Changing Collective Action – How a norm-nudge affects group decisions in a social dilemma experiment*

Florian Diekert[1,2] and Tillmann Eymess[1]

[1]Alfred Weber Institute for Economics, Heidelberg University
[2]CEES, Department of Biosciences, University of Oslo

Study plan
March 8, 2020

1 Overview

There is a growing interest in using norm-based interventions or "norm-nudges" to promote cooperative behavior when formal regulations are not an option for political or technical reasons. The success of norm-nudges is documented in several domains, including charitable giving (Shang and Croson, 2009), voting behavior (Gerber and Rogers, 2009), retirement savings (Duflo and Saez, 2003), and tax compliance (Hallsworth et al., 2017). Research that leverages social norms to induce desirable behavior has generally studied norm-based interventions when decisions are made by individuals (see Farrow et al. (2017) for a review). However, in reality decisions are often made by groups. This is particularly true for natural resources in developing countries.

Research on public good games has established that groups defect more often than individuals (Kugler et al., 2012) and that individual decisions are not necessarily a good predictor of the decisions made by groups (Charness and Sutter, 2012).[1] As a consequence, the effectiveness of norm-based interventions when decisions are made by groups is unclear, and, in fact, untested.

With our experiment, we aim to build a bridge between the lab and the field to inform policy makers whether a norm-nudge could improve resource management at Lake Victoria, Tanzania. We study the effect of norm-nudges by varying whether participants

*Research is funded by the European Research Council Project NATCOOP (ERC StGr 678049). Correspondence: diekert@uni-heidelberg.de or eymess@uni-heidelberg.de

[1]The finding is labeled as "discontinuity effect" in the social psychology literature (Insko et al., 1988; Schopler and Insko, 1992; Wildschut et al., 2003).

are given social information about past behavior of other groups. Groups in our experiment are recruited from fishing crews. At Lake Victoria, there are two relevant forms of decision making on board. Decisions are either made by all crew members together (majority) or by a captain (representative). Thus, we study the effect of a norm-nudge both when group action is determined by majority, or by a randomly selected representative.

Due to a lack of political will or limited state capacity, formal enforcement at Lake Victoria is insufficient to ensure the sustainable use of the local fisheries, making it a textbook example for the need of norm-based interventions. Fishers at the lake work in crews (crew size mean = 3.79, median = 4 for the sample observed in Diekert et al. (2019)). Hence, resource extraction is a joint decision. While single crew members may prefer to increase or reduce their fishing efforts, all fishers on a boat will always harvest or preserve the resource together.

2 Experimental Design

The experiment is a repeated two-team prisoner's dilemma game with social sanctioning. The prisoner's dilemma is played with a binary choice set, framed as a decision to take points from a collective account or to leave points in a collective account. Three participants play together in a team. Two teams form a collective and share an account with eight points. Both teams can either take four points from the collective account *(defect)* or leave the points in the collective account *(cooperate)*. Moves are made simultaneously. The remaining points increase and are then distributed equally. For four points left in the collective account, both teams receive three points, *i.e.* a marginal per agent return of 3/4. The payoff matrix illustrates that defection is the payoff-dominant strategy, see Figure 1. In the following we explain the different stages of the experimental design.

		Team 2	
		cooperate (leave)	*defect* (take)
Team 1	*cooperate* (leave)	6,6	3,7
	defect (take)	7,3	4,4

Figure 1: Payoff Matrix

2.1 Social Information

Social information is only provided in the social information treatments (**SI**), but not in the no social information treatments (**noSI**). Participants are given information about

past behavior of other teams in a previous session of the experiment. By leveraging social comparison, the social information message is designed to affect participants' expectation about the upcoming interaction in the direction of cooperative play. The message is verbally provided during the instructions of the game. To induce cooperative play, the following message is given:

You are not the first landing site where fishermen participated in this survey. In a previous session, many/most[2] *teams left the points in the collective account.*

2.2 Team Decision

After teams are fully informed about the game's rules (including the social sanctioning mechanism discussed below), teams are asked to decide on an action. All participants privately choose whether they want their team to take four points from the collective account or leave the points in the collective account. Two team decision processes are imposed and crossed with the social information treatments in a factorial manner: In the majority treatments (**maj-SI** and **maj-noSI**) the team action is determined by a majority vote. In the representative treatments (**rep-SI** and **rep-noSI**) the team action is determined by implementing the choice of a randomly selected team member. That is, all team members make a choice before knowing whether their choice is implemented as the team's action.

