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# The Creation of Social Norms under Weak Institutions*

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**Abstract**

Preventing overfishing at Lake Victoria is a typical situation where policies have to rely on norm-based interventions to improve outcomes. Our lab-in-the-field experiment (N=588) studies how information about high or low levels of previous cooperation affects the creation of social norms in a three-player prisoner's dilemma game with/without a feedback mechanism. The provision of social information succeeds in creating norms of cooperation only if a feedback mechanism is available. Without feedback, social information cannot prevent the decline of cooperation rates. Exploring the role of the reference network, we find that the effect increases with social proximity among participants. (98 words)

***JEL Classification***: C72, C93, D7, Q22

***Keywords***: common pool resource; collective action; social norms; lab-in-the-field experiment.

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# 1 Introduction

Fisheries at Lake Victoria in East Africa support the livelihood of four million people, contributing annually about 700 million Euro to one of the poorest regions in the world (Mkumbo and Marshall, 2015; LVFO, 2017a). In principle, efficient use of common-pool resources can be ensured through appropriate regulation with sufficient monitoring and enforcement (Baland and Platteau, 1996; Ostrom, 2008). However, due to lack of political will or limited state capacity, formal institutional structures around Lake Victoria are weak and efforts to combat overfishing are insufficient (Eggert and Lokina, 2010). Moreover, climate change, pollution, and population growth have dramatically increased pressure over the last 20 years (LVFO, 2017a). Preventing further depletion of Lake Victoria's resources is of vital importance for the region. To reach sustainable outcomes in the absence of formal enforcement, resource users have to rely on voluntary efforts and self-management. Under weak institutions, policies that aim to facilitate cooperation may turn to social norms as solutions (Ostrom, 1990; Nyborg et al., 2016).

We present a lab-in-the-field experiment with resource users ($N$=588) from the open access fisheries at Lake Victoria, Tanzania. Our experiment is designed to shed light on how different social norms of cooperation may be created. In particular, we investigate how a subtle manipulation of the expectation of others' behavior affects cooperation through the creation of social norms in the presence or absence of a feedback mechanism. Specifically, we provide participants with different initial social information to generate high or low expectations about the cooperation behavior of others in a repeated three-player prisoner's dilemma game. We then assess whether different patterns of behavior and beliefs emerge to form different social norms of cooperation. In addition, we inspect the role of a feedback mechanism in creating norms of cooperation, and finally relate cooperation in the experiment to fishermen's social proximity with their reference network at Lake Victoria.

Scholars often distinguish between *injunctive* and *descriptive* norms. The former prescribe what one ought to do, and the latter describe what most others actually do (Cialdini et al., 1990). It is the descriptive social norm that our norm-based intervention seeks to affect. As Bicchieri et al. (2018b) emphasize, "norms cannot be identified just with observable behavior, nor can they merely be equated with normative beliefs". Beliefs and behavior must collectively align for a social norm to be realized. Moreover, a social norm describes an equilibrium not only in the static sense that each agent prefers a given action conditional on her beliefs, but also in the dynamic sense that behavior and beliefs are stable and do not change over time (Sethi and Somanathan,

1996; Young, 2015). The latter aspect highlights the role of social norms as selection devices in coordination problems, particularly when rationality provides limited guidance or incentives are in conflict.[1] Thus, repeated strategic interaction is necessary, both for participants to coordinate,[2] and for the researcher to observe whether a stable pattern of behavior and beliefs has emerged and a social norm has formed.

The existing literature on norm-based interventions suggests that providing social information can induce behavioral change (Frey and Meier, 2004; Shang and Croson, 2009). For example, social norms are found to be an effective policy tool in promoting voting behavior (Gerber and Rogers, 2009), retirement savings (Duflo and Saez, 2003) and tax compliance (Hallsworth et al., 2017). Importantly, Allcott (2011) and Allcott and Rogers (2014) demonstrate the cost-effectiveness and simple implementation of norm-based interventions on a large scale.[3] Moreover, to understand the underlying mechanism of *how* social information influences behavior, several studies have turned to lab experiments. Building on theories of norm-compliance (Bénabou and Tirole, 2006; Kimbrough and Vostroknutov, 2016), the findings so far suggest that social information prompts the desire to conform by affecting the perception of a social norm (Bicchieri and Xiao, 2009; Ferraro and Price, 2013; Goeschl et al., 2018). Somewhat surprisingly, conformity with social norms is mostly studied in non-strategic one-shot settings (Gächter et al., 2017). However, to inform policies for common pool resource users, we need to learn about behavior in a strategic situation, and we need to learn about behavior of participants in the field.

The behavior and opinion of others motivates conformity with social norms. Elster (2007, p.357) highlights the role of feedback when distinguishing *social norms* from *moral norms*: "Moral norms [...] are capable of shaping behavior even when the agent believes herself to be unobserved by others. By contrast, the shame that sustains social norms is triggered by the perceived contempt of others." To capture a mechanism of social enforcement, we experimentally vary whether participants have the opportunity to give feedback on the behavior of others. Feedback is implemented by giving participants the option to vote on who should be excluded from receiving a financial bonus.

[1] Binmore (2010) emphasizes the explanatory power of social norms that have evolved in real life repeated interaction to explain behavior in one-shot lab experiments.

[2] The emergence of a cooperative equilibrium in the prisoner's dilemma depends on the speed of learning (Bereby-Meyer and Roth, 2006; Embrey et al., 2017), experience (Dal Bó and Fréchette, 2011; Breitmoser, 2015), and the continuation probability of the supergame (Blonski et al., 2011).

[3] The Opower Home Energy Report intervention studied by Allcott (2011) and Allcott and Rogers (2014) provide households with empirical information about energy consumption in their neighborhood. Motivation to conduct a large-scale norm-based intervention on energy conservation originates from a small set of field studies by Schultz et al. (2007), Goldstein et al. (2008), and Nolan et al. (2008).

Our strategy-based feedback mechanism mimics informal ways of sanctioning at Lake Victoria.[4] Crucially, the availability of the financial bonus does not change the Nash equilibrium in the game, so that our feedback treatment ties into the literature on weak sanctioning (Masclet et al., 2003; Tyran and Feld, 2006).[5]

In total we have four treatments: We refer to the treatment where a feedback mechanism is available and the social information message emphasizes high cooperation as the **hi-F** treatment, whereas the corresponding treatment without a feedback opportunity is referred to as the **hi-noF** treatment. In parallel, **low-F** and **low-noF** refer to the treatments with and without feedback, when the social information message emphasizes low cooperation.

Which outcomes would we expect from the combination of treatments? To the extent that the social information treatment is effective, we would expect to see higher cooperation rates in the **hi-** treatments than in the **low-** treatments. If participants use the feedback mechanism to encourage cooperation (or discourage defection), we would expect to see higher cooperation rates in the **-F** treatments than in the **-noF** treatments. However, if participants use the feedback mechanism to encourage conformity with a social norm, we would expect to see differences in cooperation rates only to the extent that different social norms are actually created. In this case, we would expect to see higher cooperation rates in the **hi-F** treatment and *lower* cooperation rates in the **low-F** treatment.

Our findings can be summarized as follows: First, we observe that the initial social information message has no effect on cooperation without feedback. Cooperation rates decline during the repeated game, independent of whether social information emphasizes cooperation or defection. With feedback the provision of social information leads to significant differences in behavior: When cooperation is emphasized, cooperation rates start high and stay high. In contrast, when defection is emphasized, cooperation rates start low and stay low.

Second, using the data on elicited beliefs, we argue that different social norms are created with feedback. We find the differences in behavior in the two **-F** treatments are accompanied by parallel differences in beliefs. In the **hi-F** treatment, cooperation

[4] A concrete example could be the exclusion from playing pool, a popular leisure activity at the shores of Lake Victoria. For an anthropological account of the social ties that form an important part of many fisher's lives see Beuving (2010).

[5] Specifically, Ostrom (2000, p.149) writes: "a frequent finding is that when the users of a common-pool resource organize themselves to devise and enforce some of their own basic rules, they tend to manage local resources more sustainable than when rules are externally imposed on them", and further on p.151, "sanctions that are imposed are often so low as to have no impact on an expected benefit-cost ratio of breaking local rules (given the substantial temptations frequently involved)."

rates are high and the majority expects others to cooperate. In the **low-F** treatment, cooperation rates are low and the majority expects others to defect. Hence, the two necessary conditions for the existence of a social norm are met: (*i*) behavior is stable, and (*ii*) beliefs and behavior collectively align. By creating resonance, the feedback mechanism incentivizes individuals to conform with initial empirical expectations that consolidate in repeated interaction to become different norms of cooperation. Without feedback, we find that social norms are not created. Irrespective of the initial social information message, cooperation rates decline and condition (*i*) is not met. Thus, our study highlights the importance of local feedback mechanisms when policy makers aim to leverage social norms to support cooperative behavior.

Motivated by the question of how norm-based interventions could use the existing social structure and whether it should be targeted at specific groups,[6] we explore the role of the reference network that is highlighted by scholars working on social norms (Elster, 2007; Bicchieri, 2006, 2017; Dimant, 2019). For this, we have used the natural heterogeneity of fishing communities at Lake Victoria. Building on sociological and anthropological studies that highlight target species and ethnic affiliation as determinants characterizing networks at landing sites (Beuving, 2010, 2013; Fiorella et al., 2017; Nunan et al., 2018), we measure whether a participant belongs to the majority in a given experimental session with respect to gear type (as a proxy for target species) and region of origin (as a proxy for ethnicity). We find that those participants in close proximity to the others in their session are more affected by the norm-based intervention, that is, they cooperate more in the **hi-F** treatment and less in the **low-F** treatment.

[6]For example, Loock et al. (2012) find that in their social comparison study on energy conservation, reference groups with close social proximity are more effective in inducing behavioral change. Similarly, Costa and Kahn (2013) test whether political orientation can predict the effectiveness of their intervention. Results indicate that political liberals are more receptive to pro-social norms.

## 2 Lake Victoria Fisheries


Figure 1: Map of Field Research Sites, Lake Victoria, Tanzania

Lake Victoria, see Figure 1, has always played a role for the local and regional economy, but has reached its current importance after the introduction of the Nile perch (*Lates niloticus*, see Lokina, 2009). The introduction of this exotic species to Lake Victoria can be considered as a textbook example of a socio-ecological regime shift. The stock of the fast-growing predator expanded in the 1980's, quickly replacing more than 500 different native species. Until present, the fish community has been and continues to be greatly impoverished and dominated by only three species: Nile perch, Nile tilapia (*Oreochromis niloticus*), and the native Dagaa (*Rastrineobola argentea*). The dramatic ecological effects have been portrayed as "Darwin's nightmare".[7] Yet, the introduction of the Nile perch had important economic benefits. In contrast to many native species, Nile perch and Dagaa have high nutritional and commercial value, which led to a rapidly growing fishing industry in the 1990s (Odada et al., 2004).

Due to the open access nature of the fishery, catch and effort have continued to expand, leading to intense fishing pressure on the Nile perch stock today (Downing et al., 2014). According to the Lake Victoria Fisheries Organisation (LVFO) the number of fishermen at Lake Victoria has grown by approximately 70% between the years 2000 and 2016 (LVFO, 2017a). The use of unregulated hooks has increased by 300% and

[7]Title of a controversial 2004 documentary by Hubert Sauper.

the number of illegal nets has increased by 71% over the same period. Additionally, exogenous factors such as climate change, pollution, and population growth exert further stress onto the system. Several indicators now point to an emerging instability of the current regime and the threat of a collapse (Mkumbo and Marshall, 2015).[8]

The lake's resources are shared among three nations (Kenya, Tanzania, and Uganda). Despite the existence of intergovernmental structures such as the LVFO, strategic incentives limit coordinated and effective measures to curb overfishing. Within each country, weakened state capacity hampers monitoring and enforcement of the fishing regulations that are in place. Violations of regulations are common (Eggert and Lokina, 2010). Fishermen at the lake have to rely on their own cooperative efforts to overcome the social dilemma that characterizes the use of the lake's resources.

Several studies highlight the important role that social proximity plays in artisanal fishing communities. Mosimane et al. (2012) report that the management of common pool resources benefits from strong social ties between resource users. Crona and Bodin (2006), Barnes et al. (2016), and Nunan et al. (2018) identify specific determinants of the social structure in fishing communities. In addition to differences in region of origin, reflecting ethnic differences, fishermen at Lake Victoria can be classified by their main target. Dagaa fishermen use small meshed seines and fish at night using solar and kerosene powered lights while Nile perch and tilapia fishermen use hooks or large meshed nets and fish at day. Moreover, dagaa is mainly sold to local and regional markets while Nile perch are collected by processing plants and exported to the world market.[9]

In order to prevent further depletion of the fish stock and to encourage community participation, the Tanzanian government established local co-management structures known as beach management units (BMU). BMUs were introduced in 1998 and have been helpful in reducing the use of poison and dynamite but their overall effectiveness is variable. (Eggert and Lokina, 2010; Nunan and Onyango, 2017). Nevertheless, BMUs offer a forum for exchange and feedback at the landing site level (Luomba, 2013). They are a potential springboard for policies that aim at changing social norms of cooperation in an environment where state institutions are weak.

[8] A key indicator is the size distribution in the Nile Perch population. Currently, only 3% of the Nile perch stock is larger than 50 cm; 97% percent of the fish no longer reach their reproductive stage. Furthermore, the stock of haplochromines, the main prey of the Nile perch, is increasing. The evolving picture is consistent with a Nile perch population dominated by small, immature fish that mostly feed on shrimp (*C. nilotica*), leaving room for haplochromines to expand (LVFO, 2017b, p.29). Fishery biologists see these as two of several leading indicators of a possible rapid end to Nile perch dominance and the risk of an imminent shift in the current socio-ecological regime at Lake Victoria.

[9] Interestingly, existing evidence suggests that differences in the typical contractual sharing agreements between boat owners and crews in dagaa and perch fishers translates into differences in sharing behavior in the ultimatum game (Jang and Lynham, 2015).

# 3 Experimental Design and Procedures

In the following we describe an experiment designated to test whether a norm-based intervention (provision of social information) can create different social norms of cooperation with or without a feedback mechanism. In particular, we use a factorial design where one factor is an information message on either high or low cooperation rates of previous participants in a similar setting, and the other factor is whether participants have the opportunity to give feedback or not.

We refer to the treatment where a feedback mechanism is available and the social information message emphasizes high cooperation as the **hi-F** treatment. The corresponding social information treatment without a feedback opportunity is referred to as the **hi-noF** treatment. In parallel, **low-F** and **low-noF** refer to the treatments with and without feedback, when the social information message emphasizes low cooperation.

### The Social Dilemma Game

The workhorse to model the social dilemma is a repeated three-player prisoner's dilemma game. It is a simultaneous move game such that participants cannot condition their action on the observed behavior of others. A perfect stranger matching protocol furthermore prevents directly reciprocating past behavior.

Participants are randomly divided into groups of three members. Each participant receives an endowment of four points that she can either allocate to a private account (hereafter "defect") or to a group account (hereafter "cooperate").[10] Only the full endowment can be transferred to either account. For every group account contribution, all three group members earn two points. Table 1 shows the individual payoff matrix.

