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Social policy instruments and the compliance environment☆

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ABSTRACT

Two types of social policy instruments — making group behavior public to the individual and making individual behavior public to the group — are used by charities to encourage giving and by policymakers to incentivize other prosocial behaviors. However, models of social norms suggest that the effects of such interventions are theoretically ambiguous and may even backfire in low-compliance environments. We examine these questions in the context of a public good game. Exploiting a unique experimental design, we show that initial contributors' giving decisions are sensitive to the behavior of the group while initial non-contributors' decisions are not. In contrast, making own behavior public to the group increases contributions for all group types, even those comprised entirely of initial non-contributors. These findings suggest that publicizing contributions causes individuals to respond to a common understanding of prosocial behavior that is not defined solely by the initial group norm.

1. Introduction

Encouraging prosocial behavior is of great interest to policymakers. Just one form of such behavior — charitable giving from individuals and households — was over $400 billion in the United States in 2018 (Foundation, 2019). This giving is widespread, with approximately 90% of individuals in the U.S. making charitable donations (Sector, 2001).[1] Beyond charitable giving, individuals take many other prosocial actions, such as: engaging in environmental protection, donating blood and organs, voting when they surely are not pivotal, washing their hands and wearing masks to curtail disease, and contributing time and money to finance local public goods.

A rich literature has explored how social forces motivate charitable giving and other forms of prosocial behavior. This literature has identified two types of social policy instruments. The first instrument, providing "peer information," involves giving information about what others are doing to a decision maker. The second instrument, providing "social recognition," involves making public what a decision maker does (i.e., making the decision maker's actions identifiable and observable to others).[2] These types of interventions have been used in both field and lab settings, and interventions often combine both

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[1] See also Vesterlund (2006), List (2011), Andreoni and Payne (2013), and Brown et al. (2015).

[2] On peer information: see Frey and Meier (2004), Martin and Randal (2008), Shang and Croson (2009), Bracha et al. (2011), and Gee and Schreck (2018) on charitable giving; Goldstein et al. (2008) and Allcott (2011) on environmental protection; Coffman et al. (2017) on job choice; and

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instruments. For example, publicizing all gifts to a public good provides information about the contributions of others and identifies each individual's giving decision.

While there are many examples of these interventions being deployed successfully in practice, some models of behavior suggest that the efficacy of these instruments depends fundamentally on baseline contribution levels. In addition, effects may be heterogeneous for those initially engaging in the desired behavior (contributors, voters, tax compliers) and those failing to do so. Both of these issues point to the importance of understanding the effects of the compliance environment — the proportion of individuals engaging in the prosocial action in the absence of the social intervention.[3]

For example, providing information about peer behavior can encourage contribution when others give more than expected but can also discourage contribution when others give less than expected (see, e.g., Croson and Shang (2008) for empirical evidence). This pattern may arise because individuals respond to information in others' decisions (Vesterlund, 2003), because they are motivated by reciprocity (Sugden, 1984), or due to conformity (Bernheim, 1994). Similarly, some models that aim to explain the effects of social recognition also predict that baseline contribution levels interact with the efficacy of making an individual's contribution public. If the individual cares about being perceived as fair or norm-compliant (Andreoni and Bernheim, 2009) or is more likely to conform to the actions of others when his or her actions are public (Bernheim, 1994), then making contributions public in low-giving environments may reinforce low levels of giving and fail to increase contributions.

Our knowledge of how the effects of these social policy levers vary with the compliance environments is limited. Field studies utilizing these interventions tend to focus on contexts in which baseline compliance is high or target only initial non-prosocial actors, and observational variation in the compliance environment does not allow for causal identification. And while there are numerous laboratory studies examining how group behavior affects individual decisions (often referred to as "conditional cooperation" in this context) and how various forms of social recognition or social pressure affect behavior, this study is the first — to the best of our knowledge — to focus explicitly on how the compliance environment affects these interventions in a public good setting.[4]

In this paper, we use an innovative experimental design to vary the compliance environment (i.e., the baseline level of prosocial behavior). Subjects play a repeated binary public good game in groups of four, remaining with the same group throughout the game. Our algorithm for group assignment generates exogenous variation in the number of contributors each individual is paired with, conditional on own contribution decision at baseline. In all treatments, this information is provided to all individuals in the group. That is, we always provide subjects with *peer information*, but the information they receive is exogenously varied via the group composition.

To vary social recognition, we inform all participants that there will be a snack break after the session while the experimenters organize payments. In the *social recognition* treatment, subjects are told they will wear name tags during the snack break that link them back to their contribution decisions during the experiment. As discussed in Section 2.1, we see advantages of this design innovation, such as the ability to introduce social recognition without revealing subject identities ex ante, since revealing identities (e.g., through pictures) might confound information, coordination, empathy, or solidarity with social recognition.[5]

We introduce both peer information and the presence of social recognition only after subjects have made their first-round contribution decisions. This feature of our design allows us to explore how behavior responds among two types of decision makers — baseline contributors and baseline non-contributors — and to investigate which types of agents respond to which social policy instruments.

We present three main results. First, subjects randomly put in groups with more contributors give at significantly higher rates, consistent with the literature on conditional cooperation. We find, however, that only individuals who contribute in the first round (i.e., before they observe the contributions of others) respond to the number of other contributors in their group; initial non-contributors do not appear to respond to peer behavior.

Keser and Van Winden (2000), Fischbacher et al. (2001), and Fischbacher and Gächter (2010) on laboratory public good provision. Kessler (2017) finds that just announcing support for a charity can encourage others to give. On social recognition: see Perez-Truglia and Troiano (2018) on tax compliance; Gerber et al. (2008) and DellaVigna et al. (2016) on voting; Harbaugh (1998), Ariely et al. (2009), DellaVigna et al. (2012), Karlan and McConnell (2014), and Samek and Sheremeta (2017) on charitable contributions; Linardi and McConnell (2011) on volunteering; Charness and Gneezy, 2008 on dictator game giving; Tadelis (2007) on trustworthy behavior; and Rege and Telle (2004), Filiz-Ozbay and Ozbay (2014), Samek and Sheremeta (2014), and Samek and Sheremeta (2016) on laboratory public good provision.

[3] We use the term social policy instruments broadly to describe mechanisms that can be used by charities or policymakers to encourage prosocial behavior. In this context, compliance refers to behavior compliant with the objective of the policymaker.

[4] In particular, we explore a repeated contribution environment in which individuals are asked to give repeatedly. While there are a number of papers about publicizing contributions in repeated settings — see Soetevent (2005) on charitable giving; Gerber et al. (2008) on voting; and Andreoni and Petrie (2004), Filiz-Ozbay and Ozbay (2014), Samek and Sheremeta (2014), and Samek and Sheremeta (2016) on repeated laboratory public goods — we are unaware of any previous work explicitly examining how making contributions public affects behavior across different compliance environments.

[5] There is significant experimental evidence that monetary punishment and reward can influence behavior in public good games. For example, games where group members can punish one another between each round can increase contribution to the public good (Fehr and Gächter, 2000). Even non-monetary punishment (akin to scolding) can increase contribution, but more severe punishment (i.e., monetary rather than non-monetary) generates more contribution to the public good (Masclet et al., 2003). Here, we do not impose a specific punishment technology and do not allow for punishment between rounds of the game. Instead, we investigate how individuals respond to the threat of organic social reward and punishment, which will be imposed after all choices are made. In this way, we reveal how subjects respond to the treatment without round-by-round feedback about what type of punishment they have received.

Second, we find that social recognition significantly increases individual contributions. This effect is driven initially by the subjects who do not contribute in the first round. Later in the game, however, there is a substantial treatment effect of social recognition for initial contributors, encouraging them to maintain a high level of giving.

Third, we find that social recognition increases contributions from groups at every initial contribution level, even those with zero baseline contributors. This result demonstrates that while peer information has differential effects across compliance environments, the reaction to social recognition appears to be based on a more inherent sense of what behavior is socially desirable. While ours is just one setting, these results are inconsistent with models that predict social recognition will backfire when baseline giving is low. Instead, they provide support for models that predict that publicizing behavior generally increases giving — because agents seek social approval (Holländer, 1990) or because it allows agents' choices to signal their underlying generosity (Bénabou and Tirole, 2006), wealth (Glazer and Konrad, 1996), or both (Bracha and Vesterlund, 2013).

Our results underscore the significant appeal of using social recognition to increase public good contribution. While financial incentives like subsidies for contribution can be quite costly and may need to be in place continuously to be effective, social recognition can potentially be implemented at a low cost but still deliver substantial positive effects, even for initially low-contribution groups.[6] In addition, our results speak to the different motivations for responding to social recognition. Our results imply that publicizing contributions induces individuals to respond to a common understanding of prosocial behavior that is not defined solely by the initial group norm. This suggests our findings are more consistent with models focusing on social approval or signaling positive traits than models focusing on conformity to others' actions.

