

# Spontaneous associations and label framing have similar effects in the public goods game

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## Abstract

It is known that presentation of a meaningful label (e.g., "The Teamwork Game") can influence decisions in economic games. A common view is that such labels cue associations to preexisting mental models of situations, a process here called frame selection. In the absence of such cues, participants may still spontaneously associate a game with a preexisting frame. We used the public goods game to compare the effect of such spontaneous frame selection with the effect of label framing. Participants in a condition where the public goods game was labeled "The Teamwork Game" tended to contribute at the same level as participants who spontaneously associated the unlabeled game with teamwork, whereas those who did not associate the the unlabeled game with teamwork tended to make lower contributions. We conclude that neutrally described games may be subject to spontaneous frame selection effects comparable in size to the effects of label framing.

Keywords: public goods game, framing, subjective construal, perceptions, beliefs, cooperation, teamwork, better-than-average effect, hypothetical decisions, incentivized decisions.

## 1 Introduction

Much research in behavioral economics and related fields involve laboratory experiments on economic games. In such experiments it is common practice to present the games in abstract terms as choices between neutrally labeled strategies that yield payoff according to certain rules (Camerer, 2003). Presentation of a game in more concrete terms that indicate an analogy to some real-life situation may affect participants' decisions in the game. The method of framing a game by presenting it with a meaningful label has been termed *label framing*; other means of framing include valence framing, which refers to the presentation of certain information in either positive or negative light (Dufwenberg, Gächter, Hennig-Schmidt, 2011).

The effect of label framing has been studied extensively for the prisoners dilemma game. An early study found that cooperation was higher among participants who were told the game represented "international negotiations" rather than "economic bargaining" (Eiser & Bhavnani, 1974). Several more recent studies have found that labeling the prisoners dilemma a "community game" yields higher

levels of cooperation than labeling it a "Wall Street game" or "stock market game" (Ellingsen et al., 2012; Kay & Ross, 2003; Liberman et al., 2004). Presentation of a label seems to affect also participants' beliefs about whether the other player will cooperate (Liberman et al., 2004). It has been proposed that the effect on beliefs is actually the primary effect of label framing; beliefs about others' cooperation might drive behavior through preferences for conditional cooperation (Dufwenberg et al., 2011; Ellingsen et al., 2012). We shall return to this issue in the general discussion at the end.

Various authors have used different words to describe what is essentially the same explanation of the effectiveness of label framing. In sum, the common view is that various mental models of situations are developed in the course of life experiences. These mental models may include norms and other constraints on own behavior as well as expectations on others' behavior. An individual's behavior in a given situation will depend on which mental model is selected to serve as the mental frame of the situation. For instance, according to Liberman et al. (2004, p. 1183), a label manipulates participants' "subjective construal" of the situation, which links it to "preexisting cognitive structures and situational norms". Dufwenberg et al. (2011, p. 472) suggested that the label "may serve as a cue on comparable social situations" and that participants may "infer others' behavior and expectations from their life experiences" of these comparable situations. Kroneberg, Yaish, & Stocké (2010, p. 7) conceive of labels as "activating a mental model of a situation, or frame, that seems to match the concrete situation at hand and that subsequently defines this situation". Following Kroneberg and

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colleagues, we shall refer to this process as *frame selection*.

### 1.1 Spontaneous frame selection

The possible scope of the frame selection account extends far beyond experiments on label framing of games. For instance, Kroneberg et al. (2010) applied their model of frame selection to account for real-life phenomena such as electoral participation and the rescue of Jews in the second world war.

The focus of the present paper will be frame selection in game experiments with or without label framing. Our point is that frame selection could be important also for unlabeled games. Even a neutral description of a game might trigger associations to preexisting mental models of situations, and such associations should still be expected to lead to corresponding adaptation of behavior. If game rules are sufficiently suggestive of one particular real-life situation, the result may be the same whether the game is presented neutrally or in terms of the real-life situation in question (Abbinck & Hennig-Schmidt, 2006). In general, though, we should expect the absence of cues other than the game rules to lead to greater heterogeneity in participants' spontaneous associations. Such heterogeneity in frame selection should lead to systematic between-individual effects on behavior.

A recent Japanese study provided direct support of the effect of spontaneous frame selection in economic games (Yamagishi et al., 2013). Participants played several two-player games, including a prisoners dilemma. Post-questionnaires measured how much participants thought the game resembled various real-life situations. Factor analysis of these items revealed two main factors: collaborative situations and business transactions. No significant correlation with game behavior was found for the factor that measured perceived similarity to business transactions. However, the factor that measured perceived similarity to collaborative situations was predictive of cooperative behavior across several games, including the prisoners dilemma. This effect could not be explained by other personality measures such as social value orientation. Yamagishi and colleagues concluded that a pivotal role in the processes underlying pro-social behavior is played by the way in which participants frame game situations.

The findings of Yamagishi et al. (2013) underscore the potential importance of spontaneous frame selection. Nonetheless, a couple of limitations should be noted. Spontaneous associations were always measured after the game; therefore it cannot be ruled out that these measures were influenced by what the player actually did rather than the other way around. Also, there was no corresponding label framing condition with which to compare the effect of spontaneous frame selection.

### 1.2 Framing of the public goods game

In this paper we investigate frame selection effects in the linear public goods game. This is a popular game played in a group of several players, often four. Every player makes a decision on how much of an individual endowment to put in a common pot. The pot subsequently grows by some factor and is then shared equally between all group members, irrespective of their individual contributions.

The public goods game was not included among the games for which spontaneous associations were studied by Yamagishi et al. (2013). However, the effect of label framing in the public goods game has been the subject of some study.

In an experiment in Norway, Rege and Telle (2004) found a weakly significant tendency for more cooperation in a community-related condition than in a neutral condition (e.g., the pot was referred to either as the "community box" or the "box"). Dufwenberg et al. (2011) demonstrated that this effect of label framing is country dependent. They compared a condition where participants were told they took part in a "community experiment" with a neutral condition where it was simply referred to as the "experiment". The same experiment was conducted in both Switzerland and Germany. In the Swiss sample, the community frame yielded higher contributions than the neutral frame, thus replicating the Norwegian finding. The German sample showed the opposite pattern.