Table 1: Individual Payoff Matrix

| | | Number of other cooperators | | |
|---|---|---|---|---|
| | | *0* | *1* | *2* |
| Own decision | *cooperate* | 2pt | 4pt | 6pt |
| | *defect* | 4pt | 6pt | 8pt |

### Social Information Message and Belief Elicitation

Prior to the allocation decision in the three-player prisoner's dilemma game (but after participants are fully informed about the rules), we elicit the participants' normative

[10] A screenshot of the respective choice situation is shown in Appendix Figure 3(b).

beliefs, normative expectations, and empirical expectations (Bicchieri, 2017). Before the belief elicitation, participants receive a verbal social information message, see Table 2.

Table 2: Social Information Treatments

| *Treatment* | *Message* |
|---|---|
| High | In a previous survey, it was found that many participants chose to put the points to the group account and not to put them to their private account. |
| Low | In a previous survey, it was found that many participants chose to put the points to their private account and not to put them to the group account. |

Our message is designed to affect empirical expectations in the direction of either cooperative (high) or defective (low) behavior. The phrasing utilizes the word "many"[11], making our social information manipulation very subtle.[12] Moreover, we deliberately do not want to persuade participants that one or the other action is better. That is, we address descriptive norms instead of injunctive norms.

In practice, descriptive and injunctive norms may not be fully separable. For example, participants could take the social information message as a signal of what the right action ought to be in the eyes of others and therefore re-evaluate their own moral belief. Therefore, we ask participants what they think one ought to do in this situation, *i.e.* their *personal normative beliefs*. Moreover, we ask participants what they think most others think one ought to do, *i.e.*, their *normative expectations*. Participants can choose from a menu of three options. They can either state that one ought (i) "put the points to the private account", (ii) "put the points to the group account", or (iii) "do what others do".[13] Next, we repeat the social information message and ask participants what they think others will actually do, *i.e.*, their *empirical expectation*. Here participants can reply that (i) most other participants will allocate the endowment to the private account, or (ii) most other participants will allocate it to the group account. Both *normative expectations* and *empirical expectations* are incentivized by offering an extra point for each correct prediction.[14]

[11] Note that in Swahili both "many" and "most" are expressed by the word "wengi".

[12] We have visited these communities about a year before, and we have data from a public good game in that previous survey where the majority of responses in different sessions aligned with either message.

[13] A screenshot of the corresponding choice situation is given in the Appendix, Figure A-3(a).

[14] A guess was correct when the option chosen was the modal answer to that question among all 21 participants in the session (normative expectation) or the predominant decision in the subsequent choice situation (empirical expectation). In case there were 7 answers on each choice for normative expectations, everyone would be rewarded an extra point.

### The Feedback Mechanism

To model social enforcement, we design a feedback mechanism that is closely related to the informal institutions available to fisherman communities. First, being based on the exclusion of group members from a financial bonus of one point, our feedback mechanism simulates the kind mild ostracism observed in the field (Beuving, 2010). Second, the feedback mechanism has the character of giving a general comment on the behavior of others. Participants vote on which strategy should be excluded from receiving the bonus point, and participants vote before they know the contribution decisions of their group members. Finally, the majority rule of the feedback mechanism implies that successful exclusion requires solving a coordination problem, which is a relevant feature of sanctioning in the field (Balafoutas and Nikiforakis, 2012; Guala, 2012).

Specifically, each participant in a group casts a vote that either (i) those who allocated their endowments to their private account shall be excluded from receiving the bonus, (ii) those who allocated their points to the group account shall be excluded, or (iii) that no one shall be excluded from receiving the bonus. The exclusion rule is determined by a simple majority, *i.e.*, the rule receiving two or three votes within a group is applied. If each alternative receives exactly one vote (no majority is reached), no member is excluded from receiving the extra point.

In the treatments with feedback, participants are informed about the feedback mechanism after beliefs are elicited, but before they make their first contribution decision. The voting procedure itself takes place after contribution decisions are made but before the actual choices of the group members are revealed.[15] After voting, participants are informed about the allocation decisions by the three group members, the exclusion rule that was selected, and who was excluded from receiving the bonus. In the treatments without feedback, the feedback mechanism was not mentioned at any point during the game. After their allocation decision, participants see a report on the allocation decisions of all group members and the total points earned by themselves.[16]

### Repetition

After participants finish the (one-shot) procedure explained above they are informed that the experiment will continue for 6 additional rounds. We employ a perfect-stranger matching, highlighting that "you will be matched with two other participants from this session that have never been in your group before and will never be in your group again".

[15] For a timeline of the game's procedure, see Appendix Figure A-5.

[16] A screenshot of the report is given in the Appendix, Figure A-4.

The perfect-stranger protocol is easy to communicate and neutralizes forward-looking motivations that participants may have for a specific action.

Moreover, before the allocation decision in each of the additional 6 rounds, we elicit the participants' empirical expectations. We do not repeat the social information message because once participants gain experience, further messages may become obsolete or add confusion. We do not further elicit injunctive norms as they are considered constant in the short time span of this experiment.

## Implementation

The experiment was conducted in 20 villages with a total of 28 sessions in the Lake Victoria region of Tanzania between February and March 2018, (see Figure 1).[17] The sample is balanced with seven sessions per treatment. Each session comprised 21 participants such that the total number of participants is $N = 588$.[18]

The experiment took place in a community center in the village or directly at the landing site. Seating cards ensured a random allocation of participants. To begin, the general rules of the session were explained and we obtained informed consent. Afterwards, tablets were distributed and participants familiarized themselves with the device by completing brief handling exercises.[19] Participants were guided through the social dilemma game step by step, utilizing posters for visualization and requisites for illustration of the game's mechanics. In particular, it was explained that decisions during the game would translate to real money dependent on own choices and choices of other group members. All decisions were made anonymously and no communication between participants was allowed during the session. Carton shields ensured private decisions. Participants were not able to identify their group members, neither during the experiment nor afterwards. Comprehension of the game's rules was tested with the help of four different scenarios that asked participants to name the correct payoffs after specific decisions were made by all group members. Results of these questions are used as a measure of understanding in the analysis.

Upon completion of the experiment, a volunteer was asked to roll a die in order to

[17] In eight villages two sessions were held on the same day. In 12 villages there was a single session.

[18] The current experiment is the second field trip to these communities as part of a longer project. During the first field trip to the same landing sites in 2017, participants were mainly invited based on a random draw from the lists of registered fishers at the respective landing site. Crew members, boat owners or fishing agents were all eligible to participate in the experiment. If a list of registered fishers was not available we over-invited a convenience sample and randomly retained 21 participants. In the current experiment, we achieved a re-sampling rate of just under 50%. See Table A-11 in the Appendix for an overview.

[19] The experiment was programmed using the oTree software (Chen et al., 2016).

determine which of the six repeated rounds would be paid out in addition to the one-shot round. Subsequently. we used the incentivized lottery-choice task by Gneezy and Potters (1997) to measure the participants' relative risk propensity.[20] Participants receive six points and select how much of it to invest in a risky option with a 50% chance to lose their money and a 50% chance to triple the amount. Participants then filled out a short questionnaire on demographics, compliance to fishing regulations, official management of the landing site, and socioeconomic background. After an average of 2 hours, sessions ended with a private payout.[21]

## Participant Characteristics

Table 3 provides an overview of the demographic characteristics of the participants.

Table 3: Participants' Characteristics

| Variable | mean | sd | min | max |
|---|---|---|---|---|
| Age | 37.95 | 12.03 | 18 | 93 |
| Female | 0.02 | - | 0 | 1 |
| 0 - 5,000 TZS daily earnings | 0.45 | - | 0 | 1 |
| Fraction HH Income Fish | 2.68 | 1.14 | 1 | 4 |
| Never moved | 0.61 | - | 0 | 1 |
| Crewsize | 3.79 | 0.84 | 1 | 6 |
| Main gear: dagaa net | 0.39 | - | 0 | 1 |
| Relative risk propensity | 2.9 | 2.51 | 0 | 6 |

Among all 588 participants, there are only 12 women, illustrating that the fishing sector at Lake Victoria is heavily dominated by men. The fishermen in our experiment are, on average, about 38 years old and 72% see themselves still being a fisherman in two years time. Daily earnings are low with about 45% of all participants reporting an income below 5,000 TZS (ca. US$ 2.20) per day. Over 60% of participants state that they have always lived at the respective landing site. The average crew size in our sample is 3.79 with a median value of 4 while just under 60% of all participants work as crew members and 23% report to be a boat owner. 39% of the participants target Dagaa, while 22% use gillnets and 35% use hooks to target Nile Perch or Tilapia. The majority of fishermen report that they have never switched their target species. The last row of Table 3 shows that participants invested, on average, 2.9 out of six tokens in

[20] As risk aversion is likely correlated with the decision to cooperate (Bohnet and Zeckhauser, 2004; Schechter, 2007), we control for it in the regression analysis.

[21] The average payout was just above 5,000 TZS (about US$ 2.20) which is the median daily income in our sample. The minimum payout was set to 2,500 TZS.

the risky option.

### Social Proximity Measure

Scholars that study the role of social norms emphasize the importance of a reference network for compliance (Elster, 2007; Bicchieri, 2017). We draw on the sociological and anthropological literature on the social structure in fishing communities (Crona and Bodin, 2006; Barnes et al., 2016; Nunan et al., 2018) to construct a measure of a participant's social proximity to other participants in a given experimental session. We combine information from the post-experimental questionnaire on the main type of gear (as proxy for their target species) and the participant's region of origin (as proxy for ethnicity).[22]

Specifically, both the main type of gear and region of origin variables were elicited as categorical variables. For each question, an indicator variable is assigned when the participant's response was the modal choice within the session. In forming the social proximity measure, main type of gear and region of origin indicators are weighted equally. The measure can therefore take three distinct values: *affiliation = 1* if the participant's response is the modal choice in both questions, *affiliation = 0.5* if the participant's response is the modal choice in one of the two questions, and *affiliation = 0* if the participant's response is the modal choice in neither question. The measure serves as a proxy for the social proximity during the experiment that is based on real-life observations.[23]

[22]Directly eliciting participant's ethnic origin may be considered impolite in our context, and the region of origin represents a similar categorization.

[23]This answers to the sentiment issued by Manski (1993) who criticizes the measurement of a reference network based on behavioral responses in the lab.

# 4 Theoretical Predictions

To derive theoretical predictions, we first discuss standard preferences and then proceed to norm-based preferences. The individual payoff matrix (Table 1) illustrates that defection is the dominant strategy. Under standard preferences, the dominant strategy is neither changed by the social information message nor by the feedback mechanism. First, defection maximizes own payoff irrespective of the (induced) beliefs about others' behavior. Second, our feedback mechanism is a form of "weak" sanctioning (see e.g., Tyran and Feld, 2006; Bicchieri et al., 2018a). The gain from defection is 2 points, while the bonus in the treatments with feedback is only 1 point so that the dominant strategy is still to defect (even when an agent expects to be sanctioned with probability 1). Hence, standard neo-classical theory predicts that all agents will put their points to the private account.

Predictions from standard neo-classical theory can be viewed as a straw man for lab-in-the-field experiments. An alternative is to draw predictions from norm-based theories. Theories that describe how social norms affect utility often postulate that – in addition to monetary payoffs – agents experience disutility or discomfort when choosing an action that does not conform to what they expect others to do (Kimbrough and Vostroknutov, 2016; Michaeli and Spiro, 2017). Thus, in a norm-based model, utility depends on two components. The first is an idiosyncratic component that contains the material payoff from the game, as well as any moral calculations that trade-off a given action with the personal normative belief about what is the right thing to do. The second component is a discomfort function that increases in the distance between the agent's own action and her empirical expectation.

Under norm-based preferences, we expect that both the social information message and the feedback mechanism affect behavior. A prerequisite is that the social information message shifts initial empirical expectations. When agents expect others to cooperate, they are more likely to cooperate to avoid the discomfort of non-conformity.

**Hypothesis 1a** Initial empirical expectations about cooperation rates are higher in the **hi-** treatments than in the **low-** treatments.

**Hypothesis 1b** Average cooperation rates are higher in the **hi-** treatments than in the **low-** treatments.

The feedback mechanism increases the discomfort from not conforming to the anticipated actions and opinions of others. Thus, when the initial information message

emphasizes cooperation, and if it affects empirical expectations accordingly, we expect that agents cooperate more in the **hi-F** treatments than in the **hi-noF** treatments. Conversely, when the social information message emphasizes defection, and if it affects the empirical expectations accordingly, we expect to see less cooperation in the **low-F** treatments than in the **low-noF** treatments. In other words, the effect of the feedback mechanism is not monotone, but depends on the respective message.

**Hypothesis 2** The average cooperation rate is higher in the **hi-F** treatment than in the **hi-noF** treatment and lower in the **low-F** treatment than in the **low-noF** treatment.

A social norm is characterized by (*i*) a stable pattern of behavior, and (*ii*) a corresponding pattern of beliefs. We therefore consider the evolution of cooperation and empirical expectations in the repeated game. The typical pattern in social dilemma experiments is a decline of cooperation rates (Ledyard, 1995; Fosgaard, 2018).

When the feedback is not present, the discomfort from not acting according to one's empirical expectations is small. Consequently, we do not necessarily expect that empirical expectations and cooperation behavior align over the course of repeated interactions. Thus, it is unclear whether the social information message is sufficiently strong to stabilize cooperation rates and condition (*i*) for the creation of social norms is met.

However, when the feedback mechanism is present, we do expect that cooperation rates are stable. The feedback mechanism amplifies the perceived contempt of others for not conforming with their actions. The initial cooperation rate aligns with agents' empirical expectations that are influenced by the social information message. Consequently, agents see their empirical expectations confirmed and act accordingly in the next round of the game: a self-fulfilling prophecy of either high or low cooperation.

In sum, we predict that conditions (*i*) and (*ii*) are fulfilled in the two treatments with feedback. The variation in the social information treatment induces social norms at two different levels. For the treatments without feedback, we do not make a prediction whether social norms are created.

**Hypothesis 3** Behavior and beliefs are stable and align in the **-F** treatments: different social norms are created.

We present our experimental results in the next section. To test hypotheses 1-3, we conduct non-parametric tests and use regression analysis. Our estimation strategy is described in detail in the Appendix A-1.

# 5 Experimental Results

We can summarize our main finding as follows: The provision of different social information succeeds in creating different norms of cooperation, but only if a feedback mechanism is available. We explain this finding in three steps.

First, we turn to behavior (section 5.1) and show that cooperation stays at a given level (high or low) in the treatments with feedback but no stable pattern of cooperation emerges in the no-feedback treatments. Second, we turn to beliefs (section 5.2) and show that the differences in behavior are not driven by differences in initial normative beliefs. The social information message has, however, marginally affected empirical expectations. The difference in empirical expectations is perpetuated in the **hi-F** and the **low-F** treatments and mirrors the difference in observed cooperation rates. Third, we explore the use of the feedback mechanism in section 5.3. Participants vote to exclude defectors more often in the **hi-F** than in the **low-F** treatment. Exclusion is rare overall, and having been excluded only has a marginal impact on voting and cooperation behavior in subsequent rounds. It is not exclusion itself, but rather the opportunity to comment on the behavior of others that gives resonance to the norm-based intervention. The feedback mechanism allows the social information message to take effect and create different social norms of cooperation.