2. Experimental design

The experiment involved subjects in groups of four making binary contribution decisions in a finitely repeated public good game. Subjects were told that they would play 16 rounds of the public good game in the same group. In each round, each subject had a \$5 endowment and could either contribute nothing or contribute the whole endowment ($g_i \in \{0, 5\}\ \forall\ i$). Binary contribution of \$5 to the public good generated a payoff of \$2 for each of the four group members. Payoffs (in U.S. dollars) thus took the following form (where i is one of the four participants in the group, and so the contribution of i is included in the summation indexed by j):

$$\pi_i = 5 - g_i + 0.4\sum_{j=1}^{4} g_j$$

The payoffs of the public good were explained to subjects. The wording of the experiment called the public good a "group pot" and the decision was whether or not to "allocate" their \$5 to the group pot. While used throughout the paper, the words "public good" and "contribute" were not used in the instructions, which can be found in Appendix A.1. Before any choices were made, subjects were allowed to spend up to two minutes making hypothetical contribution choices for four players and observing the resulting payoffs for all group members (see panel (b) of Appendix Fig. A2). Subjects were told that they would be paid for the results of one randomly selected round of the 16. Finally, subjects were told that the rules of the game might change and they would be informed if they did.[7]

All sessions included 16 subjects, subjects were assigned to groups of four within that session, and subjects stayed in the same group for all 16 rounds. We introduce several unique design features to test the impact of peer information and social recognition on behavior.

Random assignment to compliance environment The experimental design generated variance in initial group cooperation levels by randomly assigning subjects to groups. To ensure that we are powered to measure behavior in very low and very high compliance groups, we generated excess variance by making group assignments conditional on first period giving. We did this by informing subjects that they would play in the same group for all 16 rounds, but (unknown to the subjects) we placed them into groups as a function of their first-round choice. This allowed us to create more "extreme" groups (e.g., of all defectors or all cooperators) than would have occurred if groups had been assigned before the first round decision (see Table 1). When using this technique, we were careful not to deceive subjects by telling them anything inaccurate. For example, we told subjects that they would be playing all rounds of the game in the same group (which was true, since payoffs for the first round were determined based on the assigned group); but we did not state that the group had been formed prior to a subject's first-round contribution decision (since they were not yet in a group when they made that contribution decision). This experimental design feature is related to, but slightly different from, experimental designs that

[6] The cost of implementing a policy and its efficacy are only two inputs into the policy's overall welfare effects. For work on the welfare effects of social recognition, see Butera et al. (2019); for work on the welfare effects of peer information, see Allcott and Kessler (2019).

[7] At the end of the experiment discussed here, we introduced a surprise restart for a second 16 rounds in which we changed the payoff structure of the game. Because this was unknown to subjects ex ante, it cannot have impacted the experimental results here. Instructions and data from these rounds are available on request.

Table 1
Subjects and Treatment Assignment.

	Peer Information Only	Social Recognition
Sessions	10	12
Groups	40	48
Subjects	160	192
Subjects in...		
(0,4) Groups	20	20
(1,3) Groups	36	40
(2,2) Groups	16	24
(3,1) Groups	32	36
(4,0) Groups	56	72

Notes: For the label "(X,Y) Groups," X represents the number of round 1 contributors and Y represents the number of round 1 non-contributors. Note $X + Y = 4$ for all groups.

create more-generous and less-generous groups based on how subjects play in games preceding the public good game of interest (see, e.g., Aksoy and Krasteva (2020)). Since subjects receive information about the number of other contributors in their group after making their initial contribution decision, they can respond to the number of other contributors in their group starting in round 2.

Provision of peer information All subjects received information about the contribution decisions of others in their group from the prior rounds. After first-round contribution decisions were made, each subject was given a unique ID and told that, going forward, their contribution decisions would be associated with this ID and shown to the other members of their group. After round 1, subjects only learned the number of subjects in their group who had contributed. After round 2, and throughout the rest of the study, subjects received more detailed information, namely the specific history of play for each particular group member. This data allowed subjects to determine whether the same participants were contributing in each round. A table showing the allocation choice for each ID in their group (for each round starting with round 2) was displayed continuously on each subject's screen for the next fifteen rounds (see an example in Appendix Fig. A7).

Random assignment to social recognition treatment Subjects were randomly assigned to the *peer information only* treatment or to the *social recognition* treatment in a between-session design. In the *peer information only* sessions, subjects' unique ID numbers were private information. In the *social recognition* sessions, subjects were told that their ID numbers, and thus their contribution decisions, would be associated with their real identities. This variation was introduced at the same time that the ID numbers were introduced, starting in round 2, allowing round 1 to serve as a baseline and balance check.

In both the *peer information only* and *social recognition* treatments, subjects were told that at the end of the study, they would have two minutes to look over the contributions of all their group members by ID and then spend 15 minutes in a room at the back of the laboratory having drinks and snacks with the other 15 subjects in the session. In the *social recognition* treatment, however, subjects were informed that their ID number would be made public to the other group members (see screenshots in Appendix Fig. A6). In particular, subjects were told that after all decisions were made in the experiment, subjects would: (1) stand up at the same time as their other group members, (2) announce their ID number, and (3) receive a name tag with their ID number that they would wear during the 15 minutes of drinks and snacks at the back of the laboratory. Since social recognition is implemented at the end of the game, this design requires subjects to anticipate the costs and benefits associated with having their contribution decisions made public.

2.1. Comments on experimental design

This experimental design allows us to make several important advances. In this section, we highlight these advances and relate them to approaches taken in prior work. We then discuss caveats of our design and consider attempts to answer our questions using field data.

First, as noted above, our design generates exogenous and excess variation in peer contributions, conditional on a subject's first-round contribution decision. This allows us to measure how subjects respond to different levels of peer information.

Second, the excess variation in our group formation generates more than the expected number of groups at extreme contribution levels (e.g., 0 initial contributors out of 4 and 4 initial contributors out of 4) allowing us to be well powered to explore low-compliance and high-compliance environments. Previous experiments on making contributions public have looked for average effects on contributions and found that public revelation leads to higher contributions. We are explicitly interested in heterogeneity in compliance environments and, in particular, how social recognition works in low-contribution environments, since it is for groups with 0 or 1 initial contributors that the models discussed in the Introduction predict that social recognition might not increase giving.

Third, choices are binary, and subjects make their first contribution decision without knowledge of the contributions of others and without any threat of social recognition. We consequently can identify two different types of subjects: (1) initial non-contributors who, faced with a public good game played with a fixed group for 16 rounds, choose not to contribute in the first round; and (2) initial contributors who, faced with the same game, choose to contribute in the first round. We can therefore test for heterogeneity in behavioral responses by subject type.

Fourth, because we observe individuals playing repeatedly in the same group for 16 rounds, we can investigate the dynamics of repeated play under the threat of social recognition. The repeated nature of the design contrasts with previous studies that make contributions public but look at one-shot decisions, as in Rege and Telle (2004) and in Linardi and McConnell (2011).

Fifth, we use a snack break at the end of the experiment to construct an environment where the consequences of social recognition can arise. This allows our experiment to approximate the types of normal social interactions through which recognition or shame may occur in practice.

Sixth, the design allows subjects to face the threat of social recognition but for subjects to make all their contribution decisions before they learn the identities of their group members. Keeping identities private until the end of the game allows for the effect of social reward and punishment to be measured in a repeated setting without confounding information, coordination, empathy, or solidarity that might arise from protocols that allow individuals to see pictures of or interact with other members of their group before making all their contribution decisions.

This last design choice differs from an alternative approach, used in prior literature, for introducing social recognition, which involves taking pictures of subjects at the start of the experimental session and sharing these pictures alongside the subjects' contribution decisions during the experiment (Andreoni and Petrie, 2004). Seeing group members and their contributions during the game has the potential to alter subjects' beliefs about the types of individuals with whom they are playing or create feelings of kinship or solidarity that might affect contribution decisions. For example, Reinstein and Riener (2012) finds that individuals respond more to another donor's gift when the donor's identity is known and finds that individuals respond more to the gifts of female donors than male donors. Researchers who are interested in how social recognition affects behavior when these other factors are relevant and can influence contribution may prefer the use of pictures to our approach. Our design, alternatively, focuses on how making contribution public affects behavior through the possibility of social reward and punishment, isolated from these other forces.[8]

While our paper has important advantages, it is worth emphasizing caveats associated with our experimental approach. We run a laboratory study, which may lead some to be concerned about external validity and experimenter demand effects (Levitt and List, 2007). On experimenter demand, it is clear to subjects in our study that they are in an experiment, which means that they may infer that the experimenter has preferences over their actions. That said, our experiment is motivated by the many environments in which a policymaker aims to encourage a certain behavior. In these settings, individuals may respond to a policy lever in part due to their inferences of what the policymaker wants them to do (i.e., a demand effect). To the extent that subjects experience such effects in the lab, we see them as similar in spirit to what they might experience in the field. More broadly, on external validity, it is worth noting that — as with much other experimental work — our primary interest is in the qualitative effects that we observe, which are likely to be stable across settings (Kessler and Vesterlund, 2015). That is, while the specific numeric estimates presented in the results section that follows would surely differ across settings, we see no reason why the general qualitative pattern of results would differ in a field setting or alternative lab setting.