Dufwenberg and colleagues pointed to a likely explanation of the difference between Germany and Switzerland: The German term for community, *Gemeinschaft*, has different connotations in the two countries. For historical reasons, the connotation is negative in Germany but positive in Switzerland. Note that this explanation aligns well with the hypothesis that label framing affects behavior via the associations that the label activates.

### 1.3 Hypothesis

Our fundamental hypothesis is that the effects of spontaneous associations and label framing can both be accounted for by the same basic process of frame selection. By this we mean that it is the content of the activated frame that matters, not whether it was activated spontaneously or cued by a label.

A priori, frames might have various types of content that would guide people's behavior. For instance, a frame could come with notions about what is the right thing, or the best thing, or just the usual thing to do. A frame might also, or alternatively, include expectations about others' behavior. Another possible type of frame content is a sense of the extent to which others' interests are aligned with one's own. The list of possibilities goes on.

Whatever the crucial type of frame content is, the findings of Yamagishi et al. (2013) indicate that it is present in collaborative frames: In various two-player games cooperation was higher among those who perceived the game to be similar to a collaborative situation. On the other hand, the same study found no effect on cooperation of perceptions of games as similar to transactions. This suggests that a transaction frame typically lacks the type of content that matters for cooperation. In the general discussion we return to the question of what the crucial type of frame content may be.

## 1.4 Predictions

In order to obtain some preliminary idea of what situations people may spontaneously associate with the public goods game, we conducted a classroom survey to an introductory discrete mathematics class at a Swedish university. The survey presented the public goods game in abstract terms and asked respondents to state any real-life situation they thought the game reminded them of. The response format was free. Common responses included collaborative situations such as teamwork and also various transactions such as investments, gambling, and paying taxes. We therefore judged this game to be a good candidate for exhibiting between-individual effects on behavior of spontaneous frame selection, thus allowing comparison with label framing effects. To enable distinct labels we chose a single collaborative situation (teamwork) and a single transaction (paying taxes) from the list of common responses in the pilot survey. Thus, the specific aim was to study the effects of spontaneous associations to teamwork and paying taxes and compare them with the effects of labels ("The Teamwork Game" and "The Paying Taxes Game", respectively).

### 1.4.1 Predictions about teamwork frame effects

Teamwork was selected as an example of a collaborative frame. Following Yamagishi et al. (2013), contributions should therefore tend to be higher when a teamwork frame is activated than when it is not. According to our fundamental hypothesis about frame selection, this effect of framing should be obtained regardless of whether participants spontaneously associate a neutrally described game with teamwork or have the association pressed upon them by the label "The Teamwork Game".

### 1.4.2 Predictions about paying taxes frame effects

Paying taxes was selected as an example of a transaction frame. Following Yamagishi et al. (2013), contributions were therefore not expected to be influenced by the activation of a paying taxes frame. Thus we predicted a

null effect of spontaneous association to paying taxes. In contrast, there may still be an effect of framing using the label "The Paying Taxes Game". The reason is that the label is such a strong cue that it might suppress associations to collaborative situations that would otherwise occur spontaneously. The paying taxes label should then lead to contributions comparable to those participants who do not spontaneously associate the public goods game with teamwork.

## 1.5 Outline of studies

To test the above set of predictions we conducted a series of online studies using a total of almost 1,200 unique American participants recruited on the Amazon Mechanical Turk (mturk.com). We initially used hypothetical decisions (Studies 1 and 2) and then conducted a replication with paid decisions (Study 3). In a final set of experiments (Studies 4 and 5), we instead used cues about others' contributions to prime participants' spontaneous associations to teamwork, which in turn was predicted to lead to a change in contributions beyond any direct effect the cues may have on contributions.

## 2 Studies 1–2: Spontaneous frame selection and label framing with hypothetical decisions

The first two studies used hypothetical decisions in the public goods game. The aim of these studies was to estimate the effects of spontaneous frame selection and label framing.

In Study 1 the public goods game was introduced without any label. Associations to teamwork and paying taxes were measured after decisions were made, following Yamagishi et al. (2013). In Study 2 the same public goods game was presented using either of two labels: "The Teamwork Game" or "The Paying Taxes Game". The studies were run at separate occasions but, for effectiveness of presentation, we here report them together.

### 2.1 Method

#### 2.1.1 Participants

Among American users of the Amazon Mechanical Turk (Mturk) we recruited 200 participants for Study 1 and 100 participants for Study 2. All participants received a flat fee of 0.70 US dollars. The total age range was from 17 to 70 years ( $M = 32$ ,  $SD = 11$ ) and the total gender distribution was 39.2% female, 60.4% male, and 0.4% unknown, with both age and gender distributions very similar across studies. The instructions asked participants not to take part

if they had taken a similar study before. Exclusion of those few participants who nonetheless had participated more than once, according to their Mturk user IDs, left 283 unique participants: 193 in Study 1 and 90 in Study 2.

**2.1.2 Procedure**

Participants were asked to consider a scenario describing a "laboratory experiment that researchers use". The experiment was described as follows: "Four people form a group where they play a game [called **The Teamwork Game/ The Paying Taxes Game**]. In this game, each group member is given a sum of money (100 units, corresponding to one day's salary at a minimum wage), and is asked how much he or she will put in a pot (keeping the rest for himself/herself). In the experiment, the value of the total money in the pot is then doubled and shared equally among all group members — regardless of how much each one put in the pot." The boldfaced text within brackets was included only in Study 2, with participants randomly assigned one of the two game labels.

Following examples of payoff calculations for various outcomes of the game, participants were asked two questions: "About how much money do you think that *you* would put in the pot if you found yourself in this scenario?" and "About how much money do you think that *most people* would put in the pot in this scenario?" To each question the response options were 0, 25, 50, 75, and 100 units.