## 5.1 The Evolution of Cooperation

Figure 2 shows cooperation rates over time in the different treatments. Without feedback, the social information message has no effect. Irrespective of which behavior is emphasized (**hi-noF** or **low-noF**), cooperation rates decline over the course of the repeated game. With a feedback mechanism stable cooperation rates are maintained. Cooperation rates start high and stay high when the initial message emphasizes cooperation (**hi-F**), and they start low and stay low when the initial message emphasizes defection (**low-F**).

To formally establish the significance of this result, we conduct Wilcoxon-Mann-Whitney tests, pairwise comparing between treatments (see Table A-2 in the Appendix). Treating each three-player group in each round as an independent observation, we find a significant difference in cooperation between the **hi-F** and **low-F** treatments (in round 1, 2, 4, and 5 at $p < 0.01$ and in round 3 at $p = 0.09$; two-sided tests). We also find differences between the **hi-F** and **hi-noF** treatments in rounds 4-6 (at $p < 0.01$). We furthermore observe marginally significant differences between the **low-F** and **low-noF** treatments in early rounds and no differences between the **hi-noF** and **low-noF**

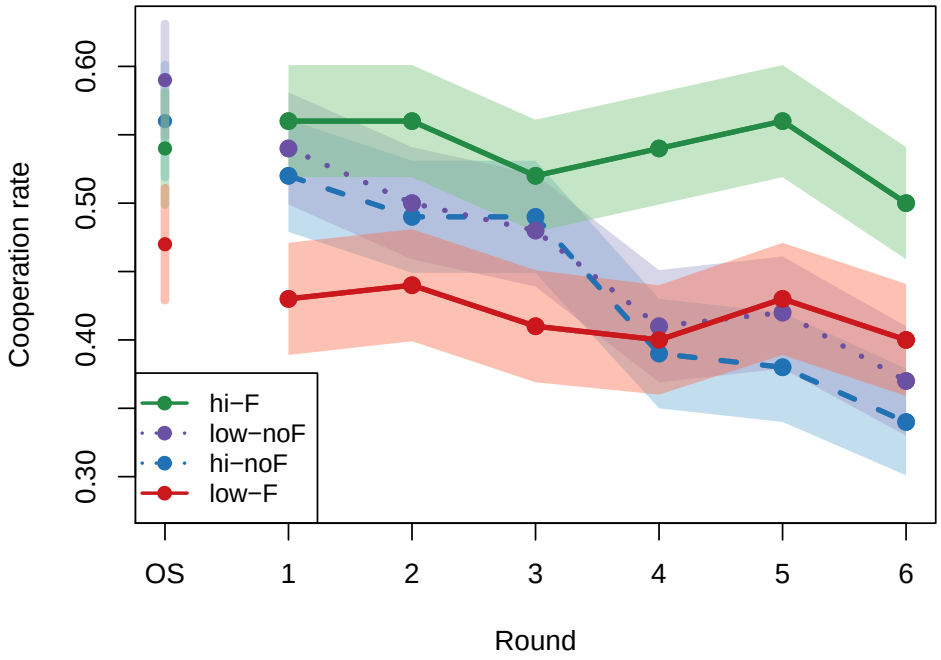


Figure 2: Cooperation rates (averaged on the treatment level) over the game. The one-shot game is indicated by OS and repeated rounds by their number. The shaded area indicates ±1 SE.

treatments in any round.[24]

Furthermore, we estimate a parametric panel data model, regressing cooperation (the decision to allocate the endowment to the group account) on the treatments and a time trend. The regression results are shown in column (1) of Table 4. In line with the non-parametric tests, we find significantly less cooperation in the **low-F** treatment than in the baseline **hi-F** treatment ($p < 0.01$). Moreover, both treatments without feedback exhibit a significant round effect; Cooperation erodes with each repetition of the social dilemma game ($p < 0.01$). The unraveling of cooperation is not observed in the feedback treatment; cooperation rates show no trend over rounds (Table 4). The cooperation rate is significantly lower when the social information message emphasizes defection rather than cooperation.

Results are robust to the exclusion of the last round, or the one-shot procedure (see section A-2.3 in the appendix). Moreover, the discussion in section A-2.3 highlights the

[24]We also conducted the pairwise test on the session level, leaving only seven independent observation per treatments. We still find a marginally significant difference between the **hi-F** and **low-F** treatments ($p = 0.096$).

Table 4: Behavior and Beliefs: Individual Level

| | Cooperation (1) | Empirical Expectation (2) |
|---|---|---|
| low-noF | 0.127 | -0.554*** |
| | (0.211) | (0.200) |
| low-F | -0.772*** | -0.982*** |
| | (0.188) | (0.171) |
| hi-noF | -0.095 | -0.264 |
| | (0.214) | (0.179) |
| Round | -0.025 | -0.025 |
| | (0.032) | (0.032) |
| low-noF × Round | -0.173*** | -0.022 |
| | (0.053) | (0.044) |
| low-F × Round | -0.018 | 0.021 |
| | (0.041) | (0.036) |
| hi-noF × Round | -0.181*** | -0.072** |
| | (0.049) | (0.036) |
| Session Fixed Effects | Yes | Yes |
| Individual Controls | Yes | Yes |
| N | 4116 | 4116 |

*Notes*: The table reports random effect estimators for an individual level probit model. The baseline is set to the **hi-F** treatment. The model includes one-shot game and all repeated rounds. Robust standard errors are clustered at the session level (in parentheses). Individual controls include age, age squared, an indicator variable for comprehension, and a risk preference measure. ***, **, and * indicate significance at the 1,5, and 10% level.

robustness to choosing a linear probability model instead of the probit model used in producing the estimates shown in Table 4.

In sum, we find partial support for hypothesis 1b: While the average cooperation rate is higher in the **hi-F** treatment than in the **low-F** treatment, there is no difference between the cooperation rates in the **hi-noF** and the **low-noF** treatment. Similarly, we find partial support for hypothesis 2: While starting from the same level, the average cooperation rate in the last rounds is higher in the **hi-F** treatment than in the **hi-noF** treatment. Conversely, the average cooperation rate in the **low-F** treatment is lower than in the **low-noF** treatment in the early rounds, but it ends at about the same level in the two treatments.

## 5.2 Beliefs and Expectations

Behavior must be supported by shared expectations about what should or should not be done to qualify as a norm. We therefore analyze participants' personal normative beliefs,

normative expectations, and initial empirical expectations. Thereafter, we turn to the evolution of empirical expectations that we elicited over the course of the experiment.

Recall that the belief elicitation is conducted after the provision of social information that is intended to shift empirical expectations, but before the one-shot game is played. Moreover, at the belief elicitation stage participants are not yet informed about the feedback mechanism in the **low-F** and **hi-F** treatments. Hence, for the initial beliefs we only distinguish between two conditions: whether the social information message emphasizes contributions to the group account (high) or the private account (low). The results of the belief elicitation are presented in Figure 3.

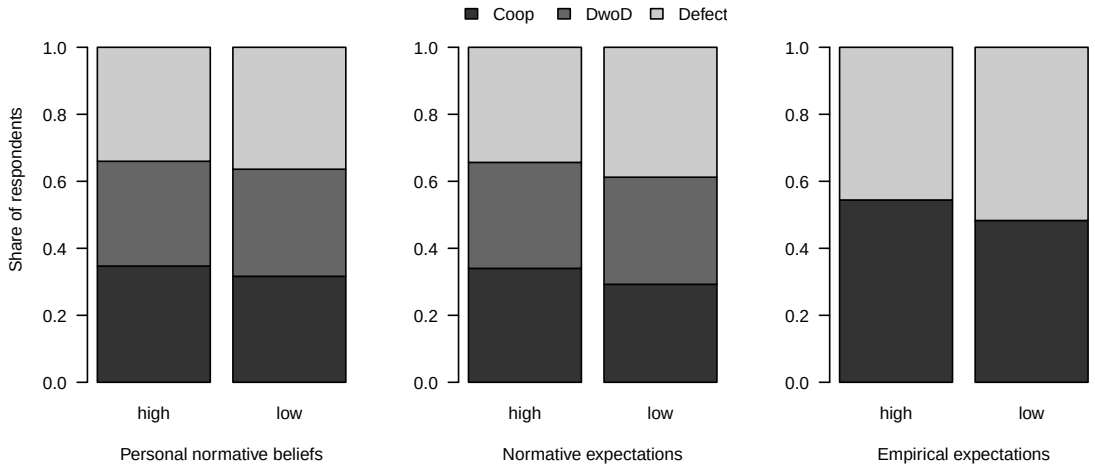


Figure 3: Elicited Beliefs by Information Treatment. Left panel shows personal normative beliefs after the high and low social information message. The dark gray area shows the share of fishermen that think the right thing to do is to "put the points in the group account" (Coop). The medium gray area shows the share of fishermen that think the right thing to do is to "do what others do" (DwoD). The light gray area shows the share of fishermen that think the right thing to do is to "put the points in the private account" (Defect). Middle panel shows normative expectations, and right panel shows empirical expectations (where "do what others do" was not an option).

The left panel in Figure 3 shows the distribution personal normative beliefs. It suggests that participants perceive no clear moral difference between contributing to the private or the group account. Each of the three options, to "put the points to the private account", to "do what others do", and to "put the points to the group account" is chosen by about one third of the participants for both social information messages.

The fact that no action is perceived to be morally better than the other supports a relativistic view on how we expect the provision of social information would affect the

creation of social norms. In contrast, if there was a clear opinion on what one ought to do, we would not expect that an intervention that leverages descriptive norms could shift behavior in opposing directions.

The middle panel in Figure 3 shows the distribution of normative expectations. Similar to personal normative beliefs, each option about what participants think most others think one ought to do is chosen by about one third of the participants. This suggests that our norm-based intervention did not affect injunctive norms, at least not strongly.

The right panel in Figure 3 shows the distribution of initial empirical expectations. The intention of the social information message is to shift empirical expectations in the direction of either cooperation or defection. We observe a marginally significant difference in empirical expectations between the high- and low social information treatments ($p$=0.08, one-sided test of proportions, $N_{low}$=$N_{high}$=294). In particular, 54% of our participants expect others to cooperate in the high information treatment, while this proportion is 48% with low social information. Note that although the effect appears to be a small, it changes the expectation of the majority. Since the feedback mechanism is based on majority voting, the majority expectation may be crucial.[25]

With respect to hypothesis 1a, we find weak evidence that initial empirical expectations about cooperation are lower in the **low-** treatments than in the **hi-** treatments. Considering the clear differences in cooperation behavior, the small difference of initial beliefs is remarkable. It suggests that if different social norms emerge over the course of the experiment, these norms were created by the norm-based intervention and not imported into the lab. We turn to the evidence on the emergence of different social norms next.

A social norm exists if there is $(i)$ a stable pattern of behavior, and $(ii)$ a corresponding pattern of beliefs. Cooperation declines over time in both **-noF** treatments, violating condition $(i)$. No social norm is created. In the two **-F** treatments, we do observe a stable pattern of behavior. The question is whether we also observe a corresponding pattern of beliefs.

Figure 4 plots average cooperation and empirical expectations over the course of the experiment for all four treatments. First, we find a marked difference in the levels of empirical expectations between the **hi-F** and **low-F** treatment. In particular, the majority of participants in the **hi-F** treatment expect others to cooperate, while the majority in the **low-F** treatment expect others to defect. Second, we find that, similar

[25] It is interesting to note that the difference in empirical expectation is larger when we consider the respective feedback subsamples: 54% in **hi-F** treatment expect others to cooperate, while this proportion is 44% in **low-F** treatment.

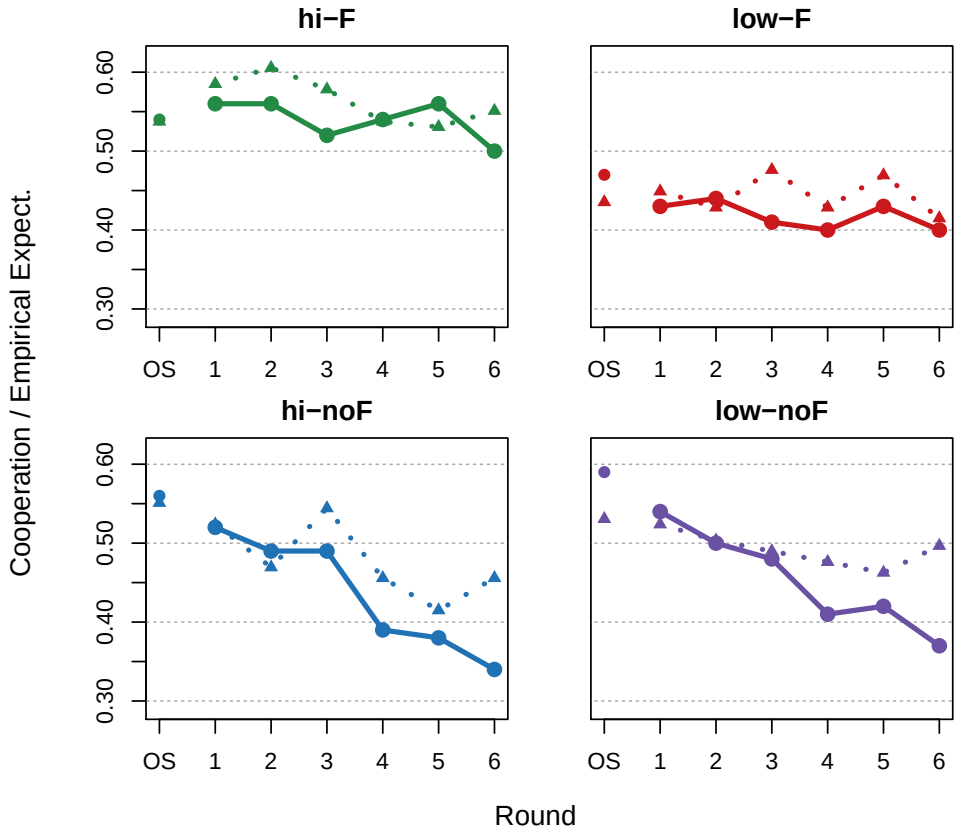


Figure 4: Evolution of empirical expectations. Dotted lines show average empirical expectations, solid lines average cooperation rates. The one-shot game is indicated by OS, repeated rounds by their number.

to the average cooperation rate, the average empirical expectation is stable in the two **-F** treatments. In the two **-noF** treatments, the average cooperation rate declines, and a gap to average empirical expectation opens up. Accordingly, we observe that participants' empirical expectations in the rounds 4-6 of the **-noF** treatments are significantly less accurate than the empirical expectations of participants in the **-F** treatments ($p<0.01$).[26]

We use the panel data probit model to formally establish that empirical expectations show the same pattern as cooperation behavior. We regress empirical expectations (column (2) of Table 4) on the same set of co-variates as cooperation (column (1) of Table 4) . The difference in cooperation behavior between the **low-F** and **hi-F** treatment is accompanied by parallel differences in empirical expectations. Participants have signifi-

[26]While 55% and 56% of the participants' empirical expectations are accurate in round 1-3 and round 4-6 of the **-F** treatments, accuracy drops from 54% in round 1-3 to 44% in round 4-6 in the **-noF** treatments.

cantly lower empirical expectations in the **low-F** treatment ($p<0.01$). Moreover, neither feedback treatment exhibits a round effect for behavior or beliefs.