An additional caveat is that our design does not allow subjects to select into an environment with or without social recognition, which we randomly introduce in some sessions but not others. While our experiment models the many environments in practice where individuals cannot freely exit a group, there are other settings in which individuals may choose not to join a group (e.g., a social club or a charity) based on whether social recognition is used to encourage contribution in that group. Allowing for this kind of endogenous selection may change the efficacy of policy levers in such groups, which we see as an interesting avenue of exploration for future work.[9]

Finally, it is worth emphasizing why we run a laboratory experiment rather than attempting to identify the impact of these social policy levers in the field. In field settings, you cannot randomly assign compliance environments. Instead, observational variation in the compliance environment (levels of giving, voting, etc.) may reflect sorting of individuals into groups, which can create an identification concern if individual characteristics are related to the sensitivity to treatment (i.e., independent of the compliance level of the group overall). As an illustrative example, consider comparing the treatment effect of telling voters that their voting behavior will be publicized to their neighbors, as in the seminal Gerber et al. (2008) study, across high and low compliance environments. It could be that individuals who select into high voting areas react differently to social recognition or shaming than individuals who select into low voting areas. This prevents the researcher

[8] In a similar spirit, Andreoni and Petrie (2004) have a control condition in which they provide pictures of subjects in the group but do not provide information about how much each subject contributed to the public good, which helps control for some of the other forces that might affect behavior when contributions are public.

[9] In addition, we require subjects to spend time in the snack break, preventing subjects from strategically avoiding the social punishment that they may receive for failing to contribute. The impact of social recognition will likely differ in environments when people anticipate being able to avoid social punishment or, alternatively, when they anticipate that the extent of social punishment extends beyond a few minutes.

Table 2
Effect of Round 1 Contribution on Round 2 Contribution.

	Dependent Variable: *Round 2 Contribution*			
	(1) Combined	(2) Initial Contributors	(3) Initial Non-Contributors	(4) Combined
Initial Contributors in Group	0.0982***	0.149***	0.0218	0.0218
	(0.0344)	(0.0437)	(0.0481)	(0.0478)
Own Initial Contribution	0.621***			0.423***
	(0.0741)			(0.119)
Group × Own				0.127*
				(0.0640)
Constant	0.0702	0.575***	0.151**	0.151**
	(0.0602)	(0.119)	(0.0602)	(0.0599)
Observations	160	97	63	160
R-squared	0.601	0.273	0.003	0.616

*** p<0.01, ** p<0.05, * p<0.1 *Notes:* Robust standard errors in parentheses, clustered by group. *Initial Contributors in Group* is round 1 contributors in a subject's group, excluding own contribution, and thus ranges from 0 to 3. *Own Initial Contribution* is a binary variable indicating own round 1 giving. *Group × Own* interacts those two variables. Data is from the *peer information only* treatment.

from identifying the role of the compliance environment independently from the types of individuals who comprise it.

2.2. Implementation details

Our experiment was run at the Computer Lab for Experimental Research at Harvard Business School during the spring of 2010. The experimental results are from 352 subjects who participated in one of 22 sessions in groups of four subjects. In total, 160 subjects participated in the *peer information only* treatment and 192 subjects participated in the *social recognition* treatment. Table 1 shows the number of sessions, groups, and subjects who participated in each treatment and the number of subjects who participated in each compliance environment (i.e., number of initial contributors out of four) by treatment.

Subjects were students at Boston-area colleges and universities. The experiment lasted less than one hour, and average earnings were around $24 per subject, including a $10 show up fee.

3. Results

The results section proceeds as follows. Section 3.1 presents results from the *peer information only* treatment that are based on exogenously varied group composition. Section 3.2 examines the impact of introducing social recognition by making contributions public. Section 3.3 discusses heterogeneity in the *social recognition* treatment results.

3.1. Peer information

We can identify the causal effect of varying others' contributions on one's own subsequent behavior since subjects are randomly assigned (conditional on their own first-round decision) to groups with different numbers of contributors. We condition on participants' own first-round decisions since the experiment was designed to generate excess variance in group composition, so initial contributors are more likely to be grouped with other initial contributors and initial non-contributors are more likely to be grouped with other initial non-contributors. The cleanest test arises from examining round 2 behavior in the *peer information only* treatment, where individuals learn how many other individuals in their group contributed the previous round, and then choose whether or not to contribute.

Table 2 demonstrates the strong impact of others' giving on own contributions when given peer information. As shown in the first column, having one additional person in your group contribute in the first round leads to a 10 percentage point increase in the likelihood of giving in the second round. This suggests that the effect of providing peer information depends significantly on the content of that information.[10]

There is also significant heterogeneity by whether subjects were initial contributors. Fig. 1 shows that for initial non-contributors, exogenously varied round 1 giving appears to have little effect on round 2 contribution behavior. On the other

[10] This estimate is a similar magnitude to prior experimental data investigating conditional cooperation in comparable environments. For example, Ambrus and Greiner (2012) has subjects play a binary contribution public good game in groups of 3 for 50 rounds in a treatment very similar to our *peer information only* treatment. Using publicly available replication data from that treatment, we estimate that (controlling for own round 1 contribution) the impact of switching all others in a subject's group from not contributing in round 1 to contributing in round 1 increases the probability that a subject contributes in round 2 by 29.3 percentage points, which is remarkably similar to the estimate of 29.5 percentage points we find in our data (i.e., 3×0.982).

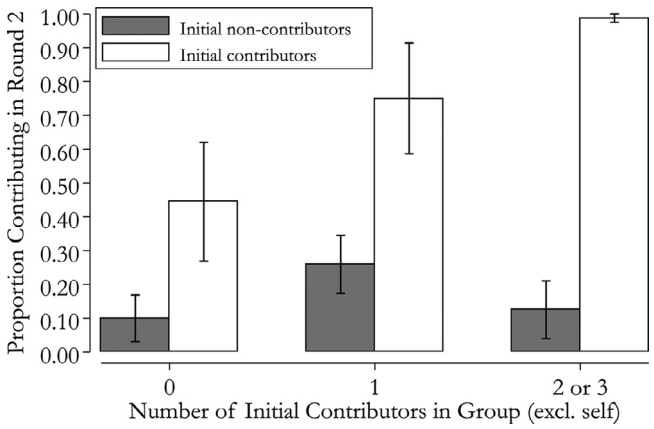


Fig. 1. Effect of Group Composition in the *Peer Information Only* Treatment *Notes:* Standard error bars are shown around each mean. Data is from the *peer information only* treatment.

hand, initial contributors' round 2 contributions are strongly affected by the number of other initial contributors in their group. Those in groups with no other initial contributors choose to contribute less than 50% of the time, while those in groups with 2 or 3 other contributors give almost universally.

The second column of Table 2 shows that among initial contributors, the influence of being in a group with an extra contributor in round 1 is a 14.9 percentage point increase in round 2 contribution. The third column shows the effect is small and insignificant for initial non-contributors. The fourth column shows that the influence of others' contributions is marginally statistically significantly different for initial contributors and initial non-contributors, with a p-value of 0.055.

While these results focus on round 2 contribution decisions, this pattern continues through all 16 rounds. Appendix Fig. A8 shows the impact of initial group composition across all rounds for initial contributors and for initial non-contributors. While initial non-contributors give at similar rates regardless of group composition, initial contributors condition giving on the number of other initial contributors. Contributions fall off rapidly when initial contributors are grouped with 0 or 1 other contributor, reaching the level of giving of initial non-contributors by about round 5. Initial contributors grouped with 2 or 3 other initial contributors, however, see substantially higher levels of contribution across the 16 rounds.

These results show that individuals do, on average, condition their giving — in round 2 and beyond — on others' contribution decisions. However, the results also highlight important heterogeneity in conditional cooperation. In particular, simply placing non-contributors with other contributors may not motivate these individuals to change their behavior. Those initially inclined to give are the ones who demonstrate conditionally cooperative subsequent giving.

3.2. Social recognition

We next turn to examining the effect of social recognition on individual behavior. The effects of social recognition are theoretically ambiguous. Various models of behavior predict that making individuals contributions public could amplify the conditional cooperation effects seen above, induce individuals to comply with a group norm, or directly encourage individuals to engage in prosocial behavior.

Fig. 2 shows the impact of social recognition on average across all groups: an immediate increase in giving in round 2, a more stable level of contribution as the game progresses, and no steep drop-off in round 16 contribution (a steep drop is visible in the *peer information only* treatment). This indicates that individuals both immediately anticipate the effects of individual identifiability and respond even though there is no specific punishment or recognition technology within the game (i.e., all potential social reward and punishment will only occur during the post-game snack break).

A regression in Table 3 further illustrates these dynamics. Column (1) shows that the *social recognition* treatment creates an overall 22 percentage point increase in contribution rates across the 15 treated rounds of the game relative to the *peer information only* treatment. Column (2) considers round 2, when the exogenous treatment effect is first introduced, and shows a 16 percentage point increase due to the *social recognition* treatment. In the *peer information only* treatment, contributions decline significantly between rounds 2 and 16, as the reciprocity motive (i.e., the hope to create subsequent giving by others by contributing in this round) diminishes. This decrease is mitigated in the *social recognition* treatment, resulting in a 35.5

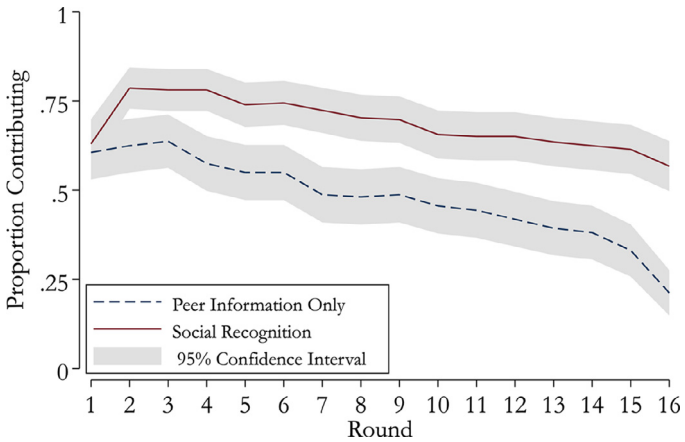


Fig. 2. Average Effect of *Social Recognition* Treatment *Notes:* Figure shows mean proportion contributing by treatment averaged across all groups. Round 1 is before the treatment is introduced, so the proportion contributing is nearly equal across the two treatments in round 1.