In Study 1 (but not in Study 2), participants were then asked, on a separate screen: "What real-life situation does the game remind you of? Below are a couple of situations that other people have mentioned. (These are by no means the only possible interpretations.) For each of these situations, we want to know whether you think it clearly reminiscent of the game. Is the game clearly reminiscent of teamwork? Is the game clearly reminiscent of paying taxes?" Both these questions had binary response options (yes/no).

**2.2 Results**

We judged data to justify parametric tests throughout this paper. Bootstrapped tests, omitted here, gave qualitatively similar results.

**2.2.1 The effect of spontaneous frame selection on hypothetical contributions**

In Study 1 it was very common for participants to associate the game with teamwork (61%) and fairly common to associate it with paying taxes (24%). Table 1 presents mean hypothetical contributions for each of the 2 × 2 combinations of these associations. A two-way ANOVA

Table 1: Mean (SD) hypothetical contributions in Study 1 depending on whether participants spontaneously associated the game with teamwork (columns) and/or with paying taxes (rows).

	Teamwork: no	Teamwork: yes
Paying taxes: no	45.0 (26.8) N = 60	55.7 (24.9) N = 87
Paying taxes: yes	43.3 (17.6) N = 15	56.5 (24.1) N = 31
Total	44.7 (25.1) N = 75	55.9 (24.6) N = 118

of the contribution level revealed a significant main effect of whether the game was associated with teamwork,  $F(1, 189) = 7.21, p = .008$ , but no significant main effect of whether the game was associated with paying taxes,  $F(1, 189) = 0.01, p = .91$ , and no significant interaction,  $F(1, 189) = 0.07, p = .79$ . A simple effects analysis confirmed that hypothetical contributions were significantly higher among those who associated the game with teamwork,  $t(191) = 3.08, p = .002, d = 0.44$ .

**2.2.2 The effect of label framing on hypothetical contributions**

In Study 2, the "Teamwork Game" label yielded higher hypothetical contributions ( $M = 56.9, SD = 26.4, N = 47$ ) than the "Paying Taxes Game" label ( $M = 40.7, SD = 26.2, N = 43$ ),  $t(88) = 2.92, p = .004, d = 0.59$ .

Figure 1 summarizes the effects on hypothetical contributions of spontaneous frame selection (Study 1) and label framing (Study 2). In Figure 1 the case of label framing using the paying taxes label is coded as "no" teamwork frame, as this label presumably inhibits association to teamwork. Note how contribution levels were very similar between those who spontaneously associated a neutrally described game with teamwork and those who were presented with the teamwork label, as well as between those who did *not* spontaneously associate the game with teamwork and those who were presented with the other label.

**2.2.3 Beliefs about others' contributions**

Figure 2 presents average beliefs about how much "most people" would put in the pot. The results for beliefs roughly follow the same pattern as for own contributions, with higher beliefs among participants who spontaneously associated to teamwork than among those who did not (Study 1) and higher if the game was labeled "The Team-

Figure 1: Mean hypothetical contributions to the pot in Studies 1 and 2.

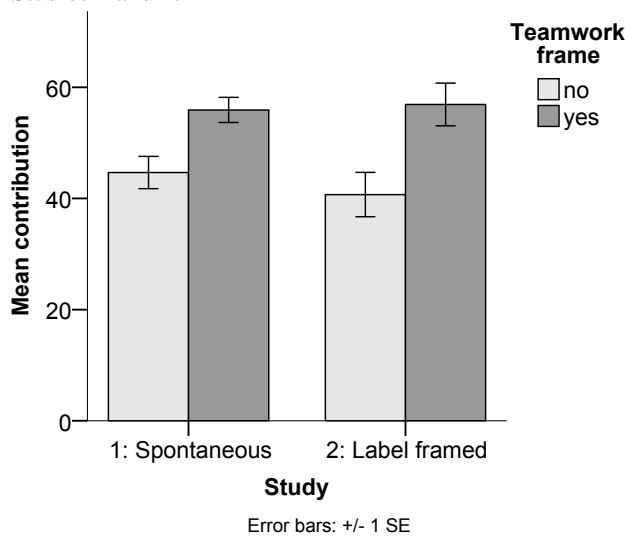
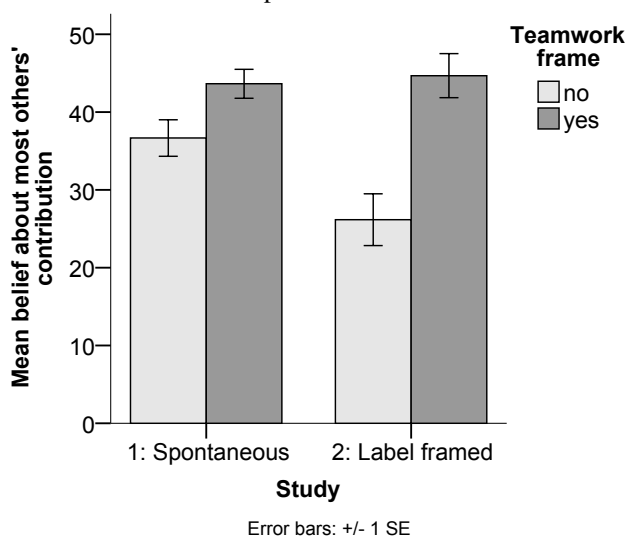


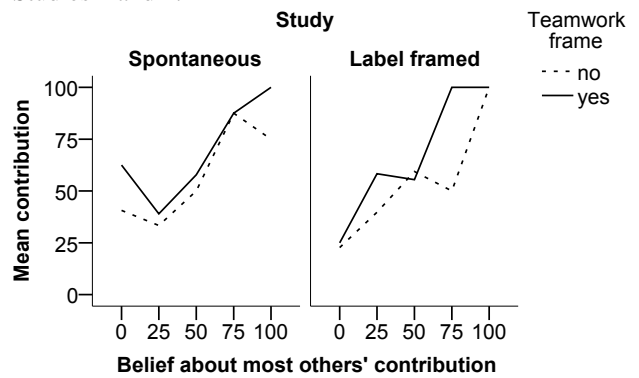
Figure 2: Mean beliefs about how much most people would contribute to the pot in Studies 1 and 2.



work Game" rather than "The Paying Taxes Game" (Study 2).