In sum, we confirm hypothesis 3: Behavior and beliefs are stable in the treatments with feedback. This is not the case in the treatments without feedback. In other words, a norm-based intervention that relies on the provision of social information alone is not sufficient: a feedback mechanism is necessary for the creation of different social norms.

### 5.3 The Role of the Feedback Mechanism

To understand the role that the feedback mechanism plays in creating social norms, we first investigate its use. Then we explain votes to exclude defectors, and how exclusion affects subsequent cooperation.

The feedback mechanism is sparsely used. In the **low-F** treatment, more than 50% of the participants vote to exclude no one in each of the repeated rounds. In the **hi-F** treatment, about 40% of the participants vote to exclude no one. Accordingly, the likelihood to be excluded from the bonus with a majority vote is rather low.[27] It is reasonable that punishment is rare in equilibrium (Gächter, 2012): after all, when everybody follows the norm, there is no need for exclusion.

Next, we focus on the votes to exclude defectors. We expect that defection is more frequently sanctioned in the **hi-F** treatment if the established norm of cooperation is higher than the norm in the **low-F** treatment. To this end, we estimate the panel data model shown in column (1) of Table 5. We find that, keeping everything else constant, there is less voting to exclude defectors in the **low-F** than **hi-F** treatment, despite the fact that there is more defection in the **low-F** treatment. This corroborates that indeed different social norms have formed in the two treatments.

The regression model also includes whether a participant was excluded for defection or cooperation in the previous round, a round trend, and whether a participant has cooperated in the current round. Being excluded from the bonus after defecting leads to a higher probability to vote for excluding defectors in the next round. We also see a weak effect for being excluded after cooperating. In both **low-F** and **hi-F** treatments there is no round trend in voting behavior.[28] Finally, the positive coefficient for the variable indicating whether a participant has cooperated in the current round, shows an additional intuitive, but subtle function of the feedback mechanism: It is a self-signaling

[27] The probability ranges from 10% to 25% for being excluded after defecting in a given round in both the **hi-F** treatment and **low-F** treatment and between 10% and 30% for being excluded after cooperating in a given round in the **hi-F** treatment and respectively between 3% and 25% in the **low-F** treatment.

[28] The absence of a round trend is expected since cooperation is stable in those two treatments.

Table 5: Estimates of the non-linear model explaining the use and effect of the feedback mechanism

| | Vote to Exclude Defectors (1) | Cooperation (2) |
|---|---|---|
| low-F | -0.753*** | -1.289*** |
| | (0.288) | (0.378) |
| excluded (def in $t-1$) | 0.595*** | 0.112 |
| | (0.070) | (0.164) |
| excluded (def in $t-1$) x low-F | -0.204 | -0.284 |
| | (0.285) | (0.364) |
| excluded (coop in $t-1$) | 0.352* | -0.317** |
| | (0.207) | (0.126) |
| excluded (coop in $t-1$) x low-F | 0.154 | 0.289 |
| | (0.260) | (0.217) |
| Round | 0.018 | -0.051 |
| | (0.040) | (0.049) |
| Round x low-F | -0.003 | 0.025 |
| | (0.064) | (0.072) |
| coop in $t$ | 0.405*** | |
| | (0.141) | |
| Session Fixed Effects | Yes | Yes |
| Individual Controls | Yes | Yes |
| N | 1764 | 1764 |

*Notes*: The table reports random effect estimators for an individual-level probit model. The baseline is set to the hi-F treatment. The model includes one-shot game and all repeated rounds. Individual controls include age, age squared, an indicator variable for comprehension, and a risk preference measure. Robust standard errors are clustered at the session level (in parentheses). ***, **, and * indicate significance at the 1,5, and 10% level.

device, reinforcing that the action one has just chosen was indeed the right thing to do.

Further, we are interested in the influence of exclusion on the cooperation decision in the next round. Recall that participants cannot vote to exclude specific group members, but they can give feedback on specific strategies. The estimates presented in column (2) of Table 5 show that being excluded for defection has no significant effect on the decision whether to cooperate or defect in the following round. Thus, exclusion itself does not drive conformity. In addition, the estimation shows a small negative effect on cooperation when participants are excluded for cooperation in the **hi-F** treatment.

Our findings on (a) the limited use of the feedback mechanism, (b) the votes to exclude defectors, and (c) the cooperation after being excluded indicate that it is the option to comment on which behavior should be excluded, rather than the exclusion

itself that stabilizes cooperation.[29]

# 6 "Norms in the Wild"

We find that the norm-based intervention works only if the feedback mechanism is available. The policy implication for using social norms as a tool to improve governance under weak institutions is clear: Local fora for feedback and discussion need to be established and supported to accompany norm-based interventions. The existing beach-management units could be such a forum at Lake Victoria. Policy makers should strengthen these institutions when using a norm-based intervention to create "norms in the wild" (the booktitle of Bicchieri, 2017).

An additional question that is relevant to policy makers is whether a norm-based intervention could use the existing social structure in communities to amplify its effect. A norm-based intervention works because individuals conform to what they expect others to do. Research in economics, sociology, and psychology has highlighted the role of the reference network and social proximity in this respect (Elster, 2007; Bicchieri, 2017; Bicchieri et al., 2019; Dimant, 2019).[30] That is, the beliefs and behavior of others matter more for individual actions when "others" refers to a group that is relevant to the respective actor. In other words, individuals who identify themselves as members of a group tend to act differently than those who are isolated Charness et al. (2007).

To explore the question of how the social structure affects norm conformity, we work with the natural heterogeneity of fishing communities at Lake Victoria. Specifically, we add a measure for social proximity to our baseline regressions on individual cooperation and empirical expectations. We ask whether participants belong the majority within a given session with respect to gear type (target species) and region of origin (ethnicity), two defining features of the social structure in fishing communities at Lake

[29] This is well in line with the literature (see e.g., Gächter et al., 2008), and could also explain the limited field evidence on severe peer punishment (Guala, 2012).

[30] The concept of social proximity strongly relates to social identity and group affiliation. The discussion of social identity and group affiliation in economics goes back to influential work by Tajfel and Turner (1979), and Akerlof and Kranton (2000). The idea of collective identity also relates to the concept of ingroup favoritism and outgroup hostility (Goette et al., 2006; Meier et al., 2016). Further findings imply that conformity to shared norms of behavior is greater with high levels of social affiliation (Platteau, 2006). Not only do close-knit communities share an understanding through their common identity, but strong social affiliation may be a consequence of existing group norms that govern beliefs and attitudes of community members (Mason, 2006).

Victoria.[31] In simple words, we ask whether a Dagaa fisherman from Ukerewe Island is more strongly affected by the social information message when in a session full of other Dagaa fishersmen from Ukerewe or when in a session full of Perch fishermen from Rorya.

Figure 5 shows the predictive margins for our proximity measure on individual cooperation (left panel) and empirical expectations (right panel) in the repeated game. The full regression results are shown in Table A-7 in the Appendix.

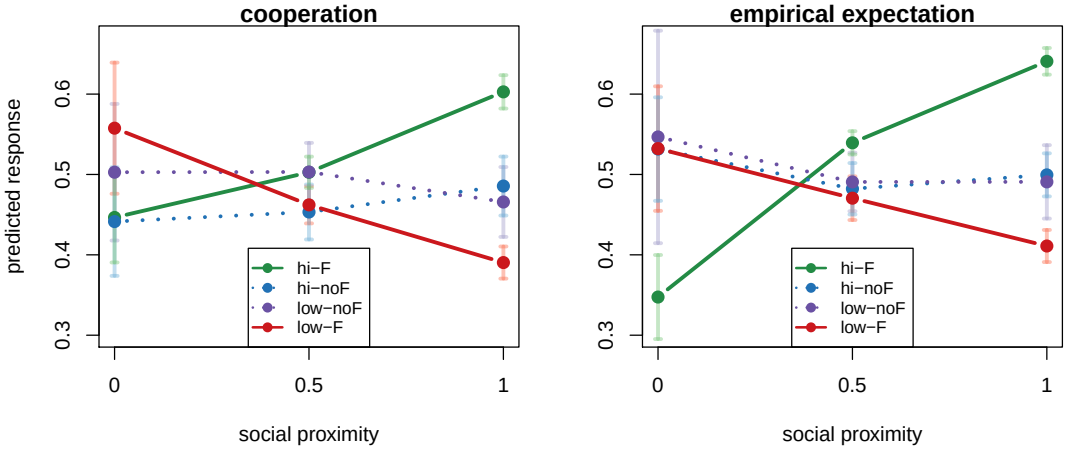


Figure 5: Predictive margins for the effect of affiliation strength on cooperation (left panel) and empirical expectation (right panel) for the four different treatments. Whiskers indicate ±1 SE.

We find that an increase in the proximity of a participant to their peers in the session leads to more cooperation in the **hi-F** treatment, but less cooperation in the **low-F** treatment. In other words, fishermen with a strong reference network in the session conform to the behavior that is emphasized by the social information message. Fishermen with weak social ties to the others in their session, however, appear unaffected by the social information message and do not conform to it. In the **-F** treatments, social proximity has a clear effect on how the norm-based intervention works. In contrast, social proximity has no effect in the **-noF** treatments. This is not surprising, since different social norms of cooperation are not created in **-noF** treatments.

For empirical expectations, we document even stronger effects: Fishermen with close social proximity to other participants expect their peers to cooperate more in the **hi-F** treatment and less in the **low-F** treatment. In fact, fishermen that are isolated with respect to both dimensions of target species and ethnicity expect the others in

[31] See section 3 for details on the construction of our social proximity measure.

the session to defect when the social information message emphasizes cooperation. As expected, social proximity has no effect when no social norm is created in the two **-noF** treatments.[32]

In sum, our analysis suggests that the creation of social norms is driven by participants with close social proximity to their peers. They are more likely to adhere to the social norm prescribed by the social information message and consolidated through observing the choices of others. Conversely, without close proximity to one's peers, normative prescriptions are not followed. Hence, policy makers should pay close attention to the social structure in communities when designing norm-based interventions. Targeting representative members as social multipliers and building community cohesion suggest themselves as important auxiliary measures to improve governance under weak institutions.

# 7 Discussion

In this paper, we study the effect of a norm-based intervention on cooperative behavior with and without a feedback mechanism. We present evidence from a lab-in-the-field experiment that the provision of initial social information leads to different cooperation behavior and empirical expectations in a repeated social dilemma only if a feedback mechanism is present. Without feedback, cooperation rates decline (the two **-noF** treatments). With feedback, cooperation rates start high and stay high when the initial social information emphasizes cooperation (**hi-F** treatment).

The high cooperation rate in the **hi-F** treatment tie in with the evidence on the effect of punishment and communication to increase cooperation (Fehr and Schmidt, 1999; Fehr and Gächter, 2000).[33] A large literature suggests that individuals hold social-preferences, predicting positive cooperation levels (Cooper and Kagel, 2016). With respect to the social information message, social-preference theories predict that emphasizing past cooperation has a positive effect on cooperation, whereas emphasizing past defection has a

[32] See the Appendix A-3 for a robustness analysis of results on social proximity, including a description of the distribution of the indicator variables in the index, as well as different specifications of the index itself.

[33] In particular, there is evidence on the positive effect of exogenous (Rustagi et al., 2010; Baldassarri and Grossman, 2011; Putterman et al., 2011) as well as endogenous punishment (Gürerk et al., 2006; Kosfeld et al., 2009). Select studies compare both mechanisms and find that democratically chosen punishment institutions are more effective in promoting cooperation than exogenously imposed ones (Sutter et al., 2010; Dal Bó et al., 2010; Kamei, 2016). See Engl et al. (2018) for review.

negative effect on cooperation.[34] With respect to the feedback mechanism, social preference theories predict that (some) cooperative individuals use it to punish defectors.[35] The feedback mechanism would hence encourage others to cooperate, also when the social information message emphasizes defection.

What is surprising, considering social-preference theories, is that we document *lower* cooperation rates in the treatment with feedback (**low-F**) than in the treatment without feedback (**low-noF**). With feedback, cooperation rates start low and stay low when the initial social information emphasizes defection. This finding is well explained by norm-based theories where individuals prefer to conform with what they expect others to do. Participants use the feedback mechanism to give a comment on which behavior is inappropriate and signal to themselves that their own action is desirable. Hence, the feedback mechanism functions as a sounding board for the initial provision of social information. The norm-based interventions can create *different* social norms of cooperation.

One could object that the initial messages merely provide different focal points for the solution of a coordination problem, rather than creating different social norms. Instead, there is a meta-norm of conformity, which is not affected by the intervention. Yet, we find no evidence for such an interpretation.

First, the share of the participants stating a strong preference for conformity (the personal normative belief that one ought to do what others do) is only about 30%. However, at least 50% of participants would need to have a strong preference for conformity to justify speaking of an influential meta-norm of conformity.[36] Second, personal normative beliefs and normative expectations are predictive for cooperation behavior in all treatments (see in section A-2.3 in the Appendix). If participants with a stated preference for cooperation (defection) indeed cooperate (defect) across all treatments, our results cannot be driven by a meta-norm of conformity.

Our participants are resource users that experience the social dilemma of overfishing in their daily lives. With existing co-management structures, weak state institutions, and increasing pressure on the resource, fisheries at Lake Victoria are a focal point for norm-based interventions. Our study takes a first step towards bridging the lab and the field and provides policy recommendations from the experimental test-bed. Improving governance through social norms may work, but only if interventions are accompanied by supporting fora for feedback and discussion. In addition to strengthening co-management institutions such as the BMUs, policies should account for the social structure in the com-

[34] This happens through the notion of 'reciprocity' (Bolton and Ockenfels, 2000) or 'conditional cooperation' (Fischbacher et al., 2001).

[35] See the evidence from sanctioning experiments (Fehr and Gächter, 2000; Masclet et al., 2003).

[36] Similarly, only 30% of the participants expect most others to have a strong preference for conformity.

munities. Exploring the role of a fisherman's social proximity in its naturally occurring setting, we find that the norm-based intervention works much stronger for those participants that are closer to the others in their session. Both own cooperation behavior and beliefs about the actions of others are more affected by the social information message when the other participants in a session belong to one's relevant reference network.

Our study on the creation of social norms opens several important questions for further research. First, it is uncertain on which level fishermen consider the resource use to be contested. Our experiment models the social dilemma on the group level within villages. Yet, competition for fish at Lake Victoria may be equally relevant at the regional or national level. How does cooperation evolve under weak institutions when resource use is contested by third parties? What is the effect on social proximity within the fishing community if an outside threat is posed to all its members?

Second, our initial social information message is subtle and with deliberation only speaks to participants' empirical expectations. This provides a lower bound for the effect of policies that attempt to affect social norms when seeking behavioral change. How much more effective is a normative message, attempting to persuade participants? Can a normative message even backfire when it is at odds with the monetary incentives or the personal normative beliefs that participants hold?