Table 3
Effect of *Social Recognition* Treatment.

	Dependent Variable: *Contribution*			
	(1) Rounds 2–16	(2) Round 2	(3) Round 16	(4) Rounds 2–16
Social Recognition	0.222***	0.161**	0.355***	0.138*
	(0.0742)	(0.0693)	(0.0749)	(0.0756)
Round				-0.0244***
				(0.00315)
Social Recognition × *Round*				0.00936**
				(0.00442)
Constant	0.469***	0.625***	0.213***	0.688***
	(0.0572)	(0.0591)	(0.0459)	(0.0637)
Observations	5280	352	352	5280
R-squared	0.050	0.032	0.130	0.081

*** p<0.01, ** p<0.05, * p<0.1 *Notes:* Robust standard errors in parentheses, clustered by group. There are 88 clusters in each regression. *Social Recognition* is a binary variable indicating the subject was assigned to the *social recognition* treatment. *Round* is a variable indicating the round of the game and ranges from 2 to 16. *Social Recognition* × *Round* interacts those two variables.

percentage point effect of the *social recognition* treatment in round 16, as shown in column (3). This pattern can be seen in column (4), where the coefficient on *Round* is statistically significantly negative, but the interaction on *Social Recognition* × *Round* is statistically significantly positive.

Given that initial non-contributors did not respond to more group members giving, one might wonder whether the effects of social recognition also vary by initial contribution status. Fig. 3 shows that the increase in round 2 giving is large for initial non-contributors, whose contributions in the *social recognition* treatment are more than double those in the *peer information only* treatment. While these initial non-contributors are not responsive to peer information, they do respond to the possibility of social reward or punishment by becoming more likely to give in round 2. Next, we explore this effect across compliance environments.

3.3. Heterogeneity in social recognition effects

As noted in the Introduction, it is unclear whether we should expect social recognition to increase public good provision across all groups. Making individual behavior public could theoretically increase conformity to a prevailing group norm of no contribution. We have already seen that the *social recognition* treatment can be effective at getting even non-contributors to give, but that effect could be driven by non-contributors who fear shame for not giving in high contribution groups. Groups with very low levels of initial contribution could be unaffected, or even negatively affected, by the *social recognition* treatment. To examine this, we look at the impact of the *social recognition* treatment by initial group composition. Fig. 4 shows that there is, in fact, a very large initial increase in contributions in the *social recognition* treatment even among groups with 0 or 1 initial contributors. In the case of groups with one initial contributor, this is driven by both increasing the giving of non-contributors and sustaining the giving of the initial contributor (see Ap-

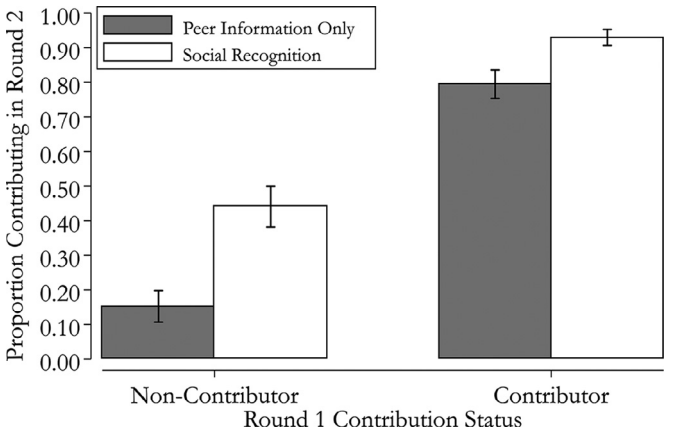


Fig. 3. Effect of *Social Recognition* Treatment, by Initial Contribution Status *Notes:* Standard error bars are shown around each mean. Means and standard errors are weighted to have equal representation of each group type (i.e., for non-contributors, groups with each of 0 to 3 initial contributors are equally weighted; for contributors, groups with each of 1 to 4 initial contributors are equally weighted). This re-weighting provides the cleanest test of the effect of *social recognition* treatment in round 2, since initial contribution is correlated with others round 1 contribution, and others' round 1 contributions can influence subsequent own contribution.

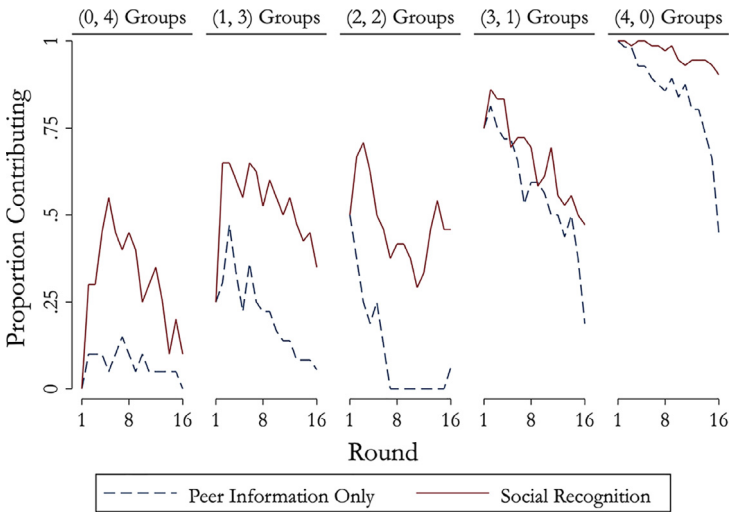


Fig. 4. Effect of *Social Recognition* Treatment by Group *Notes:* Figure shows mean proportion contributing by treatment condition, with one panel for each initial group composition, averaged across all groups with that initial group composition. For the label "(X,Y) Groups," X represents the number of round 1 contributors and Y represents the number of round 1 non-contributors. Note $X + Y = 4$ for all groups. Round 1 is before the treatment is introduced, so the proportion contributing is identical and equal to $X/4$ for each panel. Confidence intervals are not shown on this graph for visual clarity, but they are entirely overlapping for (3,1) Groups, overlapping until the end of the game for (4,0) Groups, somewhat overlapping for (0,4) Groups, and mostly not overlapping for (1,3) and (2,2) Groups.

pendix Fig. A9). In groups with 0 initial contributors, this is necessarily driven by converting initial non-contributors into contributors.

Thus, the *social recognition* treatment is effective even for low-performing groups. These results demonstrate that individuals appear to respond to an internal sense of socially acceptable behavior, even when empirically they are in a low compliance environment. Thus, individuals appear to know that even though there was little-to-no contribution in their group initially, contributing is still the right thing to do. In addition, results suggest that social recognition can be a motivator even when individuals who might "judge" a subject's behavior were initial non-contributors themselves.

Another result that is apparent from Fig. 4 is that initially high-performing groups see the largest benefit of the *social recognition* treatment at the end of the game, when they experience a much smaller drop-off in contribution. This is due in part to a ceiling effect, since initial contributors in high compliance group contribute at high rates early in the game. However, we also do not see a strong effect of lone initial non-contributors increasing their giving in high-performing groups.

Table 4
Effect of *Social Recognition* Treatment by Compliance Environment.

	Dependent Variable: *Contribution*			
	Group Level		Ind. Level	
	(1) Round 2	(2) Round 16	(3) Round 2	(4) Round 16
Social	1.364***	0.681*	0.307***	0.189**
	(0.321)	(0.394)	(0.0782)	(0.0922)
Initial Contributors in Group	0.915***	0.461***	0.119***	0.0963***
	(0.0657)	(0.106)	(0.0294)	(0.0336)
Social × *Init. Contrib. in Group*	-0.320***	0.276*	-0.0884***	0.0819*
	(0.0872)	(0.148)	(0.0298)	(0.0457)
Own Initial Contribution			0.530***	0.188***
			(0.0536)	(0.0484)
Constant	0.281	-0.268*	0.0877	-0.0769*
	(0.242)	(0.155)	(0.0609)	(0.0389)
Observations	88	88	352	352
R-squared	0.797	0.514	0.506	0.340

*** p<0.01, ** p<0.05, * p<0.1 *Notes:* Robust standard errors in parentheses, clustered by group in columns 3 and 4. *Social* is a binary variable indicating the subject was assigned to the *social recognition* treatment. *Initial Contributors in Group* is round 1 contributors in a subject's group, excluding own contribution, and thus ranges from 0 to 3. *Social* × *Init. Contrib. in Group* interacts these two variables. *Own Initial Contribution* is a binary variable indicating own round 1 giving.

Groups with one non-contributor paired with three initial contributors do not immediately respond to the *social recognition* treatment.

Table 4 shows how the number of initial contributors per group interacts with the *social recognition* treatment in round 2 (the first round of the treatment) and in round 16 (the last round). In round 2, having additional initial contributors has a negative interaction with the *social recognition* treatment, suggesting the effect of the treatment is larger in low-contribution groups than in high-contribution groups. However in round 16, this effect is reversed, and additional initial contributors strengthen the impact of the *social recognition* treatment.

