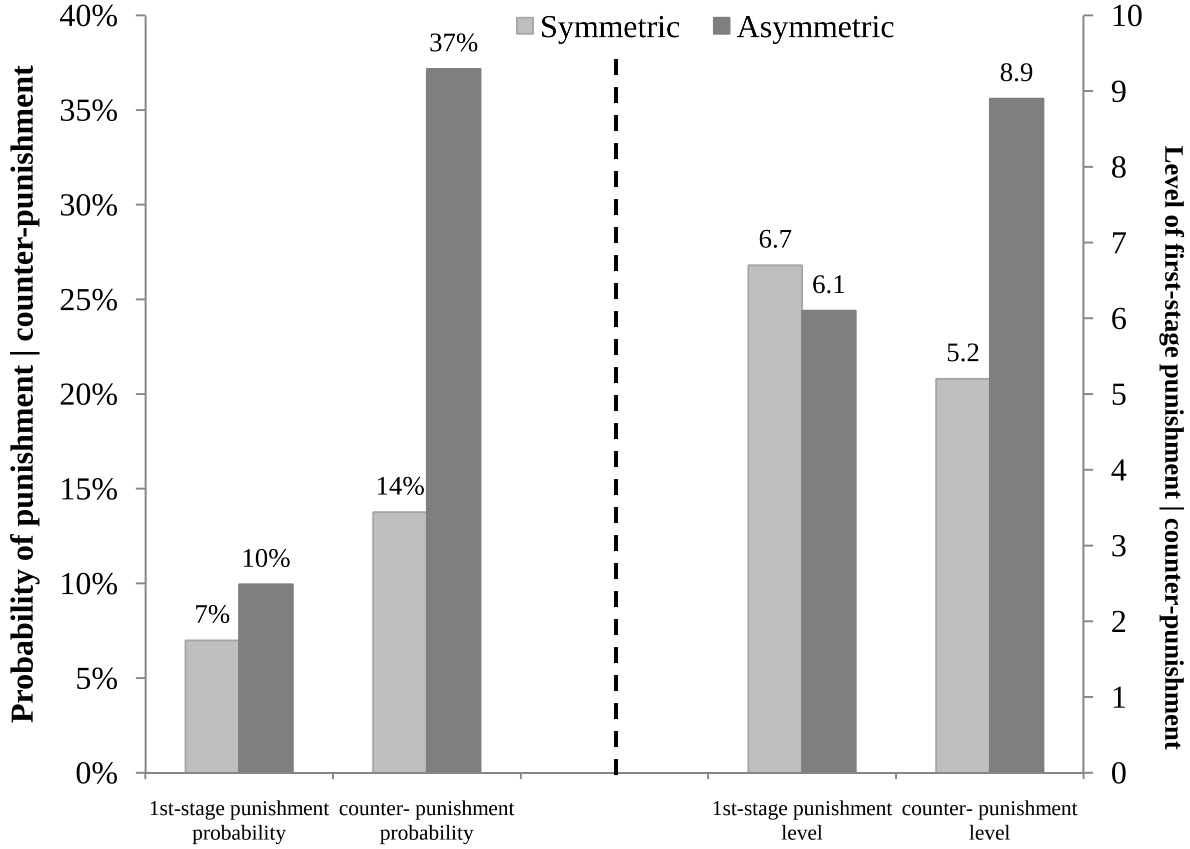


**Figure 5 – Total demand for punishment and average number of punishment