Third, results indicate that both deviations from normative beliefs and from empirical expectations are sanctioned. Future work may focus on exploring these motivations. To what extent is conditional cooperation driven by a norm of reciprocity or by a wish for conformity? How would one or the other motivation respond when the underlying game is a pure coordination problem, or when the gains from defection increase?

Finally, future work should study whether the insights gained translate to social dilemmas outside the controlled environment of a lab experiment. Providing robust field evidence for the effectiveness of "social norms as solutions" is imperative, particularly in settings where formal regulation of natural resource use is challenging (Nyborg et al., 2016). Overcoming the tragedy of the commons is not a luxury, especially within developing countries.

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# Appendix

## A-1 Estimation Strategy

Throughout the experiment's analysis, cooperation in the social dilemma is proxied with a binary contribution decision in a three-player prisoner's dilemma. Participants have the option to allocate their full endowment to either their private account or to a group account. Partial contributions to either account are not possible. To match the choice set in the contribution stage, empirical expectations are elicited as binary beliefs. Cooperation in the social dilemma and the antecedent expectation about others' play are the dependent variables in the analysis. They are each elicited a total of seven times over the course of the experiment.

We account for the binary nature of both outcome variables by employing nonlinear panel data models. Individual observations are correlated over time. That is, cooperation $y_{i,t}$ of individual $i$ in round $t$ is assumed to be correlated with the cooperation decision of the same individual in the preceding rounds.[37] Standard errors are clustered on the session level to account for idiosyncratic conditions in the experimental setup at each landing site. We use random effects probit models for all regressions on cooperation and empirical expectation to account for the unobserved heterogeneity in normative characteristics. That is, the emergence of normative behavior is assumed to vary across our sample. Participants differ in their preference for conformity and are not assumed to be comparable with respect to their sensitivity to social enforcement or the social information message as such.

Treatment interaction terms are included in all specifications. Let $y_{i,t}$ be the response of individual $i$ at time $t$, $x_{i,t}$ be a set of time-variant and time-invariant covariates, and $z_i$ a variable indicating the different treatments.[38] As treatments are not varied within sessions, $z_i$ is time-invariant. With $c_i$ as unobserved time-invariant heterogeneity and $\epsilon_{i,t}$ as idiosyncratic disturbance in the model, the general regression equation is specified as follows,

$$y_{i,t} = \beta_0 + \beta_1 x_i + \beta_2 z_i + \beta_{12} x_{i,t} z_i + c_i + \epsilon_{i,t}. \tag{1}$$

The interpretation of interaction terms in non-linear panel data models is problematic as the interaction effect can be non-zero although $\beta_{12}$ equals zero (Ai and Norton, 2003; Karaca-Mandic et al., 2012; Greene and Zhang, 2019). We therefore desist from quantifying the average treatment effect in Table 4 and Table A-7. To provide intuition about the relative size of the treatment effect with respect to the social affiliation measure (Figure 5) and normative beliefs (Figure A-1), we provide treatment specific plots for marginal effects. Readers who are generally interested in the effect size of our norm-based intervention are referred to the descriptive results in section 5. Also, Wooldridge (2010) describes linear probability models as a convenient approximation to the underlying outcome probability. For common values of the interacted covariates, linear probability models tend to give good estimates of partial effects. To this end, we present all relevant specifications not only as non-linear but also linear models, see Tables A-4, A-6, A-8, A-9, and A-10. The robustness of our results to the specification as a linear model alleviates

[37] Due to the total stranger matching protocol, we do not expect interdependencies across individuals.

[38] In the specifications of Table 4 and the related Table A-3 in the Appendix A-2, $x_{i,t}$ includes a round trend variable. In the specifications of Table 5, $x_{i,t}$ includes an indicator variable of being excluded from the bonus point for defecting in the previous round, an indicator variable for being excluded from the bonus point for cooperating in the previous round, and a round trend variable. In the specification of Table A-7 and the related Table A-8 in the Appendix A-2, $x_{i,t}$ includes a measure for affiliation to other fishermen in the session, a variable for the prevalence of violations to fishing regulations, and a round trend variable. Note that the round trend is the only covariate that varies with time.

concerns about the misspecification of interaction terms in the non-linear case (Wooldridge, 2010).

## A-2 Additional Analysis and Robustness Tests

### A-2.1 Participant Characteristics

Our sample consists of $N = 588$ fishermen from landing sites in the Lake Victoria region of Tanzania. We present sample characteristics split by the different treatments in Table A-1. With respect to age, treatment averages are between 35 and 40 years of age. The sample is predominantly male with only 0% to 4% of female participants in the different treatments. Our sample is rather poor. The share of participants earning less than 5,000 TZS per day (ca. USD 2.20), indicated by *earndaily* is just under 50% in the varying treatments. In terms of the fishermen's reliance on fishing as an income source indicated by the variable *hhfracfish* ($1 = 0\% - 25\%, 2 = 25\% - 50\%, 3 = 50\% - 75\%, 4 = 75\% - 100\%$), participants answer that about 2/3 of their income comes from fishing. To the question on how often participants have moved in the past, about 60% of respond that they have never moved (see *movefreq*). Moreover, fishermen usually fish in crews of 3 to 4 (*crewsize*) while about 40% use the dagaa net as their main gear type (*maingear*). Lastly, on a seven-point Likert scale (0-6), participants invest about 3 points into a risky instead of a safe option (*risk_pref*).

Table A-1: Participants' Characteristics: *min adj. p-val* shows the lowest p-value in all six pairwise comparisons

| treatment | hi-F | hi-noF | low-noF | low-F | min adj. p-val |
|---|---|---|---|---|---|
| age | 37.82 | 40.01 | 38.49 | 35.48 | 0.01 |
| gender | 0.02 | 0 | 0.04 | 0.02 | 0.24 |
| earndaily | 0.43 | 0.43 | 0.48 | 0.46 | 0.99 |
| hhfracfish | 2.53 | 2.68 | 2.75 | 2.76 | 0.52 |
| movefreq | 0.6 | 0.67 | 0.54 | 0.61 | 0.34 |
| crewsize | 3.85 | 3.88 | 3.63 | 3.8 | 0.08 |
| maingear | 0.4 | 0.3 | 0.49 | 0.38 | 0.01 |
| risk_pref | 2.9 | 2.97 | 3.01 | 2.71 | 0.87 |

To argue for a balanced sample with respect to the treatment variation, the rightmost column in Table A-1 displays the lowest p-value from a series of pairwise mean comparison tests between treatment averages per characteristic (we account for multiple testing hypotheses using the Benjamini-Hochberg procedure). We find that only age (highest mean in **hi-noF** = 40.01, lowest mean in **low-F** = 35.48) and an indicator variable for main gear type being the dagaa net indicated by *maingear* (highest mean in **low-noF** = 0.49, lowest mean in **hi-noF** = 0.3) display statistically significant differences at the 5% level.

### A-2.2 Cooperation Rates Over Time

To argue for the significance of our main result, *i.e.*, the significantly different cooperation rates in the information treatments with feedback presented in section 5.1, we conduct Wilcoxon-Mann-Whitney tests. The pairwise comparison between treatments are shown in Table A-2. Column (1) displays differences in average cooperation between the high information treatment with feedback (**hi-F**) and the low information treatment with feedback (**low-F**). The difference

is statistically significant in every iteration of the repeated game except for the last round. Column (2) shows the difference in average cooperation between the **hi-F** treatment and the corresponding high information treatment without feedback (**hi-noF**). The cooperation rate is significantly lower in the **hi-noF** treatment in the last three rounds of the experiment. Column (3) indicates that in early rounds, average cooperation in the **low-noF** treatment is marginally higher than in the corresponding feedback treatment (**low-F**). Finally, column (4) indicates no statistical differences between **hi-noF** and **low-noF** treatments.

Table A-2: Treatment Differences in Average Cooperation

| **Round** | **hi-F** - **low-F** | **hi-F** - **hi-noF** | **low-F** - **low-noF** | **hi-noF** - **low-noF** |
|---|---|---|---|---|
| | (1) | (2) | (3) | (4) |
| OS | +0.07 | −0.03 | −0.12∗ | −0.02 |
| 1 | +0.14∗∗ | +0.05 | −0.12∗ | −0.03 |
| 2 | +0.12∗∗ | +0.07 | −0.05 | −0.01 |
| 3 | +0.12∗ | +0.03 | −0.07 | +0.01 |
| 4 | +0.16∗∗∗ | +0.15∗∗∗ | −0.03 | −0.03 |
| 5 | +0.13∗∗ | +0.18∗∗∗ | +0.01 | −0.04 |
| 6 | +0.09 | +0.16∗∗∗ | +0.04 | −0.03 |

*Notes*: Round-by-round Wilcoxon-Mann-Whitney-test results. OS denotes the one-shot game, the numbers correspond to the rounds of the repeated part of the experiment. ***, **, and * indicate significant differences at the 1, 5, and 10% level.

### A-2.3 Regression Results

We show robustness of our results with respect to the estimation strategy discussed in the Appendix section A-1. In Table A-3 we report robustness tests for Table 4 in section 5.1. Depicted are probit models for the regression of treatment effect, round effect, and their interaction on cooperation and empirical expectations with the full data set, see columns (1) and (2) which are identical to Table 4. Results are robust to the exclusion of the one-shot game, see columns (3) and (4), and the exclusion of the last round, see columns (5) and (6). In all specifications, we find that participants, on average, contribute significantly less in the **low-F** than in the **hi-F** treatment while no feedback treatments are characterized by the significant breakdown of cooperation over the repeated game. The treatment difference between **hi-F** and **low-F** treatment is especially pronounced when excluding the one-shot game from the sample, see columns (3) and (4).

Furthermore, Table A-4 shows robustness to the choice of a linear probability model. Any other specifications are unchanged. Here, results for the full sample convey the same implication as for the non-linear model, see column (1) and (2). Participants, on average, contribute significantly less (15.5 percentage point decrease) in the **low-F** than in the **hi-F** treatment. Also, the cooperation rates in both no feedback treatments, on average, decrease about 3 percentage points per repetition round. Likewise, the results in linear probability models are robust to the exclusion of the one-shot game, see columns (3) and (4), and the exclusion of the last round, see columns (5) and (6). Again, excluding the one-shot game from the analysis (columns (3) and (4)) yields markedly stronger results.

Table A-3: Non-linear model explaining behavior and beliefs for subsets of the experiment

| | *All Rounds* | | *Without OS* | | *Without Last Round* | |
|---|---|---|---|---|---|---|
| | Coop | EE | Coop | EE | Coop | EE |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| low-noF | 0.127 | -0.554*** | -0.066 | -0.895*** | -0.001 | -0.530*** |
| | (0.211) | (0.200) | (0.292) | (0.288) | (0.199) | (0.206) |
| low-F | -0.772*** | -0.982*** | -1.162*** | -1.232*** | -0.799*** | -1.015*** |
| | (0.188) | (0.171) | (0.335) | (0.250) | (0.209) | (0.196) |
| hi-noF | -0.095 | -0.264 | -0.339 | -0.698*** | -0.159 | -0.157 |
| | (0.214) | (0.179) | (0.258) | (0.220) | (0.251) | (0.214) |
| Round | -0.025 | -0.025 | -0.051 | -0.076** | 0.001 | -0.029 |
| | (0.032) | (0.032) | (0.047) | (0.036) | (0.049) | (0.041) |
| low-noF × Round | -0.173*** | -0.022 | -0.143** | 0.033 | -0.199*** | -0.045 |
| | (0.053) | (0.044) | (0.065) | (0.057) | (0.055) | (0.054) |
| low-F × Round | -0.018 | 0.021 | 0.026 | 0.059 | -0.056 | 0.051 |
| | (0.041) | (0.036) | (0.069) | (0.047) | (0.054) | (0.049) |
| hi-noF × Round | -0.181*** | -0.072** | -0.170*** | -0.018 | -0.200*** | -0.090* |
| | (0.049) | (0.036) | (0.055) | (0.042) | (0.068) | (0.051) |
| Session Fixed Effects | Yes | Yes | Yes | Yes | Yes | Yes |
| Individual Controls | Yes | Yes | Yes | Yes | Yes | Yes |
| N | 4116 | 4116 | 3528 | 3528 | 3528 | 3528 |

*Notes*: The table reports random effect estimators for an individual-level probit model. The baseline is set to the hi-F treatment. Robust standard errors are clustered at the session level (in parentheses). Individual controls include age, age squared, an indicator variable for comprehension, and a risk preference measure. ***, **, and * indicate significance at the 1,5, and 10% level.

Table A-4: Linear model explaining behavior and beliefs for subsets of the experiment

| | *All Rounds* | | *Without OS* | | *Without Last Round* | |
|---|---|---|---|---|---|---|
| | Coop | EE | Coop | EE | Coop | EE |
| | (1) | (2) | (3) | (4) | (5) | (6) |
| low-noF | 0.016 | -0.119*** | -0.011 | -0.163*** | -0.005 | -0.112*** |
| | (0.035) | (0.037) | (0.046) | (0.049) | (0.036) | (0.038) |
| low-F | -0.155*** | -0.171*** | -0.210*** | -0.207*** | -0.167*** | -0.185*** |
| | (0.035) | (0.032) | (0.058) | (0.043) | (0.039) | (0.036) |
| hi-noF | -0.037 | -0.042 | -0.081** | -0.110*** | -0.037 | -0.023 |
| | (0.037) | (0.032) | (0.039) | (0.036) | (0.046) | (0.039) |
| Round | -0.005 | -0.005 | -0.009 | -0.012** | -0.001 | -0.006 |
| | (0.006) | (0.006) | (0.007) | (0.006) | (0.009) | (0.007) |
| low-noF × Round | -0.029*** | -0.004 | -0.024** | 0.005 | -0.034*** | -0.008 |
| | (0.009) | (0.008) | (0.010) | (0.010) | (0.010) | (0.010) |
| low-F × Round | -0.003 | 0.004 | 0.005 | 0.010 | -0.010 | 0.010 |
| | (0.008) | (0.007) | (0.012) | (0.008) | (0.010) | (0.009) |
| hi-noF × Round | -0.032*** | -0.014** | -0.029*** | -0.004 | -0.037*** | -0.017* |
| | (0.008) | (0.006) | (0.009) | (0.007) | (0.012) | (0.009) |
| Session Fixed Effects | Yes | Yes | Yes | Yes | Yes | Yes |
| Individual Controls | Yes | Yes | Yes | Yes | Yes | Yes |
| $R^2$ | 0.107 | 0.081 | 0.108 | 0.086 | 0.109 | 0.080 |
| N | 4116 | 4116 | 3528 | 3528 | 3528 | 3528 |

*Notes*: The table reports random effect estimators for an individual-level linear probability model. The baseline is set to the hi-F treatment. Robust standard errors are clustered at the session level (in parentheses). Individual controls include age, age squared, an indicator variable for comprehension, and a risk preference measure. ***, **, and * indicate significance at the 1,5, and 10% level.