As illustrated in Figure 3, participants' beliefs were indeed strongly correlated with their own contributions, both in Study 1,  $r = .48, p < .001$ , and in Study 2,  $r = .55, p < .001$ . This figure also shows that, for participants with the same level of belief about others' behavior, average contributions were largely independent of whether they were in a teamwork or no-teamwork frame.

Figure 3: Mean contributions for each level of belief about how much most people would contribute to the pot in Studies 1 and 2.



### 2.2.4 Own hypothetical contributions compared to beliefs about others

Participants' own hypothetical contributions tended to be higher than their beliefs about what most people would contribute. In Study 1 the mean difference was 10.6 ( $SD = 23.7, t(192) = 6.21, p < .001, d = 0.45$ ). In Study 2 the mean difference was 13.3 ( $SD = 24.1, t(89) = 5.26, p < .001, d = 0.55$ ).

## 2.3 Discussion

Results of Study 1 indicate that spontaneous frame selection had the predicted effect on behavior in the public goods game. In a neutrally described public goods game, hypothetical contributions were higher among those who spontaneously associated the game with teamwork than among those who did not. In Study 2, presentation of the same game as "The Teamwork Game" yielded hypothetical contributions at a similar level to those who had associated a neutral game with teamwork in Study 1. This is consistent with our main hypothesis that labels work by guiding the same process of frame selection that might otherwise occur spontaneously.

As predicted, spontaneous associations to paying taxes (a transaction situation) were not related to behavior in the game. We hasten to add that the null effect of the "paying taxes" label may still be culture-specific. Paying taxes may have different connotations in different countries (recall the case of the "community" label in the study of Dufwenberg et al., 2011).<sup>1</sup> Despite the null effect of spontaneous paying taxes frame selection, presentation of the game as "The Paying Taxes Game" had the effect of lowering hy-

<sup>1</sup> It should also be noted that there exists psychological research, in contexts outside the public goods game, on the effect of calling something a "tax" rather than a "payment" (e.g., McCaffery & Baron, 2006; Sussman & Olivola, 2011). Such research questions could also be asked within the context of the public goods game.

pothetical contributions—consistent with the notion that a paying taxes label also suppresses spontaneous associations to teamwork.

Effects on beliefs were similar to the effects on cooperation, as in previous studies of label framing (Dufwenberg et al., 2011; Liberman et al., 2004). We obtained this result also for spontaneous frame selection, in further support of its underlying similarity to label framing.

An obvious limitation of Studies 1 and 2 is that decisions were hypothetical. Further, comparisons between the studies suffer from lack of random assignment as the studies were run at different times. Another issue is that we asked for participants' beliefs about what *most people* would do whereas related studies have asked for estimates of the *average* contribution (Dufwenberg et al., 2011; Thöni, Tyran, & Wengström, 2012). Finally, it would be good to test whether the spontaneous frame selection effect is obtained regardless of whether associations are measured before or after decisions. All of these limitations were addressed in the next study.

### 3 Study 3: Spontaneous frame selection and label framing with paid decisions

The aim of Study 3 was to replicate Studies 1 and 2 while addressing their limitations. In particular, we incentivized decisions. In order to limit the cost of the study we paid only a random subset of participants: Every participant had (and was so informed) a 10% probability of being drawn for receiving payment according to the outcome of the game.

#### 3.1 Method

##### 3.1.1 Participants

We recruited 600 American Mturk users at a flat fee of 0.70 US dollars. The total age range was from 18 to 76 years ( $M = 32$ ,  $SD = 10$ ) and the total gender distribution was 37.3% female, 61.5% male, and 1.2% unknown. The instructions asked participants not to take part if they had taken a similar study before. Analysis of the Mturk user ID revealed 72 participants who had taken part in previous studies; they were excluded, leaving a total of 528 unique participants.

##### 3.1.2 Procedure

Participants were randomly assigned to either of three conditions: label framing and spontaneous frame selection measured either post-decisions or pre-decisions. The label framing condition followed Study 2 in that partici-

pants were randomly presented either with "The Teamwork Game" or "The Paying Taxes Game". The game itself was always described exactly as in the previous studies. In both conditions with spontaneous frame selection, participants were asked for their associations of the game to teamwork and paying taxes using the same binary format as in Study 1.

The monetary incentives for the decision on how many units to put in the pot were presented as follows: "You will now get a chance to play the game. We will later randomly select 10% of the participants and divide them into groups. They will receive a bonus payment equal to what they would have earned in the game based on their and their group members' answers to the question below. How much money (out of the 100 units) do you put in the pot? Each unit is worth 10 cents, so 100 units are worth 10 dollars." The response was given as an integer between 0 and 100.

The same response scale was used for the participant's estimate of the average contribution of all participants in the study, which was rewarded for accuracy: "How many units do you think that the people taking this study will contribute on average? Please give your best estimate. The participant who gives the answer closest to the average will obtain an extra bonus of 10 dollars."

#### 3.2 Results

##### 3.2.1 Label framing effects on contributions

In the label framing condition there was a marginally significant effect of labels on conditions in the expected direction, that is, higher for the "Teamwork" frame ( $M = 58.6$ ,  $SD = 31.0$ ,  $N = 84$ ) than for the "Paying Taxes" frame ( $M = 49.9$ ,  $SD = 29.5$ ,  $N = 84$ ),  $t(166) = 1.85$ ,  $p = .065$ ,  $d = 0.28$ .

##### 3.2.2 Spontaneous frame selections effects on contributions

In the spontaneous frame selection conditions it was very common for participants to associate the game with teamwork (76–80%) and fairly common to associate it with paying taxes (37–44%). Table 2 presents mean contributions for each of the  $2 \times 2$  combinations of these associations in each of the two spontaneous frame selection conditions. A three-way ANOVA of the contribution level revealed a significant main effect of whether the game was associated with teamwork,  $F(1, 350) = 7.91$ ,  $p = .005$ . There were no other significant main effects, neither of the association with paying taxes,  $F(1, 350) = 1.99$ ,  $p = .16$ , nor of condition,  $F(1, 350) = 2.54$ ,  $p = .11$ , and no significant interactions. A simple effects analysis confirmed

Table 2: Mean (SD) contributions in the spontaneous frame selection conditions of Study 3, depending on whether participants spontaneously associated the game with teamwork (columns) and/or with paying taxes (rows).