stages used per period**

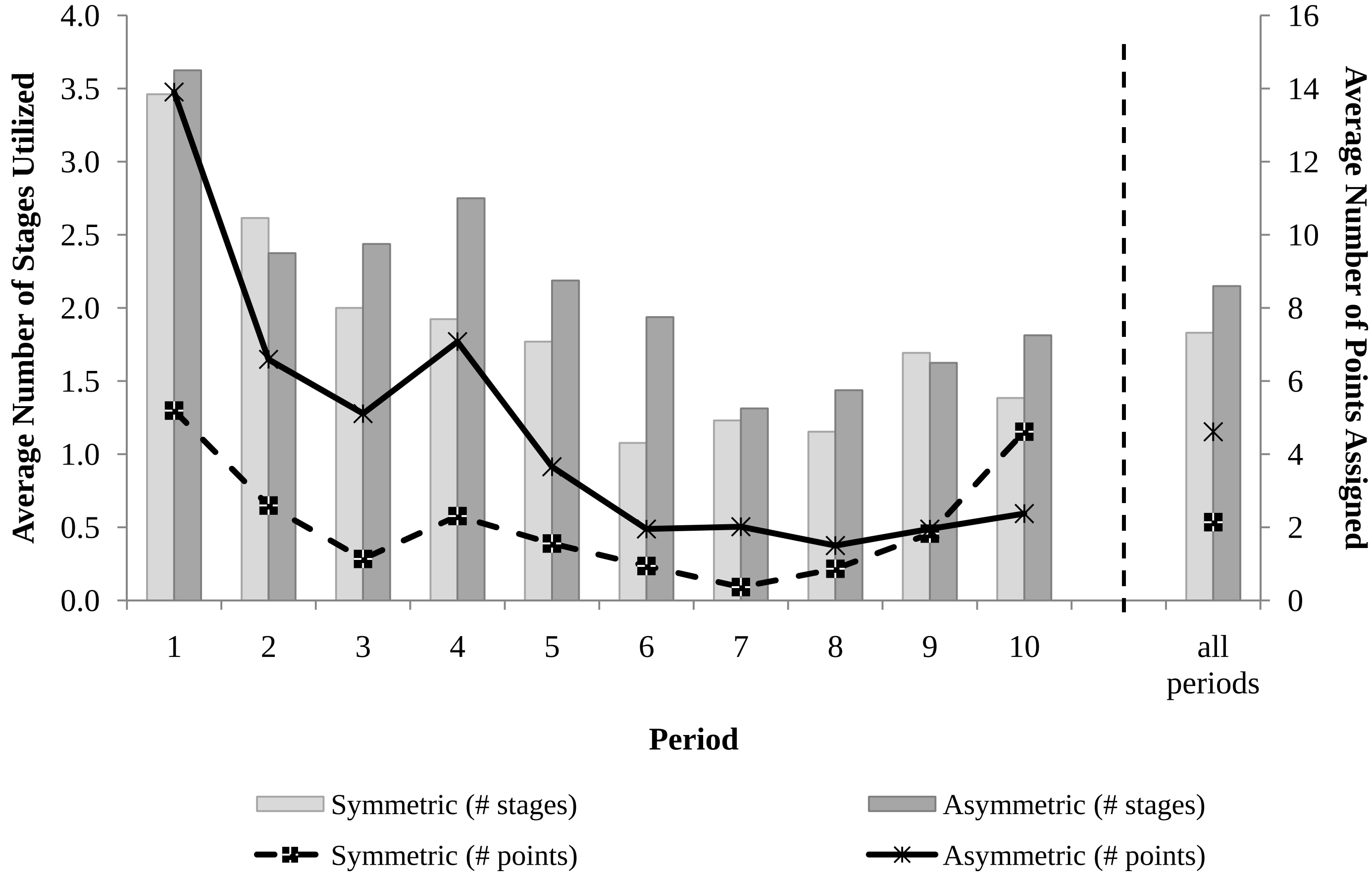
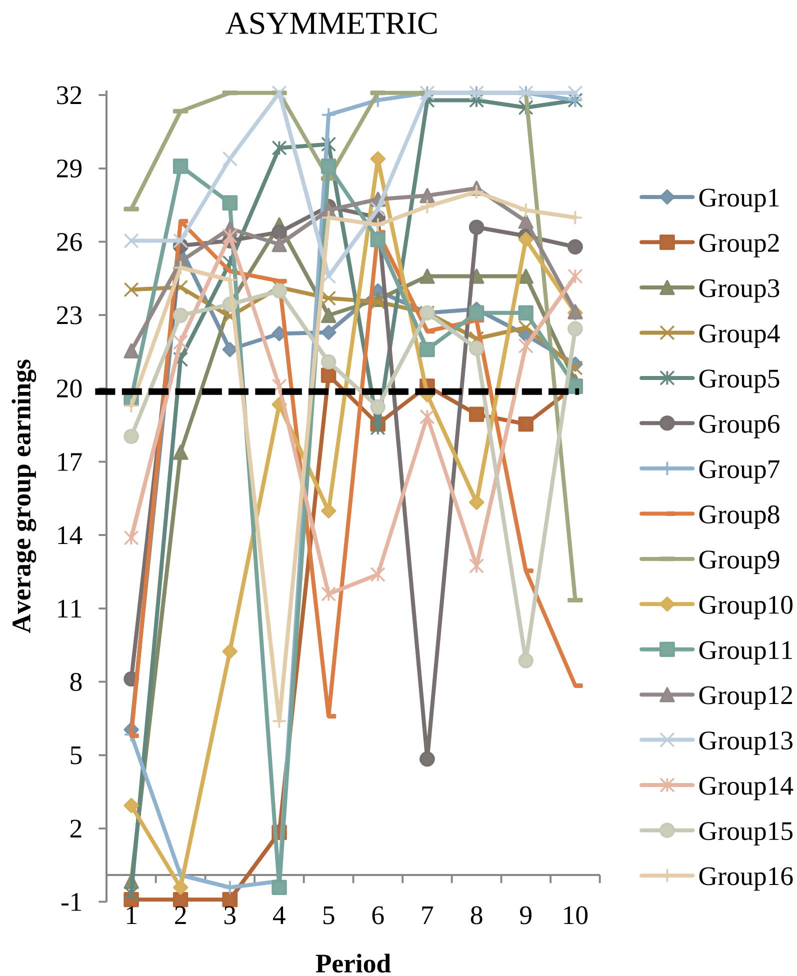