Next, we turn to a regression analysis of cooperation behavior on normative beliefs across the four different treatments. In Figure A-1, we present the predictive margins of a random effects probit model of cooperation behavior on both personal normative beliefs (left panel) and normative expectations (right panel) that were elicited during the belief elicitation stage in round 1, see section 3. The underlying regression results are presented in column (1) of Table A-5.

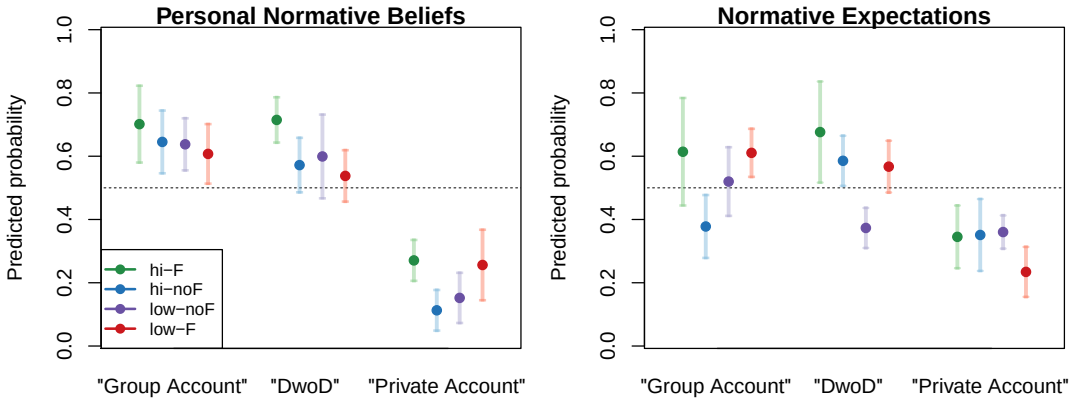



Figure A-1: Predictive margins of cooperation for normative beliefs across treatments (based on probit model). DwoD indicates the response "Do what others do".

We expect that participants with preferences for reciprocity (thinking that the right thing to do is to "do what others do") are more likely to cooperate in the high treatments, where we emphasize that previous participants have cooperated. Conversely, we expect that participants with preferences for reciprocity are less likely to cooperate in the low treatments.

Looking at the effect of personal normative beliefs in the left panel of Figure A-1, we see that participants that think the right thing to do is to "do what others do" are indeed more likely to cooperate in the hi-F treatment than in the **low-F** treatment (there is no difference between the **hi-noF** and the **low-noF** treatment). However, the difference between the **hi-F** and the **low-F** treatment is not particularly large. Most importantly, for all participants with strong preferences for reciprocity, the predicted probability is above 0.5. Thus, in all treatments, those participants cooperate more likely than not. In contrast, the difference in the predictive margin to cooperate between those that think the right thing to do is to cooperate, or to defect, is much more pronounced across all treatments.

Turning to normative expectations (right panel of Figure A-1), we first see that these expectations are a less precise predictor of cooperation than personal normative expectations: The standard errors around the point estimates are larger, the point estimates are closer to the 0.5 line, and the predictors are less consistent across treatments. For the normative expectation that most others think that one ought to "do what others do", we do see that the marginal effects in both the hi-F and **hi-noF** treatments are larger than the effects for **low-F** and **low-noF** treatments.

Additionally, Table A-5 shows the robustness of the result in Figure A-1 to the exclusion of the one-shot game, see column (2), and the exclusion of the last round, see column (3).

Table A-5: Non-linear model explaining the effect of normative beliefs on cooperation (PNB refers to personal normative belief, and NE refers to normative expectations)

| | *All Rounds* | *Without OS* | *Without Last Round* |
|---|---|---|---|
| | Cooperation | Cooperation | Cooperation |
| | (1) | (2) | (3) |
| low-noF | 0.321 | 0.203 | 0.210 |
| | (0.210) | (0.300) | (0.210) |
| low-F | -0.299 | -0.618* | -0.337 |
| | (0.232) | (0.346) | (0.215) |
| hi-noF | -0.375* | -0.611** | -0.337 |
| | (0.192) | (0.249) | (0.212) |
| Round | -0.024 | -0.051 | 0.002 |
| | (0.033) | (0.048) | (0.050) |
| low-noF × Round | -0.166*** | -0.137** | -0.191*** |
| | (0.053) | (0.064) | (0.055) |
| low-F × Round | -0.017 | 0.027 | -0.057 |
| | (0.042) | (0.069) | (0.055) |
| hi-noF × Round | -0.181*** | -0.170** | -0.199*** |
| | (0.050) | (0.056) | (0.069) |
| PNB (DwoD) | 1.680*** | 1.742*** | 1.646*** |
| | (0.160) | (0.149) | (0.223) |
| low-noF × PNB (DwoD) | -0.561 | -0.735* | -0.656 |
| | (0.423) | (0.434) | (0.459) |
| low-F × PNB (DwoD) | 0.303 | 0.295 | 0.274 |
| | (0.558) | (0.593) | (0.561) |
| hi-noF × PNB (DwoD) | 0.578 | 0.524 | 0.575 |
| | (0.411) | (0.459) | (0.420) |
| PNB (Coop) | 1.587*** | 1.607*** | 1.608*** |
| | (0.478) | (0.595) | (0.480) |
| low-noF × PNB (Coop) | -0.170 | -0.223 | -0.186 |
| | (0.649) | (0.744) | (0.643) |
| low-F × PNB (Coop) | 0.758 | 0.782 | 0.670 |
| | (0.653) | (0.753) | (0.656) |
| hi-noF × PNB (Coop) | 0.896 | 0.971 | 0.785 |
| | (0.667) | (0.755) | (0.656) |
| NE (DwoD) | 1.457*** | 1.574*** | 1.375*** |
| | (0.546) | (0.558) | (0.523) |
| low-noF × NE (DwoD) | -0.025 | -0.065 | 0.054 |
| | (0.675) | (0.713) | (0.665) |
| low-F × NE (DwoD) | -1.394** | -1.574** | -1.275** |
| | (0.598) | (0.631) | (0.581) |
| hi-noF × NE (DwoD) | -0.496 | -0.551 | -0.507 |
| | (0.656) | (0.706) | (0.649) |
| NE (Coop) | 1.240** | 1.191* | 1.178** |
| | (0.566) | (0.688) | (0.566) |
| low-noF × NE (Coop) | 0.371 | 0.362 | 0.388 |
| | (0.666) | (0.786) | (0.666) |
| low-F × NE (Coop) | -0.693 | -0.703 | -0.579 |
| | (0.666) | (0.762) | (0.669) |
| hi-noF × NE (Coop) | -1.082 | -1.222 | -1.112 |
| | (0.701) | (0.805) | (0.694) |
| Session Fixed Effects | Yes | Yes | Yes |
| Individual Controls | Yes | Yes | Yes |
| N | 4116 | 3528 | 3528 |

*Notes*: The table reports random effect estimators for an individual-level probit model. The baseline is set to the hi-F treatment. Robust standard errors are clustered at the session level (in parentheses). Individual controls include age, age squared, an indicator variable for comprehension, and a risk preference measure. ***, **, and * indicate significance at the 1,5, and 10% level.

Table A-6 depicts robustness tests for Table 5 in section 5.3. In particular, we show that the results for the regression of voting to exclude defectors on being excluded in the previous round and the regression of cooperation on the same set of covariates are robust to the choice of a linear probability model as discussed in the Appendix section A-1. Other specifications are unchanged.

Table A-6: Estimates of the linear model explaining the use and effect of the feedback mechanism

| | Vote to Exclude Defectors (1) | Cooperation (2) |
|---|---|---|
| low-F | -0.127*** | -0.228*** |
| | (0.048) | (0.066) |
| excluded (def in $t-1$) | 0.114*** | 0.009 |
| | (0.012) | (0.026) |
| excluded (def in $t-1$) x low-F | -0.037 | -0.050 |
| | (0.060) | (0.060) |
| excluded (coop in $t-1$) | 0.048 | -0.041** |
| | (0.034) | (0.020) |
| excluded (coop in $t-1$) x low-F | 0.054 | 0.048 |
| | (0.052) | (0.048) |
| Round | 0.003 | -0.009 |
| | (0.007) | (0.008) |
| Round x low-F | -0.000 | 0.004 |
| | (0.010) | (0.013) |
| coop in $t$ | -0.080** | 0.004 |
| | (0.031) | (0.013) |
| Session Fixed Effects | Yes | Yes |
| Individual Control | Yes | Yes |
| $R^2$ | 0.066 | 0.050 |
| N | 1764 | 1764 |

*Notes*: The table reports random effect estimators for an individual-level linear probability model. The baseline is set to the hi-F treatment. The model includes one-shot game and all repeated rounds. Individual controls include age, age squared, an indicator variable for comprehension, and a risk preference measure. Robust standard errors are clustered at the session level (in parentheses). ***, **, and * indicate significance at the 1,5, and 10% level.

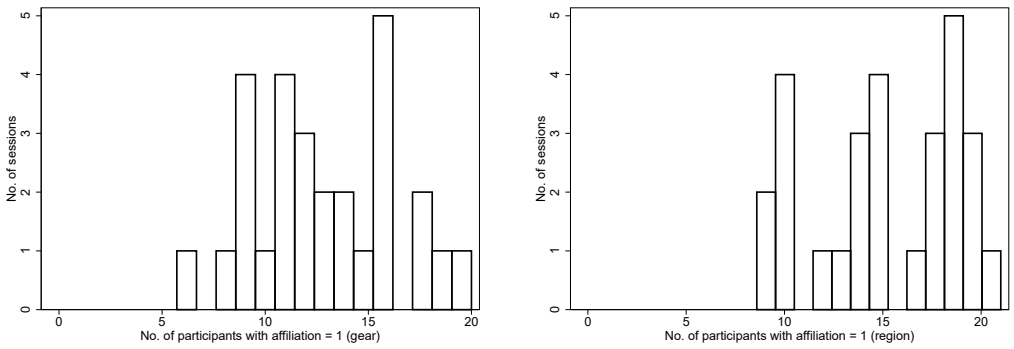
## A-3 Robustness Analysis of Social Proximity Result

We now turn to the robustness of the analysis presented in section 6.

Table A-7 depicts the random effects probit regression that underlies the predictive margins shown in Figure 5. Results strongly indicate that participants that are close to their peers based on fishing related characteristics exhibit behavior that is in line with the social norm in the respective treatment. That is, participants with high social proximity, on average, cooperate more in the hi-F treatment (baseline treatment in column (1)) and less in the **low-F** treatment than those that have low social proximity. The effect of social proximity indicates that it is those participants who are close to their peers in the session that drive the overall result. More isolated participants show behavior that is not in line with the social norm.

Table A-8 shows that results are robust to the choice of a linear probability model. Other specifications are unchanged. In the linear model we find that an increase in our social affiliation measure by one (see section 3 and below for a detailed description of the index's construction), on average, leads to 16.8 percentage points higher cooperation rates in the hi-F treatment. The coefficient indicates that those with strong social affiliation are more likely to conform with the norm of cooperation. Similarly, results display that an increase in the affiliation measure by one, on average, leads to 33.8 percentage points lower cooperation rates in the **low-F** compared to the hi-F treatment. Social affiliation does not have a significant effect in either no feedback treatment. Results for the empirical expectation measure follow the same pattern. That is, social affiliation is associated with higher expectations in the hi-F and lower expectations in the **low-F** treatment, reflecting the relationship between social affiliation and cooperation, and therefore giving a strong indication for the creation of different social norms.

In the following, we take a closer look at how the social proximity index is constructed. Figures 2(a) and 2(b) depict the distribution of session by the number of participants with the indicator variable for main gear type (Figure 2(a)) and region of origin (Figure 2(b)) = 1.




(a) Main gear

(b) Region of origin

Figure A-2: Histogram of sessions by number of participants giving the modal response to the respective proximity indicator

For participants' main type of gear, we observe the lowest value in one session where only six participants have the indicator variable = 1, see Figure 2(a). So, in this one session, the modal response to the question regarding main gear type is given by six of 21 participants. In most other sessions the modal response is given by considerably more participants. The distribution

Table A-7: Estimates of non-linear model explaining the effect of social proximity

| | Cooperation (1) | Empirical expectations (2) |
|---|---|---|
| Social Proximity (SP) = 0 | -0.322 | -1.066*** |
| | (0.379) | (0.351) |
| SP = 0 × hi-noF | 0.255 | 1.324** |
| | (0.590) | (0.581) |
| SP = 0 × low-noF | 0.321 | 1.357* |
| | (0.545) | (0.717) |
| SP = 0 × low-F | 0.853 | 1.384** |
| | (0.637) | (0.590) |
| SP = 1 | 0.578*** | 0.563*** |
| | (0.210) | (0.146) |
| SP = 1 × hi-noF | -0.396 | -0.473 |
| | (0.443) | (0.336) |
| SP = 1 × low-noF | -0.784 | -0.563 |
| | (0.487) | (0.440) |
| SP = 1 × low-F | -0.983*** | -0.874*** |
| | (0.330) | (0.295) |
| hi-noF | 0.044 | -0.145 |
| | (0.346) | (0.280) |
| low-noF | 0.433 | -0.379 |
| | (0.274) | (0.276) |
| low-F | -0.396 | -0.692*** |
| | (0.245) | (0.228) |
| Round | -0.025 | -0.025 |
| | (0.032) | (0.032) |
| Round × hi-noF | -0.181*** | -0.071* |
| | (0.049) | (0.036) |
| Round × low-noF | -0.172*** | -0.022 |
| | (0.053) | (0.044) |
| Round × low-F | -0.018 | 0.022 |
| | (0.041) | (0.036) |
| Session fixed effects | Yes | Yes |
| Individual controls | Yes | Yes |
| N | 4116 | 4116 |

*Notes*: The table reports random effect estimators for an individual-level probit model. The baseline is set to the hi-F treatment. For the social proximity variable, the baseline is set at 0.5. The model includes one-shot game and all repeated rounds. Individual controls include age, age squared, an indicator variable for comprehension, and a risk preference measure. Robust standard errors are clustered at the session level (in parentheses). ***, **, and * indicate significance at the 1,5, and 10% level.