Condition		Teamwork: no	Teamwork: yes
Post- decision	Paying taxes: no	45.8 (33.5) <i>N</i> = 13	58.5 (35.0) <i>N</i> = 83
	Paying taxes: yes	49.8 (30.1) <i>N</i> = 28	53.3 (29.0) <i>N</i> = 48
	Total	48.5 (30.9) <i>N</i> = 41	56.6 (32.9) <i>N</i> = 131
Pre- decision	Paying taxes: no	25.3 (28.4) <i>N</i> = 16	52.3 (32.2) <i>N</i> = 101
	Paying taxes: yes	49.0 (28.0) <i>N</i> = 22	53.6 (30.8) <i>N</i> = 47
	Total	39.1 (30.2) <i>N</i> = 38	52.7 (31.7) <i>N</i> = 148

that contributions were significantly higher among those who associated the game with teamwork,  $t(356) = 2.59$ ,  $p = .010$ ,  $d = 0.33$ .

### 3.2.3 The effect on contributions of label framing and spontaneous teamwork framing

Consistent with the results in Studies 1 and 2, when the game was labeled "The Paying Taxes Game" contributions were comparable to those of participants who spontaneously did not associate the game with teamwork (post-decisions). As discussed earlier, this suggests that the paying taxes label inhibits spontaneous selection of a teamwork frame. We shall therefore refer to this case as a "no-teamwork" frame.

Figure 4 summarizes how contributions differed between teamwork and no-teamwork frames across conditions. A two-way ANOVA of the contribution level revealed a significant main effect of teamwork/no-teamwork frame,  $F(1, 520) = 10.52$ ,  $p = .001$ , a marginally significant main effect of condition,  $F(2, 520) = 2.64$ ,  $p = .073$ , and no significant interaction,  $F(2, 520) = 0.30$ ,  $p = .74$ . A simple effects analysis confirmed that contributions were significantly higher in the teamwork frame ( $M = 55.5$ ,  $SD = 32.0$ ,  $N = 363$ ) than in the no-teamwork frame ( $M = 47.1$ ,  $SD = 30.2$ ,  $N = 163$ ),  $t(524) = 2.84$ ,  $p = .005$ ,  $d = 0.27$ .

Figure 4: Mean contributions to the pot in Study 3.

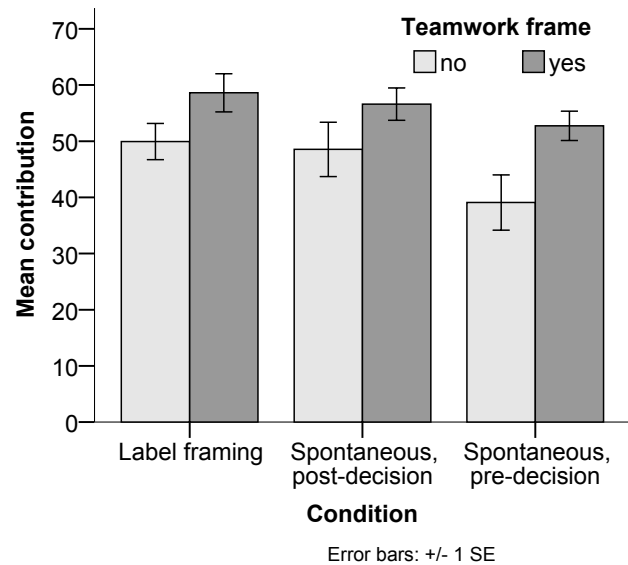
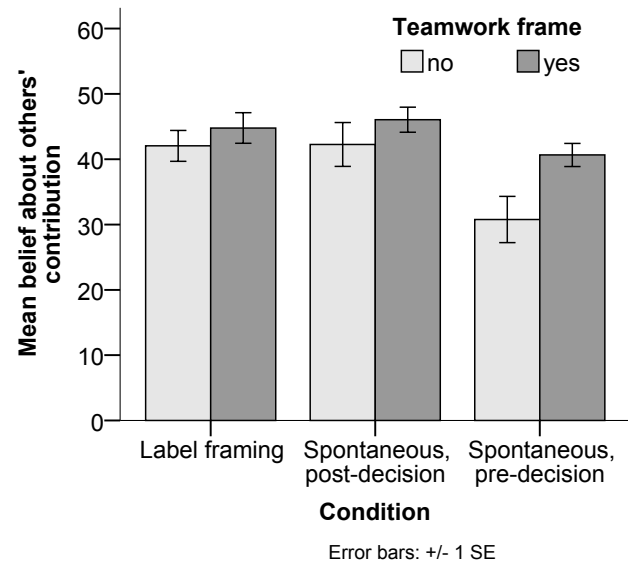


Figure 5: Mean beliefs about the average contribution to the pot in Study 3.

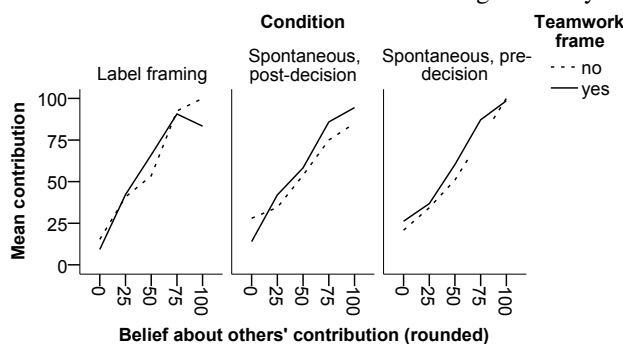


### 3.2.4 Beliefs about others' contributions

Figure 5 illustrates mean beliefs about the average contribution. The effect of frame selection, whether through label or spontaneous, had the same direction in all conditions. According to a two-way ANOVA, the effect of frame selection was significant,  $F(1, 520) = 6.46$ ,  $p = .011$ , and with no significant interaction with condition,  $F(2, 520) = 1.04$ ,  $p = .35$ .