Teams are not informed about the identities of members in the other team. Direct communication or interaction within or across teams is not allowed. The experimenter is not able to observe individual choices or team actions.

2.3 Disapproval

Similar to the non-monetary punishment mechanism introduced in Masclet et al. (2003) and Dugar (2013), participants have the opportunity to express their disapproval of other teams' actions after making their contribution decision. Each individual has to simultaneously choose one of the following three options: (i) to disapprove defection, (ii) to disapprove cooperation, or (iii) to disapprove neither action.

All participants are informed about the number of participants disapproving each option during feedback, see below. Note that disapproval is given by participants since judging the appropriateness of an action is not a team decision. Yet, disapproval is received by teams as all team members are subject to the consequences of their team's

[2]In Swahili, "many" and "most" are both translated with the word "wengi".

action. Also, the disapproval votes are given without knowledge of the actions chosen by other teams in their collective or in other collectives.

2.4 Feedback

In the last stage, participants are informed about the outcome of the prisoner's dilemma game and the disapproval rating. First, all participants within a team are informed about the choices of their team members and the resulting team action. Second, all participants within a team are informed about the aggregate action of the other team in the collective. They are however not informed about the individual choices that lead to the aggregate decision of the other team. No information will be given about the outcomes in other collectives. Third, participants are informed about their own team's total payoff from the prisoner's dilemma. Finally, all participants are informed about the number of participants in the session that disapprove of either action and the number of participants that do not disapprove of any action.

2.5 Repetition

The game is played for a total of five rounds. Teams are re-matched into new collectives based on a total stranger matching protocol, *i.e.*, for each new round of the game, teams are randomly matched with another team that they have not played with before. The composition of participants in a team remains the same over all five rounds.

2.6 Elicitation of Normative Beliefs and Expectations

Norms are the combination of behavior and beliefs Bicchieri et al. (2018). To assess the influence of social information on beliefs, we elicit participants personal normative beliefs after the explanation of the rules. Specifically, we ask them what they think is the morally right thing to do in this situation. In addition, we elicit participant's empirical expectations by asking them what they "guess most teams in this survey will actually do?". We elicit empirical expectations in every round.[3]

[3]The elicitation of empirical expectations is incentivized – participants earn one extra point when their guess is correct.

2.7 Implementation

The experiment will be implemented with fishermen in the Lake Victoria region, Tanzania.[4] The research trip comprises 36 sessions at 24 landing sites with two prior pilot sessions. Data will be collected between March 9th and April 3rd 2020.[5]

For each session six boats will be randomly selected from the list of registered vessels at a given landing site. From each boat, we randomly select three fishers that are willing to participate in the experiment. Hence, we have 18 participants in six teams that can form three collectives in each round of the game.

After selection of participants, seating IDs ensure a random allocation over the available space. Informed consent is obtained and a detailed explanation of the game's rules are given. In particular, it will be highlighted that all decisions are made anonymously, that communication is not allowed, and that the points earned during the game directly translate to real money at the end of the experiment. To ensure that rules are well understood, test scenarios will be played out and comprehension of the scenarios' outcomes is assessed with test questions. Responses may serve as a measure of understanding in the analysis. All decisions in the experiment will be made on tablet computers, using the oTree software to implement all parts of the game (Chen et al., 2016).

After finishing all repetitions of the prisoner's dilemma game, one round will be randomly chosen for payout. The game will be calibrated such that participants, independent of treatment, earn an average of approximately USD 5. In combination with an unrelated second experiment and a questionnaire to survey background information, a session will last about two hours.

3 Hypotheses and Testing

Our 2×2 factorial design between social information and decision making process results in four different treatments, see Figure 2. Our main hypotheses focus on the comparison of average cooperation rates in treatment $\mathbf{t}$ denoted by $x_{\mathbf{t}}$. In Figure 2), we show the number of observations and sessions in each treatment cell. To balance the number of independent team actions, majority treatments are run approximately three times as often as representative treatments. As any of the three decisions within a group could determine the team action in the representative treatment, we get three observations

[4]Field research is conducted within the NATCOOP project, an ERC funded research project (principal investigator: Prof. Dr. Florian Diekert, `www.natcoop.eu`). The proposed trip in 2020 will be the third field trip to Tanzania by the NATCOOP team.