Table A-8: Estimates of linear model explaining the effect of social proximity

| | Cooperation (1) | Empirical expectations (2) |
|---|---|---|
| Social Proximity (SP) = 0 | -0.045 | -0.178** |
| | (0.068) | (0.074) |
| SP = 0 × hi-noF | 0.045 | 0.246** |
| | (0.108) | (0.118) |
| SP = 0 × low-noF | 0.016 | 0.227* |
| | (0.108) | (0.134) |
| SP = 0 × low-F | 0.161 | 0.284*** |
| | (0.114) | (0.110) |
| SP = 1 | 0.108*** | 0.082*** |
| | (0.037) | (0.027) |
| SP = 1 × hi-noF | -0.070 | -0.048 |
| | (0.084) | (0.059) |
| SP = 1 × low-noF | -0.159* | -0.090 |
| | (0.082) | (0.078) |
| SP = 1 × low-F | -0.181*** | -0.108** |
| | (0.062) | (0.052) |
| hi-noF | -0.014 | -0.040 |
| | (0.060) | (0.049) |
| low-noF | 0.078* | -0.092* |
| | (0.045) | (0.048) |
| low-F | -0.089** | -0.140*** |
| | (0.043) | (0.044) |
| Round | -0.005 | -0.005 |
| | (0.006) | (0.006) |
| Round × hi-noF | -0.032*** | -0.014** |
| | (0.008) | (0.006) |
| Round × low-noF | -0.029*** | -0.004 |
| | (0.009) | (0.008) |
| Round × low-F | -0.003 | 0.004 |
| | (0.008) | (0.007) |
| Session fixed effects | Yes | Yes |
| Individual controls | Yes | Yes |
| N | 4116 | 4116 |

*Notes*: The table reports random effect estimators for an individual-level OLS model. The baseline is set to the hi-F treatment. For the social proximity variable, the baseline is set at 0.5. The model includes one-shot game and all repeated rounds. Individual controls include age, age squared, an indicator variable for comprehension, and a risk preference measure. Robust standard errors are clustered at the session level (in parentheses). ***, **, and * indicate significance at the 1,5, and 10% level.

is skewed to the left (mean = 13) and offers considerable variation (sd = 3.61). In fact, in 21 out of 28 sessions the modal response is given by the majority ($\geq 11$) of the 21 participants.

For participants' region of origin, we observe the lowest value in two different sessions, where nine participants have the indicator variable = 1, see Figure 2(b). So, in these two sessions, the modal response to the question regarding the region of origin is given by nine out of 21 participants. In most other sessions the modal response is given by more participants. Also, the distribution for region of origin is skewed to the left (mean = 15.43) and offer considerable variation (sd 3.87). In fact, in 22 out of 28 session the modal response is given by the majority ($\geq 11$) of the 21 participants.

Table A-9 and A-10 report robustness results for the reference network analysis presented in section 6. Regression results for the social proximity measure on cooperation (Table A-9) and empirical expectation (Table A-10) are robust to alternative specifications of the proximity index. Column (1) in both tables, respectively, repeats the regressions from Table A-8 with social proximity interpreted as a numerical variable instead of a categorial variable. Results are virtually unchanged, and to economize the exposition we show results where social proximity is employed as a numerical variable in the rest of the tables. In column (2) the index is disaggregated and gear use as well as region of origin affiliation indicators are single covariates. Columns (3) and (4) model social proximity with only one of the indicator variables. In column (5) and (6), different weights are applied to both indicator variables in calculating the index. In column (5), 25% of the index is calculated with the region of origin variable while 75% is explained with gear use. In column (6), the weights are turned around, 75% for gear use and 25% for region of origin.

For the regressions on cooperation and on empirical expectation, different specification of the affiliation index yields significant results. The robustness indicates that both gear use and region of origin as a proxy for ethnicity indeed have explanatory power for our measure of social norms. Individuals with high social proximity are more receptive to the social information when feedback is possible.

Table A-9: The effect of social proximity (SP) on cooperation is robust to various compositions of the index

| | Cooperation | | | | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| low-noF | 0.172* | 0.222** | 0.080 | 0.169* | 0.119* | 0.196* |
| | (0.095) | (0.106) | (0.051) | (0.094) | (0.063) | (0.108) |
| low-F | 0.074 | 0.078 | -0.053 | -0.023 | 0.013 | 0.046 |
| | (0.073) | (0.077) | (0.054) | (0.069) | (0.063) | (0.075) |
| hi-noF | 0.043 | 0.037 | 0.023 | -0.015 | 0.043 | 0.013 |
| | (0.086) | (0.076) | (0.070) | (0.060) | (0.081) | (0.072) |
| SP | 0.168*** | | | | | |
| | (0.063) | | | | | |
| SP × low-noF | -0.231 | | | | | |
| | (0.145) | | | | | |
| SP × low-F | -0.338*** | | | | | |
| | (0.094) | | | | | |
| SP × hi-noF | -0.121 | | | | | |
| | (0.117) | | | | | |
| SP(100% gear) | | 0.074* | 0.083** | | | |
| | | (0.040) | (0.039) | | | |
| SP(100% gear) × low-noF | | -0.049 | -0.054 | | | |
| | | (0.074) | (0.074) | | | |
| SP(100% gear) × low-F | | -0.146** | -0.146** | | | |
| | | (0.071) | (0.073) | | | |
| SP(100% gear) × hi-noF | | -0.053 | -0.060 | | | |
| | | (0.096) | (0.095) | | | |
| SP(100% origin) | | 0.095 | | 0.102 | | |
| | | (0.064) | | (0.063) | | |
| SP(100% origin) × low-noF | | -0.209* | | -0.218* | | |
| | | (0.113) | | (0.113) | | |
| SP(100% origin) × low-F | | -0.195** | | -0.195** | | |
| | | (0.078) | | (0.078) | | |
| SP(100% origin) × hi-noF | | -0.067 | | -0.072 | | |
| | | (0.082) | | (0.079) | | |
| SP(25% origin, 75% gear) | | | | | 0.131*** | |
| | | | | | (0.048) | |
| SP(25% origin, 75% gear) × low-noF | | | | | -0.128 | |
| | | | | | (0.103) | |
| SP(25% origin, 75% gear) × low-F | | | | | -0.248*** | |
| | | | | | (0.087) | |
| SP(25% origin, 75% gear) × hi-noF | | | | | -0.096 | |
| | | | | | (0.112) | |
| SP(75% origin, 25% gear) | | | | | | 0.148** |
| | | | | | | (0.072) |
| SP(75% origin, 25% gear) × low-noF | | | | | | -0.269* |
| | | | | | | (0.146) |
| SP(75% origin, 25% gear) × low-F | | | | | | -0.294*** |
| | | | | | | (0.092) |
| SP(75% origin, 25% gear) × hi-noF | | | | | | -0.103 |
| | | | | | | (0.099) |
| Round trend | Yes | Yes | Yes | Yes | Yes | Yes |
| Session Fixed Effects | Yes | Yes | Yes | Yes | Yes | Yes |
| Individual Controls | Yes | Yes | Yes | Yes | Yes | Yes |
| N | 4116 | 4116 | 4116 | 4116 | 4116 | 4116 |

*Notes*: The table reports random effect estimators for an individual-level linear probability model. The baseline is set to the hi-F treatment. The model includes one-shot game and all repeated rounds. Round trends are interacted with treatment. Individual controls include age, age squared, an indicator variable for comprehension, and a risk preference measure. Robust standard errors are clustered at the session level (in parentheses). ***, **, and * indicate significance at the 1,5, and 10% level.

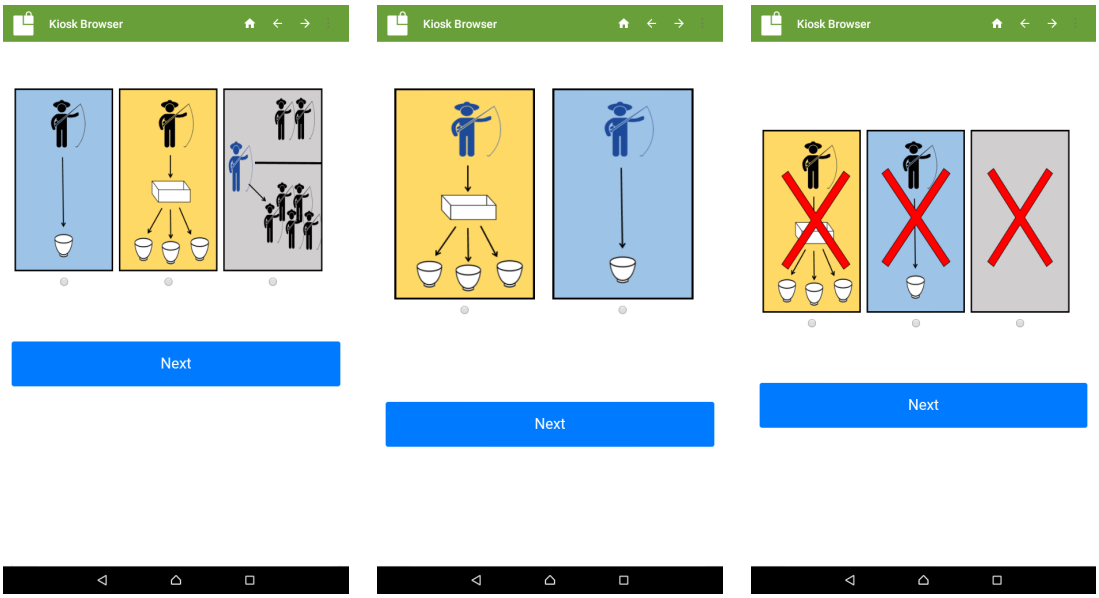
Table A-10: The effect of social proximity (SP) on empirical expectations is robust to various compositions of the index

| | Empirical Expectation | | | | | |
|---|---|---|---|---|---|---|
| | (1) | (2) | (3) | (4) | (5) | (6) |
| low-noF. | 0.068 | 0.105 | -0.027 | 0.029 | 0.020 | 0.070 |
| | (0.113) | (0.113) | (0.066) | (0.087) | (0.086) | (0.112) |
| low-F. | 0.057 | 0.073 | -0.067 | -0.020 | -0.005 | 0.042 |
| | (0.072) | (0.073) | (0.060) | (0.064) | (0.070) | (0.069) |
| hi-noF | 0.124* | 0.130* | 0.052 | 0.052 | 0.097 | 0.098 |
| | (0.074) | (0.070) | (0.060) | (0.060) | (0.070) | (0.066) |
| SP | 0.237*** | | | | | |
| | (0.070) | | | | | |
| SP × low-noF | -0.273* | | | | | |
| | (0.161) | | | | | |
| SP × low-F | -0.335*** | | | | | |
| | (0.085) | | | | | |
| SP × hi-noF | -0.244** | | | | | |
| | (0.099) | | | | | |
| SP(100% gear) | | 0.103*** | 0.116*** | | | |
| | | (0.036) | (0.035) | | | |
| SP(100% gear) × low-noF | | -0.075 | -0.085 | | | |
| | | (0.088) | (0.086) | | | |
| SP(100% gear) × low-F | | -0.111 | -0.116* | | | |
| | | (0.068) | (0.070) | | | |
| SP(100% gear) × hi-noF | | -0.086 | -0.102 | | | |
| | | (0.073) | (0.070) | | | |
| SP(100% origin) | | 0.136** | | 0.146** | | |
| | | (0.065) | | (0.068) | | |
| SP(100% origin) × low-noF | | -0.221* | | -0.233** | | |
| | | (0.113) | | (0.115) | | |
| SP(100% origin) × low-F | | -0.228*** | | -0.238*** | | |
| | | (0.080) | | (0.085) | | |
| SP(100% origin) × hi-noF | | -0.169** | | -0.178** | | |
| | | (0.085) | | (0.085) | | |
| SP(25% origin, 75% gear) | | | | | 0.184*** | |
| | | | | | (0.052) | |
| SP(25% origin, 75% gear) × low-noF | | | | | -0.170 | |
| | | | | | (0.123) | |
| SP(25% origin, 75% gear) × low-F | | | | | -0.220*** | |
| | | | | | (0.083) | |
| SP(25% origin, 75% gear) × hi-noF | | | | | -0.176** | |
| | | | | | (0.088) | |
| SP(75% origin, 25% gear) | | | | | | 0.211*** |
| | | | | | | (0.078) |
| SP(75% origin, 25% gear) × low-noF | | | | | | -0.296* |
| | | | | | | (0.152) |
| SP(75% origin, 25% gear) × low-F | | | | | | -0.327*** |
| | | | | | | (0.092) |
| SP(75% origin, 25% gear) × hi-noF | | | | | | -0.236** |
| | | | | | | (0.096) |
| Round trend | Yes | Yes | Yes | Yes | Yes | Yes |
| Session Fixed Effects | Yes | Yes | Yes | Yes | Yes | Yes |
| Individual Controls | Yes | Yes | Yes | Yes | Yes | Yes |
| N | 4116 | 4116 | 4116 | 4116 | 4116 | 4116 |

*Notes*: The table reports random effect estimators for an individual-level linear probability model. The baseline is set to the hi-F treatment. The model includes one-shot game and all repeated rounds. Round trends are interacted with treatment. Individual controls include age, age squared, an indicator variable for comprehension, and a risk preference measure. Robust standard errors are clustered at the session level (in parentheses). ***, **, and * indicate significance at the 1,5, and 10% level.

## A-4 Screenshots of Choice Situations

Figures 3(a), 3(b), and 3(c) display the most relevant screenshots from the tablets that were used during the prisoner's dilemma experiment in the field. In Figure 3(a) the menu of options during the elicitation of personal normative beliefs are shown in the following order: the blue button indicating the private account, the yellow button indicating the group account, and the gray button indicating to "do what others do". Note that the elicitation of normative expectations used the same buttons as the elicitation of personal normative beliefs. Next, Figure 3(b) displays the choice screen during the contribution decision in the prisoner's dilemma. Also here the yellow button indicates the group account decision while the blue button is related to the private account. Note that the screen for the elicitation of empirical expectations is identical. Lastly, Figure 3(c) displays the menu of choices for the feedback voting. The available choices are depicted in line with the preceding screens with the addition of red crosses indicating the exclusion of that action from the bonus point. The red cross on the gray background indicates that the vote will be cast for the exclusion of no one.




(a) Normative beliefs (b) Cooperation choice (c) Feedback rule

Figure A-3: Tablet Screenshots of Choice Situations

In Figure A-4, we display the screen that was displayed to the participant after finishing the round of play. The top left picture shows which rule has been selected to determine exclusion (in the case that is displayed: exclusion of everyone who put their points in the private account). The lower left column shows the actions of the participants within the participant's own group (in the case displayed: the participants cooperated while one other member of the group cooperated and another defected). The right column shows the consequence of the selected rule for the payout of the bonus (in the case displayed: the participants and the other cooperator in the group receive the bonus point while the lone defector in the group is excluded). A second screen (not shown) displays the amount of points earned by the participant in the round.