As in Studies 1 and 2, beliefs about average contributions were strongly correlated with own contributions;  $r$  values ranged between 0.54 and 0.65 across conditions.

Figure 6: Mean contributions for each level of belief about how much others would contribute on average in Study 3.



To enable a direct comparison to Figure 3 we rounded beliefs about average contributions to the closest multiple of 25. Figure 6 shows mean contributions among participants at each of these levels of beliefs.

### 3.2.5 Own contributions compared to beliefs about others

Participants' own contributions tended to be higher than their beliefs about the average contribution, with a mean difference of 10.6 ( $SD = 25.4$ ),  $t(523) = 9.55$ ,  $p < .001$ ,  $d = 0.42$ . The effect size was quite consistent across conditions:  $d = 0.47$  in the label framing condition;  $d = 0.34$  and  $0.45$  in the spontaneous frame selection conditions with associations measured post-decision and pre-decision, respectively.

### 3.3 Discussion

This study replicated Studies 1 and 2 using paid instead of hypothetical decisions. The use of real monetary incentives did not have any radical effect on results. A teamwork frame—whether cued or spontaneous—had a positive effect on contributions, although somewhat smaller than in the previous studies. Interestingly, the decrease in the size of frame selection effects was mainly due to contribution levels in no-teamwork frames tending to be *higher* in the paid study than in the hypothetical studies, whereas contribution levels in the teamwork frames were essentially unchanged. The effects of frame selection on contributions were matched by qualitatively similar effects on beliefs in all studies. The difference between own contributions and beliefs about others' contributions (about a tenth of the total endowment) was similar across paid and hypothetical decisions.

So far we have found a consistent link between own contribution in the public goods game and the presence or absence of a teamwork frame, whether spontaneous or cued by a label. However, an important methodological

point must be noted: Whereas the label was explicitly manipulated, the presence or absence of a spontaneous teamwork frame was only measured. Thus, the evidence for the spontaneous frame selection effect is only correlational. In the last two studies we look for stronger evidence for a causal effect of spontaneous frame selection.

## 4 Studies 4–5: Manipulation of spontaneous frame selection

In the previous studies, participants' associations to teamwork tended to covary with their beliefs about others' contributions. This suggests that it might be possible to manipulate spontaneous associations to teamwork by priming participants with cues about others' contributions. It should then be possible to estimate the extent to which the effect on associations has an effect on contributions beyond any direct effect of priming. We used two different conditions in which participants were primed either with the possibility that others contribute their entire endowment or the possibility that they contribute nothing. Two studies were conducted, differing only in whether decisions were hypothetical (Study 4) or incentivized (Study 5).

### 4.1 Method

#### 4.1.1 Participants

Among American users of the Amazon Mechanical Turk we recruited 200 participants for Study 4 and 200 participants for Study 5 (total age range 19 to 70 years, mean age 32 years; 39% females). We excluded those who had taken part in any of the previous studies, leaving a total of 194 participants in Study 4 and 182 participants in Study 5.

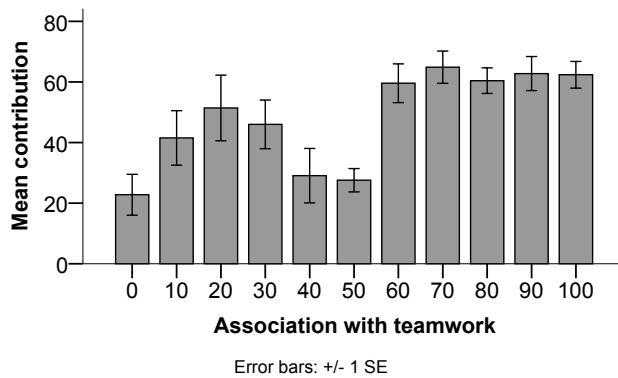
#### 4.1.2 Procedure

The basic design of the previous studies was used. The game was presented without any label. Associations were measured pre-decisions. Previous studies used a binary scale for associations. To investigate the validity of a binary measure of associations, we here asked participants to instead "use a scale from 0 to 100, where 0 means you make absolutely no such association and 100 means that it is a perfectly natural association." The scale came in eleven steps, from 0, 10, 20, etc., up to 100.

The crucial difference from our previous studies was that participants were not asked for their beliefs about others' contributions; instead we primed different possibilities for others' behavior by the addition of one sentence at the end of the game description: "In such experiments, a common behavior of participants is to put [no money/all



Figure 7: Mean contributions (paid or hypothetical; Studies 4 and 5 pooled) for different strengths of the association with teamwork.



of the money] in the pot". Participants were randomly assigned to the "no money" or "all of the money" condition.

In Study 4 decisions on contributions were hypothetical. Study 5 was identical to Study 4 except for contribution decisions being incentivized (using the exact same incentivizing procedure as in Study 3).

## 4.2 Results

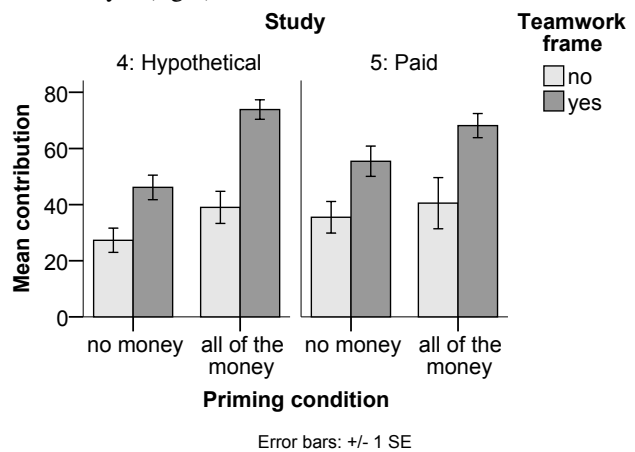
### 4.2.1 Binary vs. continuous measures of participants' associations

Our first question was whether a binary or continuous measure of participants' associations has the greatest validity with respect to prediction of contributions. In order to obtain some initial intuition we pooled all data from both studies and calculated the average contribution (paid or hypothetical) among participants at each of the 11 steps of the response scale for the strength of associations to teamwork. The result is shown in Figure 7. The figure clearly suggest a binary categorization of the association that distinguishes between those who report an association with teamwork less than or equal to the scale midpoint of 50 and those who report an association above the scale midpoint.