Appendix Fig. A10 mirrors the structure of Appendix Fig. A8 and shows the impact of the *social recognition* treatment over the 16 rounds by initial contribution status. Initial contributors give at high rates in the *peer information only* treatment, so the impact of social recognition is only observed in later rounds when giving in the *peer information only* treatment starts to drop off. Initial non-contributors, on the other hand, immediately increase contributions in response to social recognition, and the impacts continue through the 16 rounds.

4. Conclusion

This paper examines two policy instruments regularly used to increase contributions to public goods: making group behavior public to the individual (peer information) and making individual behavior public to the group (social recognition). We use a public good game to test how the impacts of peer information and social recognition vary with the compliance environment.

Our novel experimental design assigns individuals to groups and reveals treatment status after first-round contribution decisions have been made. This allows us to identify two "types" of subjects — those who contribute in the first round of a finitely repeated public good game and those who do not — and to control the compliance environment. We create excess variation in group composition to measure the impact of the two policy tools in both high-compliance and low-compliance environments. Because subjects' first round decisions matter for their assigned groups, we are able to execute this process without deception, truthfully telling subjects they are playing in the same group for all 16 rounds.

Peer information is provided to all subjects in the form of information on the number of contributors in a group. By randomly assigning subjects to groups with more or fewer contributors, we can causally identify the impact of peer compliance on own subsequent contribution decisions. Consistent with work on conditional cooperation, we find that those informed that they are in a high-contribution peer group are, on average, more likely to give subsequently.

Replacing one initial non-contributor with one initial contributor increases contribution rates by 10 percentage points. We find that the effect of this peer information depends on own initial contribution status. Initial non-contributors are not impacted by others' initial contributions, while initial contributors do respond. In other words, initial contributors' continued giving is conditional on others doing the same. Consequently, peer information alone cannot transform a low-contribution or mixed-contribution group into a high-contribution group. This result suggests that in the absence of a mechanism for increasing the contributions of free riders, total public good giving may decline when only information about others' con-

tributions is available. Indeed, conditional cooperation has been used to explain the declining profile of contribution across rounds of a finitely repeated public good game (Ambrus and Pathak, 2011).

Half of the sessions were randomly assigned to the *social recognition* treatment. We utilized a snack break at the end of the experiment to generate an environment where social reward and punishment could be meted out in an organic way. Subjects in the *social recognition* treatment knew their real identities would be associated with their giving decisions, creating the anticipation of social reward or punishment during the snack break. We find that the *social recognition* treatment increases contributions by 16 percentage points in the second round, and an average of 22 percentage points over the 15 treated rounds of the experiment.

The *social recognition* treatment affected both initial non-contributors and initial contributors, and, importantly, the results show a strong impact of the *social recognition* treatment even among the groups with no initial contributors. Indeed, the *social recognition* treatment generated an immediate effect on initial non-contributors, generating a large increase in contribution from low performing groups starting in round 2. In contrast, the *social recognition* treatment affects behavior in high performing groups by helping them sustain cooperation at the end of the finitely repeated game.

In other words, social recognition works even in a low compliance environment. Our findings thus mitigate a theoretical concern that making contributions public might encourage conformity to low-contribution or no-contribution norms. Instead, we find that social recognition increases contributions from initial non-contributors, even among groups with low levels of giving overall. Moreover, social recognition helps initially high-performing groups sustain contribution even as dynamic incentives dissipate. These findings suggest that publicizing contributions causes individuals to respond to a common understanding of prosocial behavior that is not defined solely by the initial group norm.

Policymakers often leverage social recognition to increase charitable contributions, incentivize tax compliance, or encourage other forms of prosocial behavior when other policy levers have limited effectiveness. By definition, these are precisely the situations in which baseline compliance is low, and concerns about interventions backfiring are most relevant. Our results indicate that the compliance environment *per se* need not undermine the effectiveness of social recognition as a policy tool.

We thus highlight two effective mechanisms for encouraging public good contributions. For those naturally inclined to contribute, witnessing high contribution by others is encouraging, and helps to sustain giving. However, peer information should be disbursed with caution, as its effectiveness is strongly dependent on the level of group compliance. Social recognition appears to be effective at increasing contributions irrespective of initial group compliance. It is particularly effective at bringing into the fold those not inclined to contribute while sustaining giving for those who initially do so. Thus, social recognition can be a powerful tool to motivate individuals to change behavior toward what is commonly accepted as socially desirable, even when such socially desirable behavior is empirically absent.

Declaration of Competing Interest

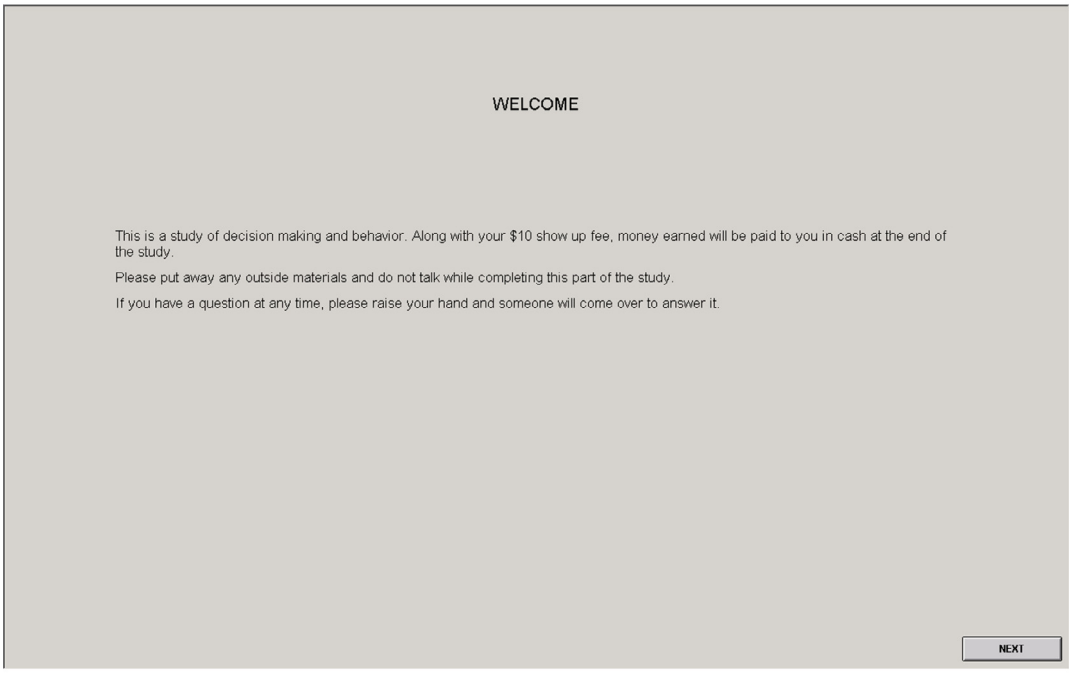
None.

Appendix A

A1. Experimental instructions

The experiment was run on z-tree (Fischbacher, 2007). The screens shown to the subjects in the experiment appeared in the order shown below. All screens were identical between the treatments, except for the screen shown in Fig. A6, which differed between the *peer information only* and *social recognition* treatments. The instructions were read aloud to subjects as they proceeded through the study, so there was common knowledge of all instructions. (One session designated to be in the *social recognition* treatment was excluded from analysis because of an error in how the instructions were read by a research assistant running the sessions.)