[5]Two pilot sessions will be run on March 6th and March 7th 2020.

per group. In the majority treatment, all three decisions are necessary to determine one team action.

	Social information	*No social information*
Majority	**maj-SI** – 78 obs. (13 sess.)	**maj-noSI** – 78 obs. (13 sess.)
Representative	**rep-SI** – 90 obs. (5 sess.)	**rep-noSI** – 90 obs. (5 sess.)

Figure 2: Treatment overview and sampling plan

Our main research objective is the effect of norm-based interventions on group decisions. Research that studies decisions of individuals in a group context suggests several potential motivations why the provision of social information may lead to a behavioral change in the social dilemma.

3.1 Social Information in Majority and Representative Treatments

We propose three motivations for a behavioral change under social information that are independent of the decision making process.

First, individuals may be motivated by social preferences such as altruism or fairness (*i.e.*, the equality of payoffs). Under fairness considerations, behavioral responses are directly influenced by social information. When social information is successful in changing the anticipation of out-group behavior to be more cooperative, a fairness preference suggests a more cooperative response.

Second, individuals may have a preference for conformity (*i.e.*, behavior that is in line with others). If social information changes the expectation of others‘ behavior in the direction of cooperation, a preference for conformity with the out-group suggests own cooperation.[6]

Third, individuals may defect because they fear exploitation by the out-group. In the social dilemma, the motivation is consistent with the desire to protect the in-group from a sucker payoff. Defection as a defensive response is necessary when the out-group is not trusted to cooperate. Social information should decrease the need for in-group protection. When other groups cooperate, they are not achieving gains at the cost of the in-group. Hence, social information should increase cooperation.

In spite of the documented effect that groups behave close to rational self-interested play, social preferences, conformity and the fear of exploitation all suggest higher coop-

[6]Additionally, preferences for conformity with own-group members also suggests own cooperation if one believes that own-group members have a preference for conformity.

eration rates with social information. Hence, we formulate a directed hypothesis, which we test for both decision making processes independently:

Hypothesis 1 *Average cooperation by groups is higher with social information.*

$$x_{\mathbf{maj-SI}} > x_{\mathbf{maj-noSI}} \qquad \text{and} \qquad x_{\mathbf{rep-SI}} > x_{\mathbf{rep-noSI}} \tag{1a and 1b}$$

3.2 Differential Effect in Majority and Representative Treatments

A key mechanism why the behavioral responses between majority and representative treatments may differ is the evasion of responsibility. In a majority decision, responsibility of each individual is decreased. In contrast, it is not possible to evade responsibility in the representative treatment as the representative is the only group member that determines the group action. The varying degree of responsibility for the individual within the group has implications for behavioral responses in our experiment.

Why Responsibility is Detrimental for Cooperation

Individuals may be motivated by in-group favoritism, *i.e.*, acts of competitive self-interest. In-group favoritism suggests defection as it increases the payoff of oneself and one's in-group members. Cooperation is costly not only at the expense of own payoffs but also at the expense of one's group members. The representative is solely responsible for benefiting the in-group and may feel forced to defect irrespective of social information. In contrast, individuals may feel a greater freedom of choice in the majority treatment and feel less pressure to defect for in-group benefits.

Why Responsibility is Beneficial for Cooperation

An individual may want to maximize own payoff and at the same time feel pressured to follow norms of fairness, or conformity (or actually want to behave pro-socially, creating dissonance). In majority treatments, the individual can hide her own choice to maximize own payoff behind the group's action and evade the responsibility for not following norms or pro-social preferences. Consequently, the channels suggesting an increase of cooperation (discussed in section 3.1) may be less effective in the majority treatments than in the representative treatments.

To summarize, majority and representative treatments differ by the amount of responsibility that is given to the individual. We have both argued that responsibility can increases cooperation and that responsibility can decrease cooperation. Furthermore,

there is no established evidence on that matter. Therefore, we formulate a null hypothesis:

Hypothesis 2 *The effect of social information does not differ between the decision making process treatments.*

$$||x_{\mathbf{maj-SI}} - x_{\mathbf{maj-noSI}}|| = ||x_{\mathbf{rep-SI}} - x_{\mathbf{rep-noSI}}|| \tag{2}$$

3.3 Manipulation Check

The effectiveness of the social information treatment depends on the successful manipulation of empirical expectations. Only when individuals change their expectation of others' behavior, the motivations discussed in section 3.1 may lead to behavioral changes. Hence, we will analyze empirical expectations throughout the repeated prisoner's dilemma to assess whether there is an influence of social information on empirical beliefs. Moreover, the disapproval stage enables individuals to give normative feedback. When social information leads to cooperative expectations and actions, it may also induce individuals to disapprove of defection. Thus, we test whether defection is disapproved more often in the social information treatments than in the treatments without social information.