In order to compare the predictive power of various measures we then calculated their correlation with contributions. The binary measure was a better predictor than the continuous measure both in the pooled dataset ( $r = .34$  vs.  $r = .28$ ) and for each separate study (Study 4:  $r = .39$  vs.  $r = .34$ ; Study 5:  $r = .29$  vs.  $r = .23$ ).

In Studies 1–3 we measured the strength of participants' associations on a binary scale. The results presented here indicate that even if a scale with more steps are used, transformation to a binary measure may be preferable. In the following analyses we will use the derived binary measure. The high and low levels will be referred to as "teamwork frame" and "no-teamwork frame", respectively.

Figure 8: Mean contributions to the pot in Study 4 (left) and Study 5 (right).



### 4.2.2 Effects of cues about others' behavior

Studies 4 and 5 were identical up to and including the point where associations were measured. The effect of the different cues on spontaneous frame selection was therefore identical in the two studies. As expected, the teamwork frame was more common in the "all of the money" condition (79%) than in the "no money" condition (63%),  $\chi^2(1, N = 376) = 11.48, p = .001$ , pooled studies. (In contrast, conditions had no effect on automatic "paying taxes" framing, which remained constant at 24–25%.)

Cues about others' behavior also affected contributions in both studies. Hypothetical contributions in Study 4 were much higher in the "all of the money" condition ( $M = 66.5, SD = 32.3$ ) than in the "no money" condition ( $M = 39.1, SD = 32.9$ ),  $t(192)=5.86, p < .001, d = 0.78$ . The same effect was found in Study 5, although the effect size was not as large: Paid contributions were higher in the "all of the money" condition ( $M = 62.4, SD = 39.7$ ) than in the "no money" condition ( $M = 48.3, SD = 38.2$ ),  $t(180)=2.44, p = .016, d = 0.36$ .

### 4.2.3 Mediation analysis

Figure 8 illustrates the spontaneous frame selection effect in each condition. We predicted the frame selection effect to partially mediate the effect of priming on contributions. In other words, one cause of higher contributions in the "all of the money" condition should be that this priming causes more participants associate the game with teamwork, which in turn is linked to higher contributions. To test for partial mediation we used a statistical package for mediation effects by Preacher and Hayes (2004). The dependent variable in this analysis was contributions (regardless of whether these were paid or hypothetical); the independent variable was condition ("no money" or "all

of the money", dummy coded 0/1); the mediator was the binary measure of the association with teamwork.<sup>2</sup>

The total effect of priming is the difference between the mean contributions in the two conditions. In Study 4 the total effect of priming was 27.4 units, out of which an estimated 4.1 units (95% bootstrapped confidence interval between 1.2 and 8.6 units) were accounted for by more prevalent associations with teamwork. In Study 5 the total effect of priming was 14.1 units, out of which more prevalent associations with teamwork accounted for an estimated 3.6 units (95% bootstrapped confidence interval between 0.6 and 8.6). Thus, a significant partial mediation effect was found regardless of whether decisions were hypothetical or paid.

### 4.3 Discussion

In these studies we found that spontaneous teamwork framing of the public goods game is sensitive to cues about others' contributions. Priming participants with the possibility that others may make very high (vs. very low) contributions increased how often participants associated to teamwork. These associations in turn partially mediated the effect of cues on contributions. The total effect of priming on contributions was smaller when decisions were paid rather than hypothetical. However, the mediation effect was of similar size in both cases. Thus, these studies indicate a robust causal effect on contributions of spontaneous teamwork frame selection.

## 5 General discussion

Previous label framing studies have found effects of the label "community" on decisions in a prisoners dilemma (Ellingsen et al., 2012; Kay & Ross, 2003; Liberman et al., 2004) as well as in the public goods game (Dufwenberg et al., 2011; Rege & Telle, 2004). Another recent study found a link between decisions in a prisoners dilemma and participants' perceptions of the dilemma as similar to collaborative real-life situations (Yamagishi et al., 2013). Here we have theoretically bridged these two sets of findings by conceiving of both as effects of the same process of frame selection, differing only in whether the frame selection is cued or spontaneous.

Our main prediction was that spontaneous framing of the public goods game as teamwork should have a positive effect on cooperation levels similar to that of framing by the label "The Teamwork Game". This prediction was supported whether decisions were hypothetical (Studies 1, 2, and 4) or paid (Studies 3 and 5). The effects were very consistent, although not very large: Cohen's *d*

was around 0.5 for hypothetical decisions and 0.3 for paid decisions. Spontaneous associations to paying taxes were uncorrelated with cooperation, consistent with the finding of Yamagishi et al. (2013) that spontaneous associations to transactions do not predict cooperation.

Might the observed effect of spontaneous teamwork frame selection reflect nothing more than prosocial people being more likely to make associations to teamwork? This seems unlikely, for several reasons. First, Yamagishi et al. (2013) found the effect of spontaneous collaborative framing of the prisoners dilemma to be independent of social value orientation. Second, we found cues about how others might behave in the game to influence participants' spontaneous association to teamwork with the game, and this change in associations seemed to cause a change in contribution levels beyond the priming's direct effect on contributions (Studies 4 and 5). Third, whereas spontaneous associations to paying taxes were not correlated with cooperation, the "Paying Taxes Game" label tended to decrease cooperation in the way it would do if spontaneous associations to a collaborative frame causes higher cooperation and the paying taxes label suppressed such associations.

### 5.1 Implications for the debate on neutral vs. loaded instructions

The view of frame selection that we have expressed in this paper has relevance for two debates: the methodological debate on how to word game experiments and the theoretical debate on how to model the decision making process.