(a) Welcome Screen



(b) Introduction to the Study

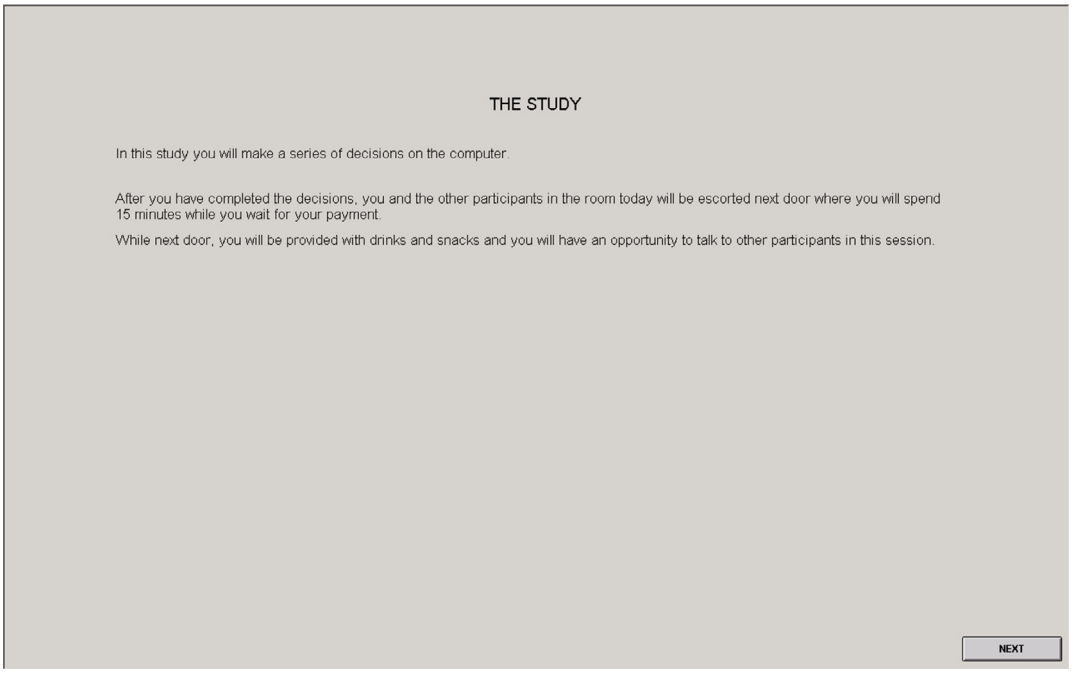
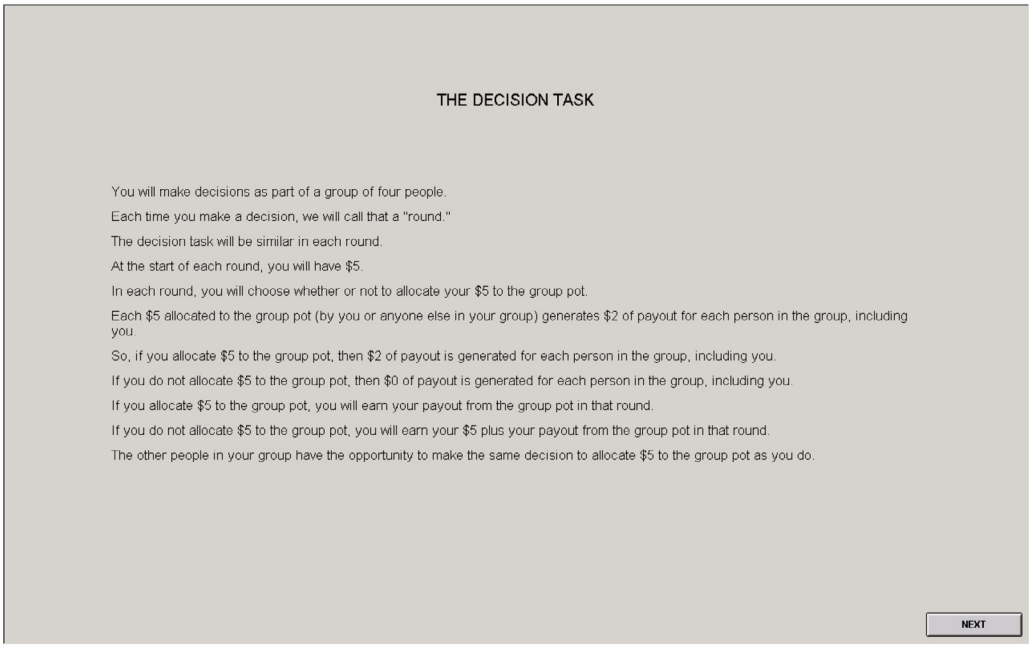


Fig. A1. Introduction.

(a) Description of Decision Task



(b) Decision Task Trial

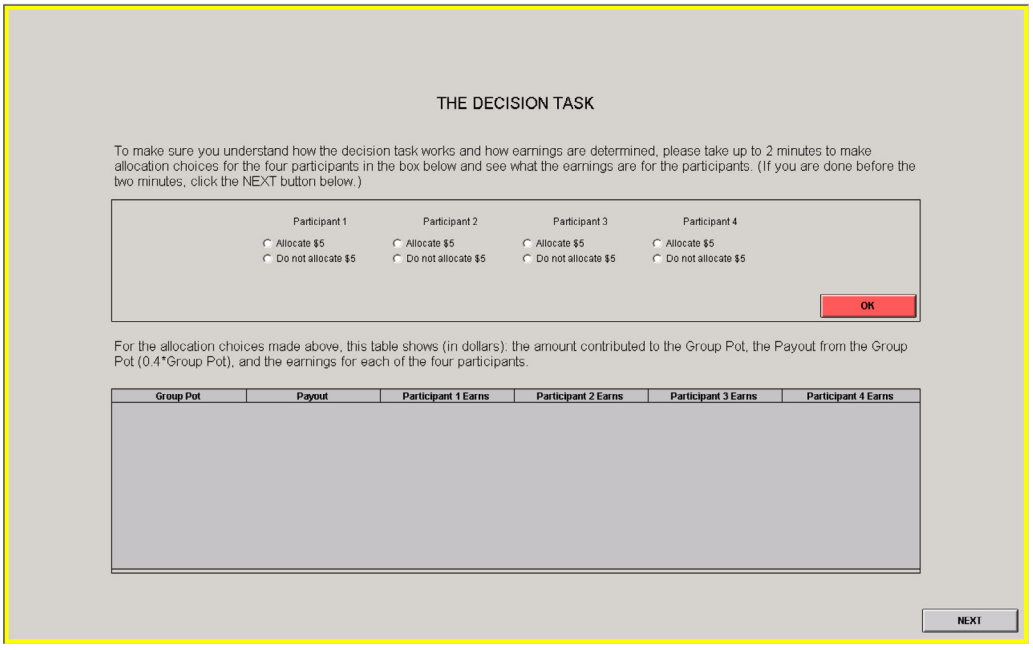


Fig. A2. Decision Task.

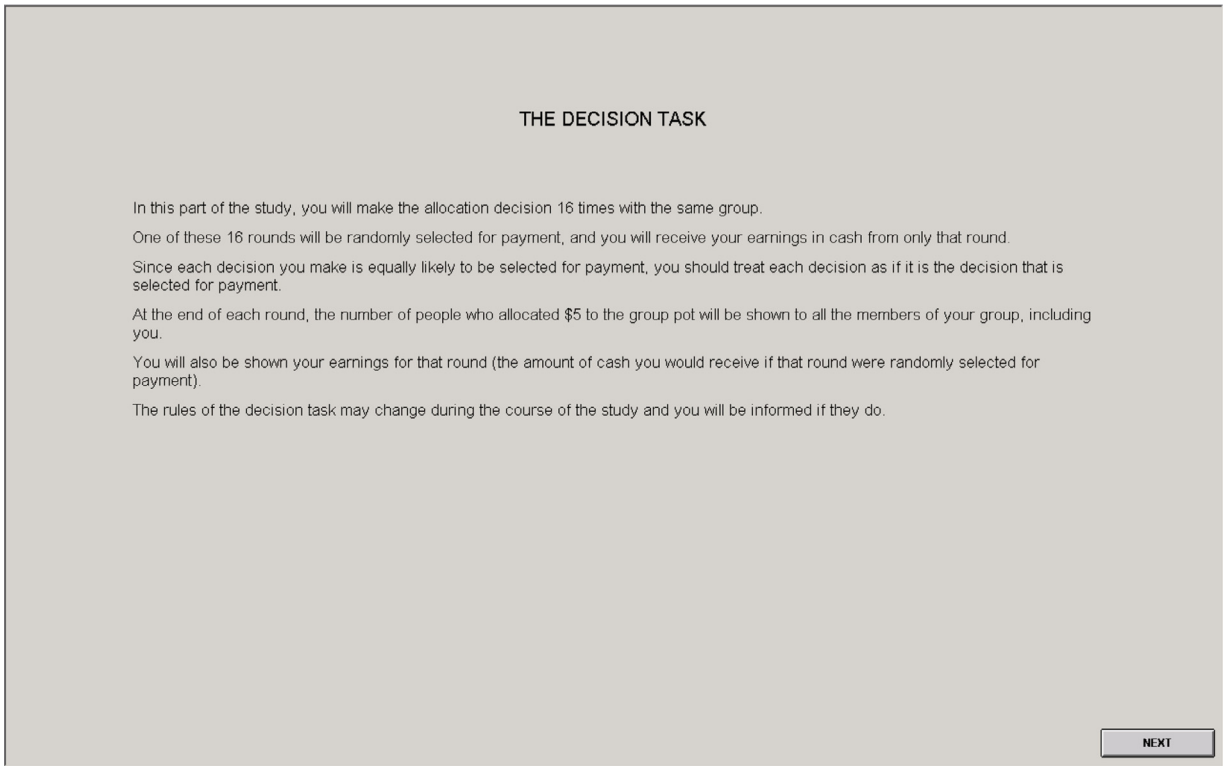
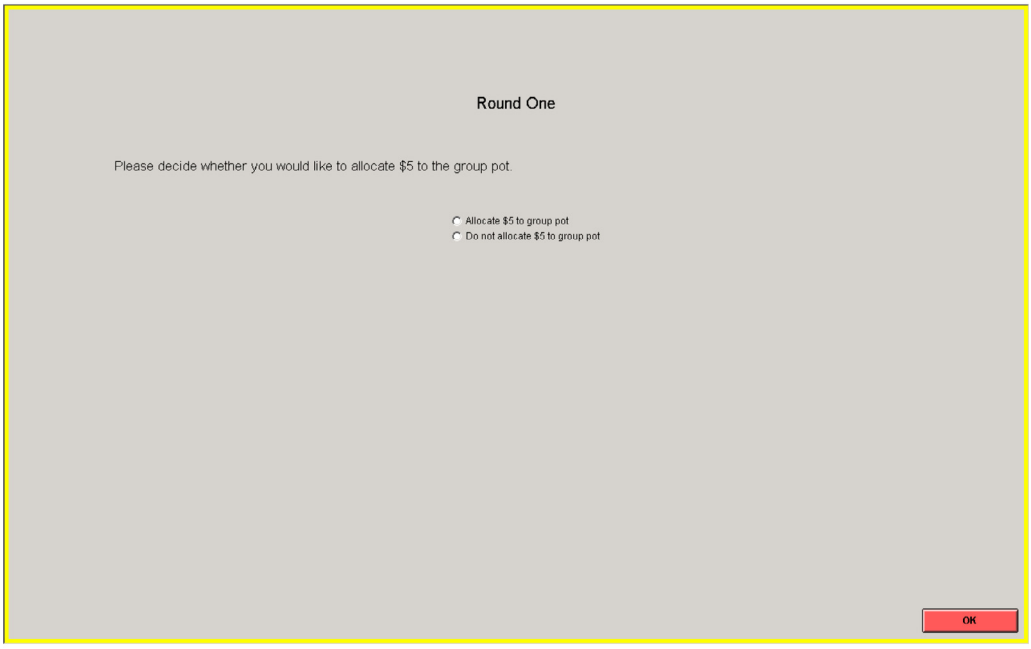


Fig. A3. Introduction of 16 Rounds.