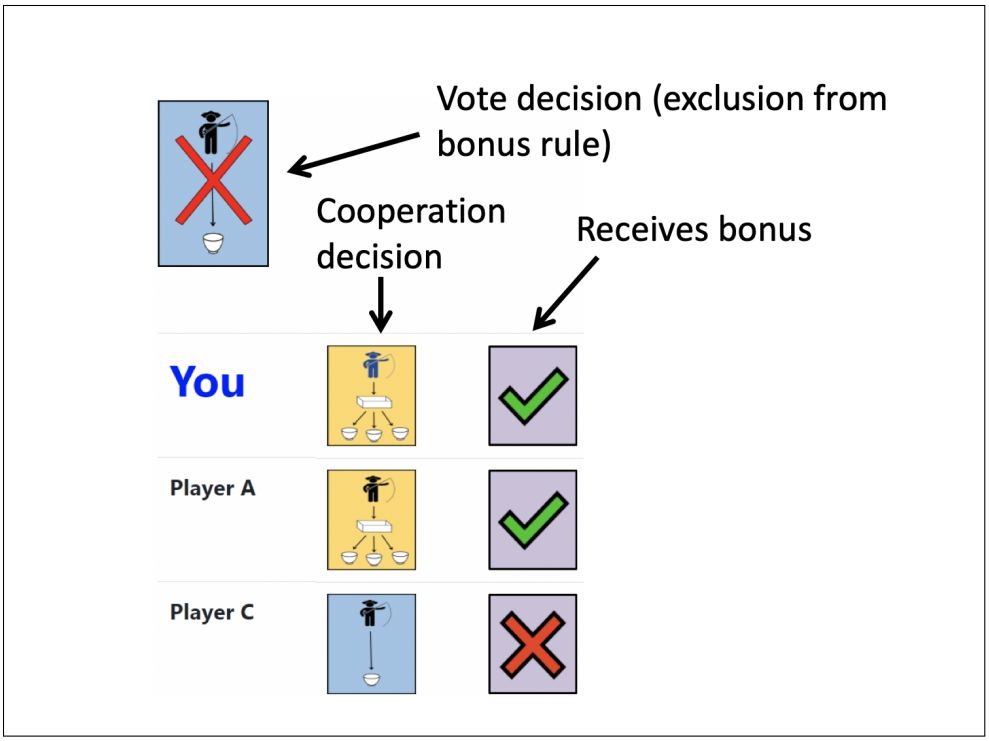



Figure A-4: Screenshot of report at the end of the round. Text and arrows not present in original.

## A-5 Flow of Experiment and Instructions (English Translation)

Table A-11 shows the distribution of participants over treatments. The sample of $N = 588$ participants is perfectly balanced over the treatment variation with $N = 147$ participants in seven sessions per treatment.

Figure A-5 lists the different steps of the experiment and the English translation of the instructions follows last.

Table A-11: Treatment Overview

| | *Feedback* | *No feedback* |
|---|---|---|
| *Low cooperation expectation* | **low-F** | **low-noF** |
| No. of sessions | 7 | 7 |
| No. of participants per session | 21 | 21 |
| *High cooperation expectation* | **hi-F** | **hi-noF** |
| No. of sessions | 7 | 7 |
| No. of participants per session | 21 | 21 |
| *Total no. of participants* | *294* | *294* |

1. **One-shot game**
   (a) Instructions
   (b) Manipulation of expectations
   (c) Elicitation of personal normative beliefs, normative expectations, and empirical expectations
   (d) Instructions on sanctioning (in relevant treatments)
   (e) Contribution decision
   (f) Voting decision (in relevant treatments)
   (g) Feedback (cooperation and exclusion rule)
2. **Participants learn that the game is repeated for 6 additional rounds** (Perfect stranger matching)
   (a) Elicitation of empirical expectations
   (b) Contribution decision
   (c) Voting decision (in relevant treatments)
   (d) Feedback (cooperation and exclusion)

Figure A-5: The different stages of the experiment

NATCOOP Field Trip 2 -- Tanzania

**Experimental Instructions**

**Introduction**

- Welcome, and thank you all for participating in our survey.
- The meeting will take about 2 hours with a break in between.
- We ask you to use a tablet to answer questions and take decisions.
- Your decisions will have financial consequences: You can earn money. How much you earn will depend on your own decisions and may therefore be different for each of you. Note that you cannot lose money.
- Your answers on the tablet are fully anonymous. We only see which page you are currently on. We ask you to sign a consent form and give us your contact information for repeated contact. Taking part is voluntary and you can leave at any time. You will receive the money you have earned in cash at the end of the session.

**Why is this important and what is the role of fishers?**

- This survey is part of a larger project on fishermen behavior. This is the second visit.
- We work with fishers because they have something important to say. You are out on the water every day and know about the challenges to catch fish in an ever-changing environment.

**Consent Forms** ***[Distribute blue folders to all participants.]***

You find the consent forms in the blue folders and we go through them together. We ask you to sign these forms, and we will collect them afterwards.

***[Go through forms, give option to ask question and to leave, collect consent forms.]***

**General Instructions**

***[Team hands out tablets according to the folder numbers (and ask participants to sit in order of the number denoted on the tablets/folders.)]***

- Now that you all have a tablet in hand, we explain the survey to you.
- Put these shields around your tablet so that no one sees what you decide.
- You are not allowed to talk to others.
- Should you have a question, please raise your hand and we will come and help you.
- The session has several parts, before each part we will explain how it works.
- **Every page has a "next" button. Please only hit the "next" button when I give you a sign.**
- The decisions you make will have financial consequences. In each of the decision situations, you can earn points. The points you earned will be exchanged to Tanzania-Schilling (TZS) at the end of the session. One point is worth **250** TZS.
- On the first screen, you will learn about two types of actions you are asked to take on the tablet. Please select the button with the ***blue person*** so that you see a small point below

the picture. And type in the number ***20*** in the field below. Then submit your answer with the "next" button.

**Rule Explanation and Comprehension**

- We are now starting with the first situation. Please take a look at this poster. ***[Team member shows poster]***
- There are always three participants that form a group. Group members are randomly matched such that no one will know who they are matched with, neither during nor after the decision.
- Each group has a group account.
- ***[Team member plays this out]*** In the beginning, each group member has an endowment of 4 points.
- Each group member has to either put the points into the group account or put them in her private account.
- If a group member puts the 4 points to the group account, then the points in the group account are increased to 6 and split equally among all group members. This means every group member gets 2 points.
- If a group member puts the 4 points to the private account, this means that only this group member receives 4 points into her private account.
- The decision is private and no one knows what the other group member have decided.
- Notice that this will potentially result in different payoffs:
- ***[Go through the following scenarios with help of marbles:]***
  - *Imagine that group member A puts the 4 points in the group account, while group members B and C each put them in the private account. Then one member has put 4 points to the group account, the points in the group account are increased to 6 and split equally among all group members. This means that every group member receives 2 points into her private account. You see the situation on your screen. The first person is member A, the second is member B and the third is member C. How much will the blue person in this situation earn in total? Please enter your answer in the tablet and hit "next". If your answer is incorrect, please try again. What is the correct answer? The blue person has put the points to the private account and receives 2 points from the group account. So she earns a total of 6 points. Note that member A, who has put the points in the group account will earn a total of 2 points. Please hit "next".*
  - *Imagine all three group members put the points in the private account. Then, there will be zero points in the group account. You see the situation on your screen. The first person is member A, the second is member B and the third is member C. How much will the blue person in this situation earn in total? Please enter your answer in the tablet and hit "next". If your answer is incorrect, please try again. What is the correct answer? The blue person will earn the 4 points that she put in her private account. Please hit "next".*
  - *Imagine all 3 group members choose to put the points in the group account. Then there are 12 points in the group account, the points in the group account are increased to 18 and split equally among all group members. This means that every group member*

*receives 6 points into her private account. You see the situation on your screen. The first person is member A, the second is member B and the third is member C. How much will the blue person in this situation earn in total? Please enter your answer in the tablet and hit "next". If your answer is incorrect, please try again. What is the correct answer? The blue person will earn 6 points from the group account. Please hit "next".*

- *Imagine that group member A puts the 4 points in her private account, while group members B and C put their 4 points in the group account. Then there are 8 points in the group account, the points in the group account are increased to 12 and split equally among all group members. This means that every group member receives 4 points into her private account. You see the situation on your screen. The first person is member A, the second is member B and the third is member C. How much will the blue person in this situation earn in total? Please enter your answer in the tablet and hit "next". If your answer is incorrect, please try again. What is the correct answer? The blue person will earn 4 points from the group account. Note that member C will earn a total of 8 points. Please hit "next".*

- Is the situation clear? Recall that in this situation, it is only possible to either put the 4 points to the private account or to put them in the group account. Please hit next?

| |
|---|
| • Social information message (high): In a previous survey, it was found that many participants chose to put the points to the group account and not put them to the private account. |
| • Social information message (low): In a previous survey, it was found that many participants chose to put the points in their private account and not put them to the group account. |

**Belief Elicitation**

- Now we ask you to answer three questions about this situation:
  1. First, what do you think one ought to do? This is about what you personally believe is the morally right thing to do. No one will see what you have chosen.
     ***[Illustrate the different choices with the help of pictorial posters and ask them to make a decision.]***
     - Put the points to the group account.
     - Put the points in the private account.
     - Do what the others do. This means that you think one ought to put the points in the group account when the others do so, and one ought to put the points in the private account when the others put the points in the private account, too.
       After your decision, please hit "next".
  2. Second, what do you guess most people in this session think one ought to do? This is <u>not</u> about your personal belief but about what you think the others believe is the right thing to do.
     You will get 1 additional point if you guess correctly what most participants have selected, so think carefully.

***[Illustrate the different choices with the help of pictorial posters and ask them to make a decision.]***

- Put the points to the group account.
- Put the points in the private account.
- Do what the others do.

*After your decision, please hit "next".*

| |
|---|
| • Social information message (high): In a previous survey, it was found that many participants chose to put the points to the group account and not put them to the private account. |
| • Social information message (low): In a previous survey, it was found that many participants chose to put the points in their private account and not put them to the group account. |

3. Third, what do you guess most people in this session would actually do?
   You will get 1 additional point if your guess is correct, so think carefully. After your decision, please hit "next".
   - Put the points to the group account.
   - Put the points in the private account.

Please note that whether your guess is correct will only be revealed at the end of the meeting before the final payout.

---

**Contribution in one-shot social dilemma with feedback [low-F and hi-F]**

- Now we get to the next stage, where we ask you to make a decision yourself. Please listen to the instructions first, we will then give you the code to proceed with the next stage.
- Remember, you will be paired with 2 other participants from this session. You will never know who your group members are, nor will they.
- After all group members made their decisions, there is a bonus stage, where each group member can get a bonus of 1 point.
- However, you have the possibility to exclude group members from the bonus. There are three options to exclude members:
  ***[show participants the three options on poster]***
  1. You can vote to exclude group members who decided to put their points in the group account.
  2. You can vote to exclude group members who decided to put their points in the private account.
  3. You can vote to not exclude any group members.
- The option that gets at least two votes will be implemented. If no option gets two votes, no one will be excluded from the bonus.
- At the end of each round, you learn about the decisions of the group members, about the voting result and also about how many points you earned.



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**Contribution**

- Now you will make a decision.
- Each group member (that is, you and the other 2 members of your group) has 4 points. You can decide to put the points in the group account or put them in the private account.
- If a group member puts the 4 points to the group account, then the points in the group account are increased to 6 and split equally among all group members. This means every group member gets 2 points.
- If a group member puts the 4 points to the private account, this means that only this group member receives 4 points into her private account.
- Remember that earned points will be exchanged to Tanzania-Schilling (TZS) at the end of the session. One point is worth **250** TZS and this situation will be payed out.

**To make your decision, please enter the code 1234 into the tablet and hit "next".**

- What is your decision:
  - Put the points in the group account.
  - Put the points in the private account.

**Feedback**

- Now, there is a possible bonus of 1 point available for each member in your group.
- However, you have the possibility to exclude group members from the bonus.
- You can vote for who should be excluded from receiving the bonus.
- The option that gets at least two votes will be executed. If no option gets two votes, no one will be excluded from the bonus.
- ***[Show Poster with exclusion possibilities.]***

**To make your decision, please enter the code 9876 into the tablet and hit "next".**

- What do you vote for:
  1. Exclude group members who decided to put their points in the group account.
  2. Exclude group members who decided to put their points in the private account.
  3. Not exclude any group members.

- Thank you for completing all stages of this situation.
- You will now be able to see on your tablet the voting result and who was excluded from the bonus. ***[Use poster to explain what participants see.]***

---

**Contribution in one-shot social dilemma without feedback [low-noF and hi-noF]**

- Now we get to the next stage, where we ask you to make a decision yourself.
- Remember, you will be paired with 2 other participants from this session. You will never know who your group members are, nor will they.

**Contribution**

- Each group member (that is, you and the other 2 members of your group) has 4 points. You can decide to put the points in the group account or put them in the private account.
- If a group member puts the 4 points to the group account, then the points in the group account are increased to 6 and split equally among all group members. This means every group member gets 2 points.
- If a group member puts the 4 points to the private account, this means that only this group member receives 4 points into her private account.
- Remember that earned points will be exchanged to Tanzania-Schilling (TZS) at the end of the session. One point is worth **250** TZS and this situation will be paid out.
- What is your decision:
    1. Put the points in the group account.
    2. Put the points in the private account.

**To make your decision, please enter the code 1234 into the tablet and hit "next".**

- Thank you for completing all stages of this situation.
- You will now be able to see on your tablet the total points earned for this situation.

---

**Repeated social dilemma with feedback [low-F and hi-F]**

- We will now repeat the same situation for 6 rounds. At the end, we will throw a dice to select which of these 6 rounds is being paid out. Thus, each round is equally important for your earnings. Remember that one point is exchanged to 250 TZS in cash.
- Please listen to the instructions first, we will then give you the code to proceed with the next stage.
- Before each round, you will be matched with 2 other participants from this session that have never been in your group before and will not be in your group again.
- Each round you have an endowment of 4 points and must decide whether to put the points in the group account or put the points in the private account.
- If a group member puts the 4 points to the group account, then the points in the group account are increased to 6 and split equally among all group members. This means every group member gets 2 points.
- If a group member puts the 4 points to the private account, this means that only this group member receives 4 points into her private account.
- At the beginning of each round, you will be asked about your guess what most people will actually do in this round? You will get 1 additional point if your guess is correct.
- Then, you will decide whether you want to put the points in the group account or put them in the private account.
- After all group members made their decisions, there is a bonus stage, where each group member can get a bonus of 1 point.
- However, you have the possibility to exclude group members from the bonus. There are three options to exclude members:

1. You can vote to exclude group members who decided to put their points in the group account.
2. You can vote to exclude group members who decided to put their points in the private account.
3. You can vote to not exclude any group members.

- The option that gets at least two votes will be implemented. If no option gets two votes, no one will be excluded from the bonus.
- At the end of each round, you learn about the decisions of the group members, about the voting result and also about how many points you earned.
- Let's start with the 6 repeated rounds. Please always hit "next" until the next code.

**To start with the repeated rounds, please enter the code 2468 into the tablet and hit "next".**

---

**Repeated social dilemma without feedback [low-noF and hi-noF]**

- We will now repeat the same situation for 6 rounds. At the end, we will throw a dice to select which of these 6 rounds is being paid out. Thus, each round is equally important for your earnings. Remember that one point is exchanged to 250 TZS in cash.
- Please listen to the instructions first, we will then give you the code to proceed with the next stage.
- Before each round, you will be matched with 2 other participants from this session that have never been in your group before and will not be in your group again.
- Each round you have an endowment of 4 points and must decide whether to put the points in the group account or put the points in the private account.
- If a group member puts the 4 points to the group account, then the points in the group account are increased to 6 and split equally among all group members. This means every group member gets 2 points.
- If a group member puts the 4 points to the private account, this means that only this group member receives 4 points into her private account.
- At the beginning of each round, you will be asked about your guess what most people in this session will actually do? You will get 1 additional point if your guess is correct.
- Then, you will decide whether you want to put the points in the group account or put them in the private account.
- Let's start with the 6 repeated rounds. Please always hit "next" until the next code.

**To start with the repeated rounds, please enter the code 2468 into the tablet and hit "next".**