**Figure 6 – Group earnings over time**



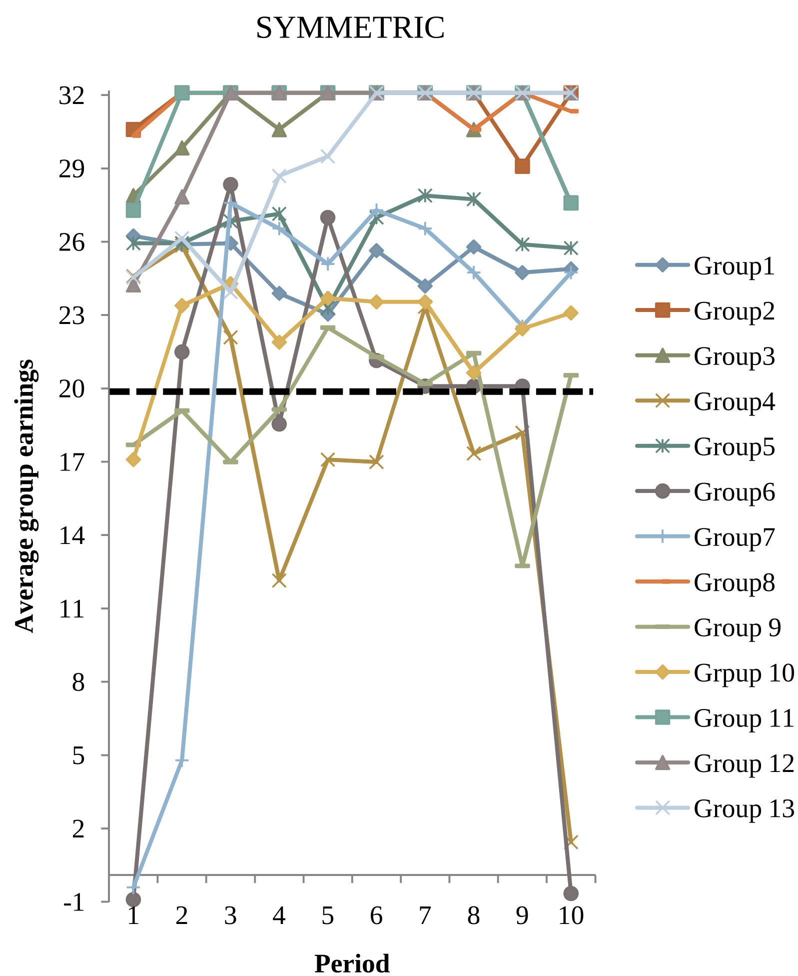



**Table A1 – Validation of Encryption Task**

| Treatment | Encoded (Mean) | Proportion High MPCR | N |
|---|---|---|---|
| ASYMMETRIC TREATMENT | 50.6 | | 64 |
| Male | 51.6 | 50.0% | 34 |
| Female | 49.5 | 50.0% | 30 |
| SYMMETRIC TREATMENT | 35.1 | | 52 |
| Male | 35.2 | - | 28 |
| Female | 35.0 | - | 25 |
| NO FEUD TREATMENT | 49.6 | | 72 |
| Male | 49.2 | 51.3% | 39 |
| Female | 50.2 | 48.5% | 33 |

Period

1 of 10

00

This column indicates how many points Player 1 assigned to each player in the previous allocation stage. As player 1 cannot assign points to herself, there is no entry in the first row. So in this example, player 1 has assigned 2 points to You and no points to players 3 and 4.

## Allocation Stage 2

In the table below you can see the points that were assigned to each player in your group during Allocation Stage 1:

| Player | Return from public account | Contribution | Earnings from contribution stage | Total points received | Points assigned by Player 1 | Points assigned by YOU | Points assigned by Player 3 | Points assigned by Player 4 |
|---|---|---|---|---|---|---|---|---|
| **Player 1** | 0.50 | 15 | 19.00 | 0 | | 0 | 0 | 0 |
| **You** | 0.50 | 5 | 29.00 | 4 | 2 | | 0 | 2 |
| **Player 3** | 0.30 | 8 | 20.40 | 0 | 0 | 0 | | 0 |
| **Player 4** | 0.30 | 0 | 28.40 | 3 | 0 | 3 | 0 | |

**Please use the fields below to assign points to the other players. If you don't wish to assign points to a particular player you must enter '0'.**

**Points you assign to Player 1**

**Points you assign to Player 3**

**Points you assign to Player 4**

This row indicates who assigned points to player 1. In this example, no player assigned points to player 1 in the first allocation stage.

This column indicates how many points each player has received in total so far (e.g. player 4 has received 3 points)

**OK**

**Example screen given to subjects in the Asymmetric treatment**