The debate about whether instructions should be context-free ("neutral") or in-context ("loaded") was reviewed by Abbink and Hennig-Schmidt (2006). Noting that "systematic comparisons of context-free and in-context presentations of the same task are surprisingly rare", Abbink and Hennig-Schmidt then presented a study of a bribery game in which very loaded instructions yielded similar results to neutral instructions. They concluded that neutrally framed experiments are not necessarily less interpretable in terms of a real-life situation than those presented in a context and, conversely, that using context does not necessarily distort experimental results or distract subjects from the strategic situation. Our study, following the study of Yamagishi et al. (2013), adds to this message by demonstrating that a neutral description of a game may give rise to different real-life interpretations for different participants. In other words, the consequence of researchers' attempts to make game descriptions as neutral as possible may be individual variation in spontaneous frame selection with ensuing systematic between-individual effects on behavior in the game.

<sup>2</sup>Substantively, the same results were found with the continuous measure.

## 5.2 Implications for the debate on the role of preferences

The second debate revolves around the challenge to preference-based decision models posed by the fact that decisions in a well-defined game are so sensitive to framing (e.g., Lichtenstein & Slovic, 2006). Can framing effects be accommodated within models in which decisions are determined by fixed preferences? Some authors propose that they can. Our studies, and those of Yamagishi et al. (2013), speak to some of their arguments.

### 5.2.1 Labels may disrupt game recognition

Cason and Plott (in press) recently pointed out one way in which behavior may change while preferences remain intact: Framing a game might make players fail to recognize exactly which game is being played. While our own studies do not speak directly to this issue, we note that Yamagishi et al. (2013) carefully measured game recognition failure. Our impression from their paper is that game recognition failure did not drive any of their main results.

### 5.2.2 Elicited beliefs about others' behavior seem to mediate decisions

Dufwenberg et al. (2011) pointed out that if framing affects beliefs about others' decisions, while preferences for conditional cooperation remain fixed, decisions will change simply because beliefs change. In their public goods experiment, participants made their decisions and were then asked about their beliefs about others' decisions. (As in our Study 3, participants were rewarded for stating accurate beliefs.) Both beliefs and decisions changed with framing. These results, which were replicated in our Studies 1–3, are of course consistent with a model in which decisions change because beliefs change. However, they are also consistent with the opposite pathway. In other words, framing could have a direct effect on participants' decisions and these decisions could in turn shape beliefs about others. Indeed, classic research indicates that public goods game players' beliefs about others tend to be inferred from their own decisions (Dawes, McTavish, & Shaklee, 1977).

### 5.2.3 Label framing is not effective in a sequential prisoners dilemma

Ellingsen et al. (2012) duly noted the problems with the interpretation of correlational evidence and searched for stronger experimental evidence. In their most important study they found that a "Community Game" label for the prisoners dilemma raised cooperation when moves were simultaneous but not when they were sequential. They argued that these results indicate that community label fram-

ing does not work by changing players' preferences for cooperation, because framing should then have affected behavior in both game forms equally.

This conclusion does not seem inevitable if one considers the power of spontaneous frame selection that we have demonstrated in our studies. The change of the game description from simultaneous to sequential moves might decrease the fit with mental models of collaborative situations, thus undermining the power of the label to activate a collaborative frame. This is of course speculation, and we must leave to future research to investigate whether the feature of sequential vs. simultaneous play is important for frame selection. (Indeed, it would be interesting to know for games in general what strategic features tend to lead to what frames being activated.)

### 5.2.4 What type of frame content is crucial for framing effects in games?

In the introduction we defined a frame as a pre-existing mental model of a situation. A priori, a frame may have just about any type of content. In the introduction we mentioned three candidate types of frame content that might apply to economic games: ideas about what one should do, expectations on how others are likely to behave, and a sense of whether own and others' interests are aligned. These theoretical possibilities could be studied empirically. For instance, are any of these notions automatically activated when people associate a game with, say, teamwork? Does activation of any particular notion cause change in behavior?

We believe such fine-grained investigation of the framing phenomenon would be a fruitful direction for future research. The results of such investigation should be useful input to the debate on how to model the decision making process.

## 5.3 Paid vs. hypothetical decisions

Our studies also speak to the methodological issue of whether studies using hypothetical decisions are as reliable as studies with real incentives. Prior studies of framing effects in the public goods game have typically use either real or hypothetical decisions, not both (reviewed by Cookson, 2000). We found the two methods to yield on the whole quite similar results. Contributions were if anything somewhat higher when decisions were paid rather than hypothetical. Framing effects were smaller for paid than for hypothetical decisions but the difference was not dramatic.

These results are well in line with earlier comparisons of paid and hypothetical decisions in related contexts. For instance, a Swedish study found willingness to give up money for a charity to be only slightly lower when deci-

sions were incentivized rather than hypothetical (Carlsson, Daruvala, & Jaldell, 2010). Studies of contingent valuation of public goods using dichotomous choice tend to find that hypothetical decisions introduce no bias (Vossler & McKee, 2006). Even studies of behavior in the prisoners dilemma game have tended to find little effect of rewards being hypothetical instead of real (Oskamp & Kleinke, 1970). On the whole, we conclude that the use of hypothetical decisions seems to be justified in studies of one-shot play of the public goods game and related contexts.

#### 5.4 The public goods game and the better-than-average effect

In Studies 1–3 we found a consistent tendency for American participants to believe that others' contributions in the public goods game would be lower than their own. A large Danish study found the same tendency (Thöni et al., 2012). Assuming that people tend to view themselves as better than others if they contribute more, these findings seem to be interpretable as an expression of the famous better-than-average effect (Alicke & Govorun, 2005).

Interestingly, the data reported in the German-Swiss studies of Dufwenberg et al. (2011) did not indicate any better-than-average effect: Average contributions were somewhat lower than participants believed they would be. Might these results reflect country differences in the better-than-average effect in general? Possibly. Recent cross-cultural studies indicate that the general better-than-average effect (or "self-enhancement bias") is stronger among Americans than among Germans (Loughnan et al., 2011; see also Eriksson & Funcke, 2014). We conclude that self-enhancement concerns might play a role for beliefs about others' behavior in game experiments.

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