(a) Round 1 Decision Screen



(b) Round 1 Outcome Screen

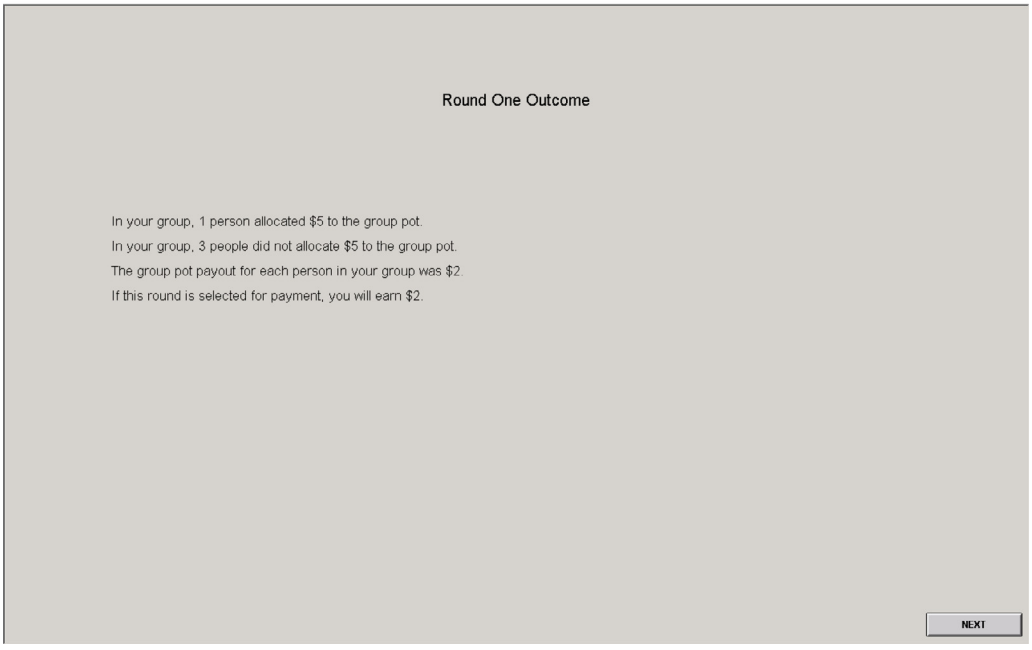


Fig. A4. Round 1.

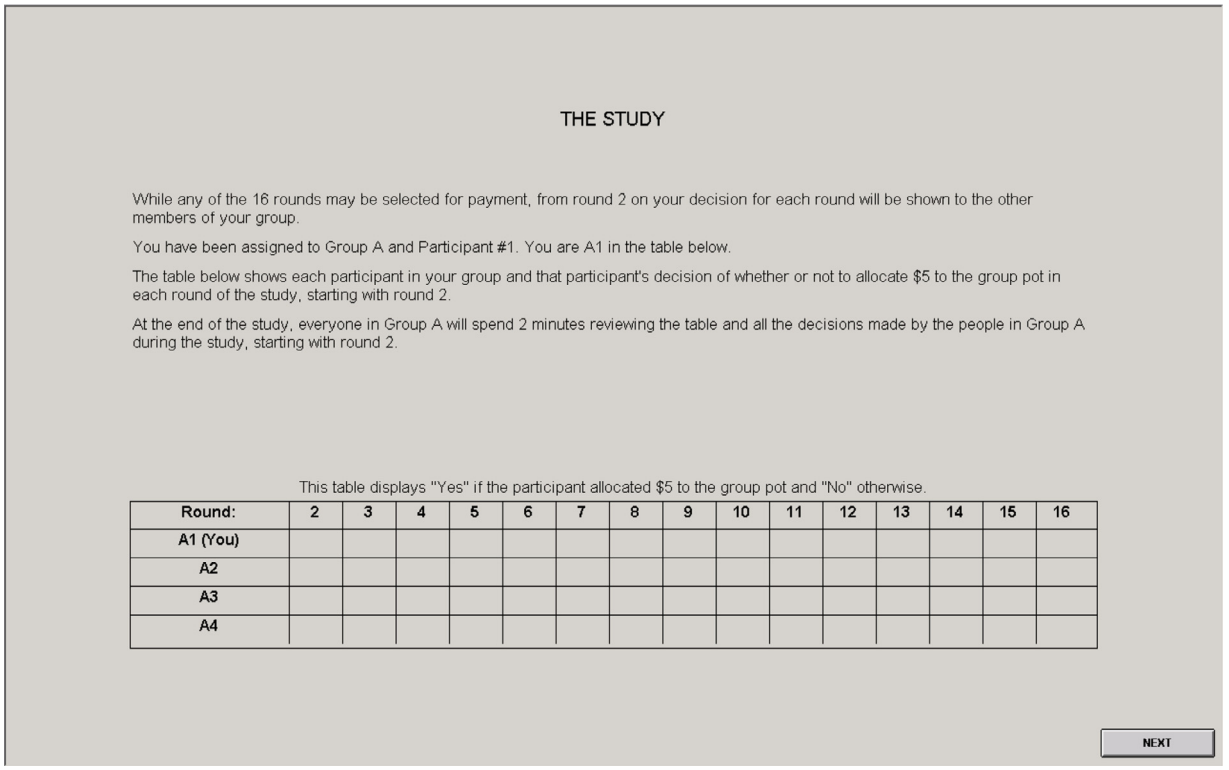
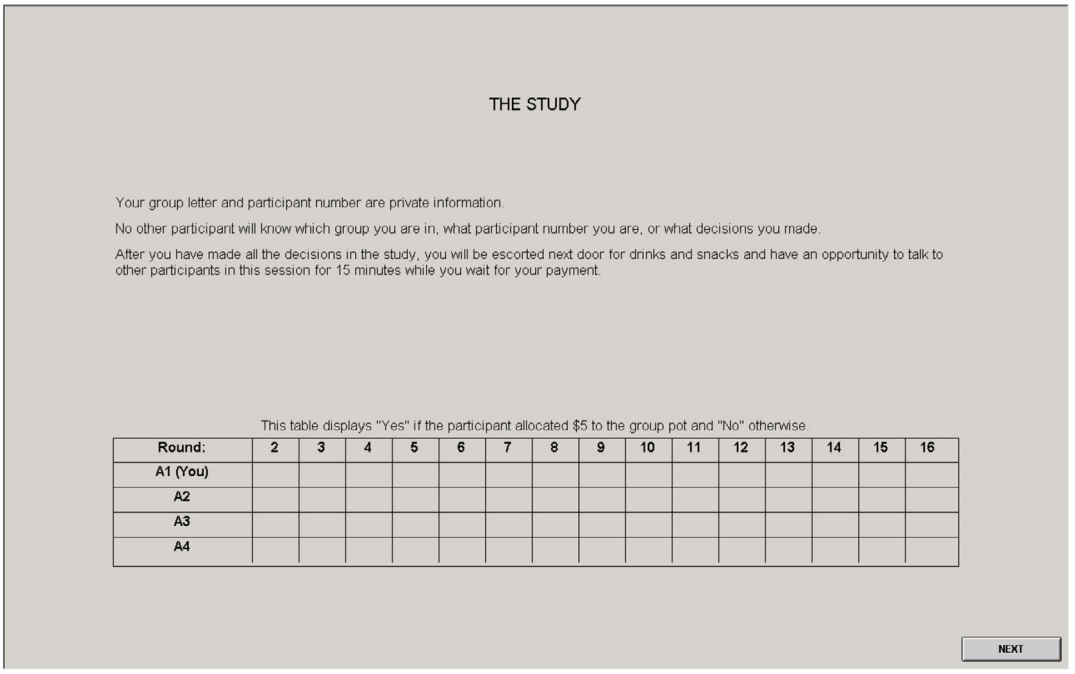


Fig. A5. Group Assignment.