3.4 Exploration

Beyond the hypotheses formulated in sections 3.1 and 3.2, we will explore the following research questions.

First, we explore ask how the crew-specific decision making process in the real world affects behavior in the two decision making treatments. During a questionnaire after the experiment, we will elicit the relevant dimensions of decision making within the group when the crew fishes on Lake Victoria. Second, we analyze whether behavior in the prisoner's dilemma is in line with stated social preferences and preferences for conformity that are elicited during the questionnaire. Last, we expect that group actions are dependent on the degree of social proximity of individuals within and across groups. Specifically, individuals are expected to have higher preferences for altruism and conformity when they are socially close to their peers. With naturally occurring groups, *i.e.*, self-selected fishing crews, altruism and conformity may depend on social affiliation with the in-group (own boat) and the out-group (other boats). A measure for social affiliation will be elicited during the questionnaire.

References

Bicchieri, C., Muldoon, R., and Sontuoso, A. (2018). Social norms. In Zalta, E. N., editor, *The Stanford Encyclopedia of Philosophy*. Metaphysics Research Lab, Stanford University, winter 2018 edition.

Charness, G. and Sutter, M. (2012). Groups make better self-interested decisions. *Journal of Economic Perspectives*, 26(3):157–76.

Chen, D. L., Schonger, M., and Wickens, C. (2016). oTree - an open-source platform for laboratory, online, and field experiments. *Journal of Behavioral and Experimental Finance*, 9:88–97.

Diekert, F., Eymess, T., Luomba, J., and Waichman, I. (2019). The Creation of Social Norms under Weak Institutions. Manuscript, Heidelberg University.

Duflo, E. and Saez, E. (2003). The role of information and social interactions in retirement plan decisions: Evidence from a randomized experiment. *The Quarterly journal of economics*, 118(3):815–842.

Dugar, S. (2013). Non-monetary incentives and opportunistic behavior: Evidence from a laboratory public good game. *Economic Inquiry*, 51(2):1374–1388.

Farrow, K., Grolleau, G., and Ibanez, L. (2017). Social norms and pro-environmental behavior: a review of the evidence. *Ecological Economics*, 140:1–13.

Gerber, A. S. and Rogers, T. (2009). Descriptive social norms and motivation to vote: Everybody's voting and so should you. *The Journal of Politics*, 71(1):178–191.

Hallsworth, M., List, J. A., Metcalfe, R. D., and Vlaev, I. (2017). The behavioralist as tax collector: Using natural field experiments to enhance tax compliance. *Journal of Public Economics*, 148:14 – 31.

Insko, C. A., Hoyle, R. H., Pinkley, R. L., Hong, G.-Y., Slim, R. M., Dalton, B., Lin, Y.-H. W., Ruffin, P. P., Dardis, G. J., Bernthal, P. R., et al. (1988). Individual-group discontinuity: The role of a consensus rule. *Journal of Experimental Social Psychology*, 24(6):505–519.

Kugler, T., Kausel, E. E., and Kocher, M. G. (2012). Are groups more rational than individuals? a review of interactive decision making in groups. *Wiley Interdisciplinary Reviews: Cognitive Science*, 3(4):471–482.

Masclet, D., Noussair, C., Tucker, S., and Villeval, M.-C. (2003). Monetary and nonmonetary punishment in the voluntary contributions mechanism. *American Economic Review*, 93(1):366–380.

Schopler, J. and Insko, C. A. (1992). The discontinuity effect in interpersonal and intergroup relations: Generality and mediation. *European review of social psychology*, 3(1):121–151.

Shang, J. and Croson, R. (2009). A field experiment in charitable contribution: The impact of social information on the voluntary provision of public goods. *The Economic Journal*, 119(540):1422–1439.

Wildschut, T., Pinter, B., Vevea, J. L., Insko, C. A., and Schopler, J. (2003). Beyond the group mind: a quantitative review of the interindividual-intergroup discontinuity effect. *Psychological bulletin*, 129(5):698.