(a) *Peer Information Only* Treatment



(b) *Social Recognition* Treatment

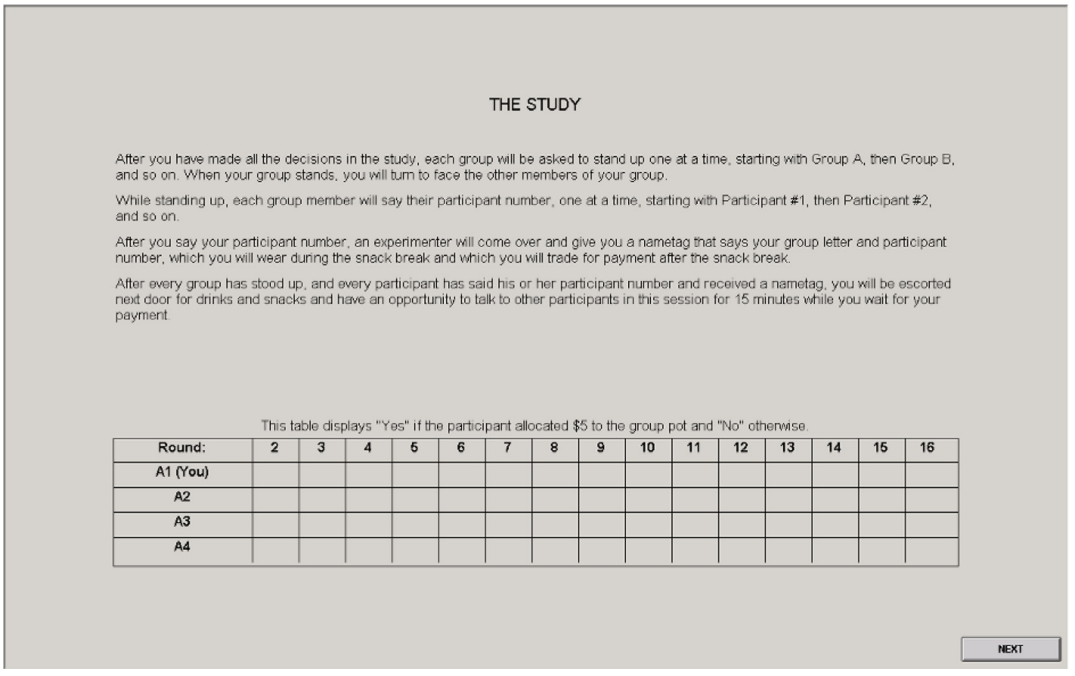


Fig. A6. Treatment.

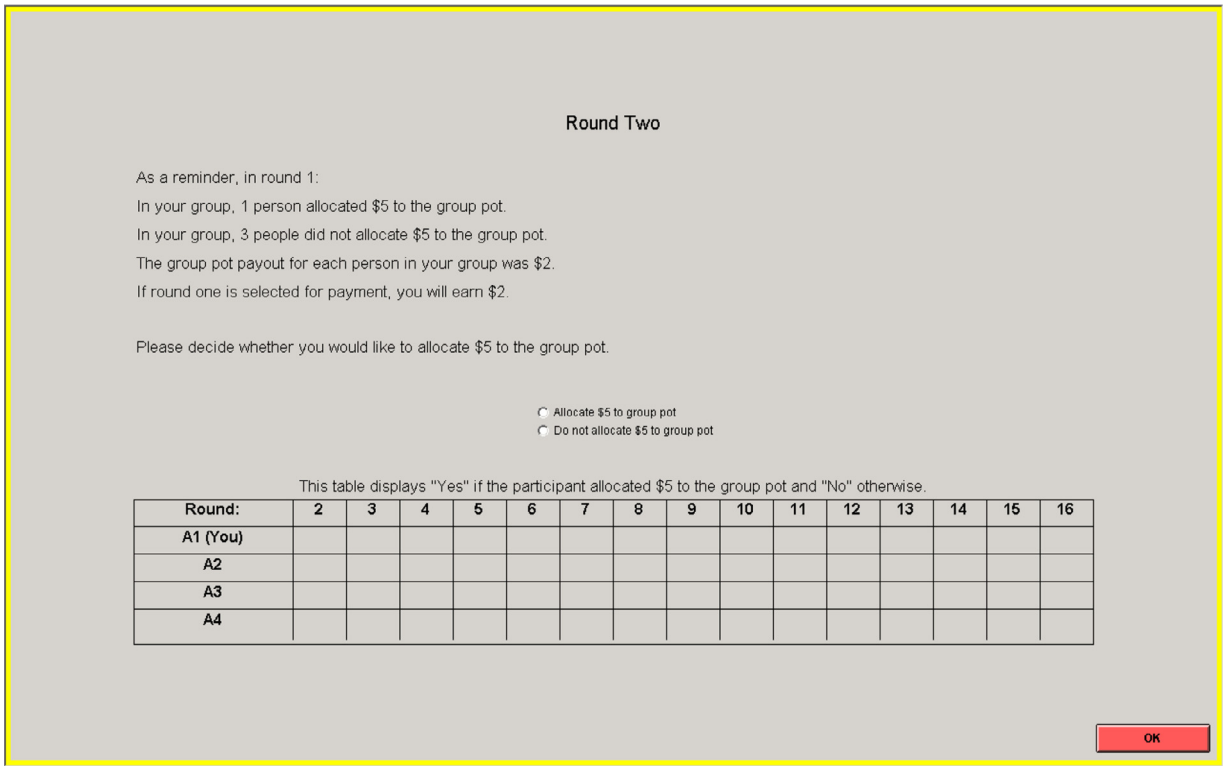


Fig. A7. Round 2 and Subsequent Rounds Decision Screen.

A2. Additional results

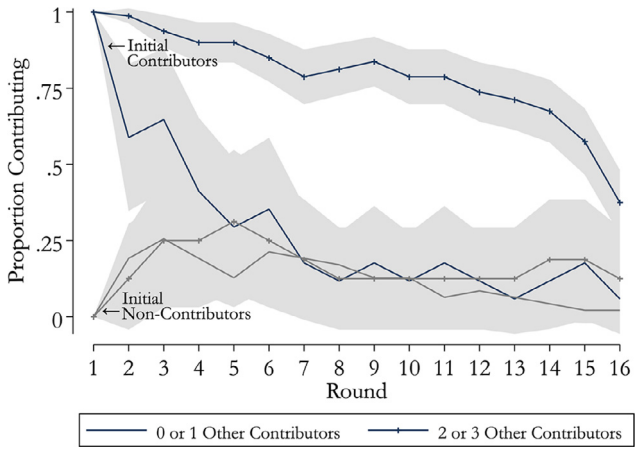


Fig. A8. Effect of Group Composition in the *Peer Information Only* Treatment, by Round *Notes:* 95% confidence intervals in gray. Data is from the *peer information only* treatment.

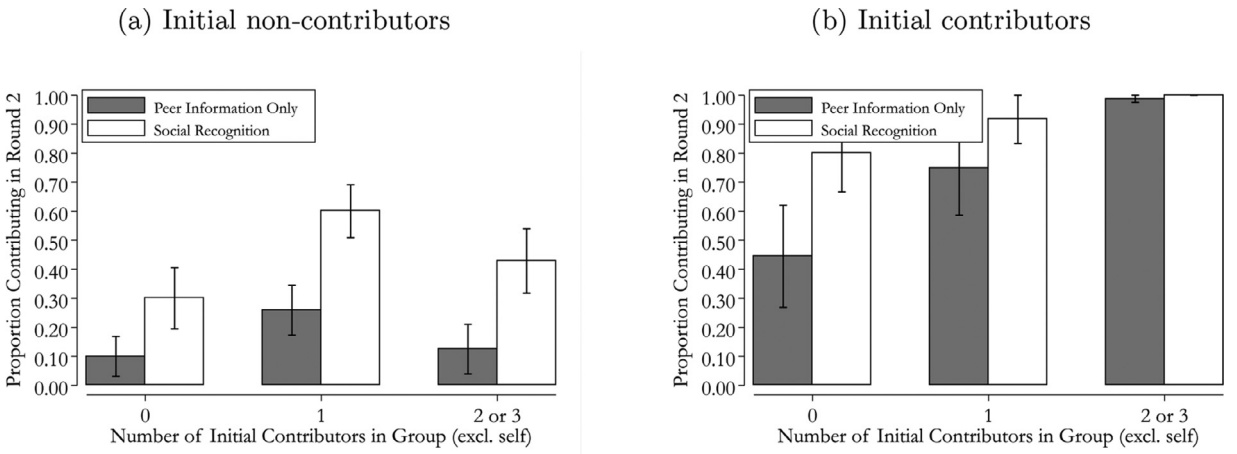


Fig. A9. Effect of *Social Recognition* Treatment on Round 2 Contributions, by Group and Initial Contribution *Notes:* Standard errors are shown around each mean.

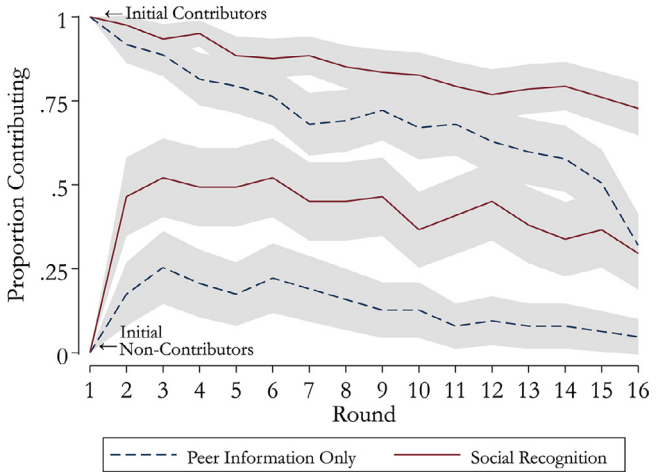


Fig. A10. Effect of *Social Recognition* Treatment by Initial Contribution Status *Notes:* Figure shows mean proportion contributing by treatment condition and initial contribution status, by round. 95% confidence intervals shown in gray. Round 1 is before the treatment is introduced.

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