Do actions speak louder than words?

- Communication and partner choice in the prisoner's dilemma game

by

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PREFACE

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Frøydis Sæbø Steine

Frøydis Sæbø Steine, Bergen. June.01.2018

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ABSTRACT

Communication has been shown to enhance cooperation (Dawes, McTavish and Shaklee 1977; Isaac and Walker 1988; Sally 1995; Bochet, Page and Putterman 2006). But do all people benefit equally from communication? This thesis experimentally investigates two main research questions. First, how does chat room communication affect cooperation between two individuals in a social dilemma? Second, are individuals with different cooperative dispositions affected *differently* by communication? I also explore *how* potential partners use language to affect each other's behaviour. I conduct an experiment to answer these questions.

The experiment consists of three parts. In the first part, I elicit subjects' cooperative dispositions. In the second part, I study participants' cooperative behaviour in a two-person repeated prisoner's dilemma. All subjects are randomly placed in potential pairs of two. Each subject may choose to form a *mutual* partnership with the other person before engaging in the prisoner's dilemma. Half of the pairs may communicate with each other through a chat room prior to the partner choice. In the third and final part of the experiment, I re-elicit subjects' cooperative dispositions.

Results show that communication does not increase the overall probability of successfully forming a mutual partnership or subjects' overall payoff. However, subjects' average contributions are higher when they may communicate with their potential partner. More specifically, subjects classified as Cooperators in the first part of the experiment contribute significantly more when able to communicate, compared to Cooperators who cannot. Free Riders who may communicate are more likely to form mutual partnerships and they earn a higher payoff than Free Riders who may not communicate.

The experiment is computerized using the experimental program z-Tree 3.6.7 (Fischbacher 2007). Results are analysed using the statistical software STATA/IC 14.2 and Microsoft Excel 16.12.

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CHAPTER 1: INTRODUCTION

> I get the benefit only if I can persuade others to help me, and I can only get others to help me by giving them information [beyond the here and now]. If we can cooperate, we all gain; if not, we all lose. (Bickerton 2009, 166)

When there is a conflict between social and individual interest, one might gain from cooperation in the long run, even when there is a potential one-time payoff from cheating (Tullock 1985). Communication enhances such cooperative behaviour as language may be used by individuals to *persuade* one another to work together for a common end (Wilson and Harris 2017).

When we face a complex situation involving many individuals, communication may facilitate a solution to a coordination problem. In these complex situations, communication may also facilitate social pressure, shaming and group pressure. All these factors make the positive effect of communication on cooperation, difficult to explain in a situation involving many individuals (Sally 1995).

However, most of our daily encounters are not as complicated. When we interact with a co-worker, friend or spouse, there is only one person to make a mutual agreement with. If so, there is no coordination problem and no obvious reason why the effect of communication itself, on cooperation, might be "tainted" by other factors, such as group pressure.

This thesis experimentally investigates how communication affects the cooperation between two individuals who may *mutually choose* to cooperate, where having no partner leads to exclusion. More importantly, I examine whether communication affects individuals with different cooperative dispositions *differently*.

A key question motivating this thesis, is not only *if* communication affects cooperation, but also *how* participants use language to affect each other's behaviour towards a common benefit,

rather than pursuing one's own interest. As the successful formation of a partnership depends on the two potential partners mutually choosing each other, the focus shifts from choosing a partner, to the desire of being *chosen*. I suggest that individuals may use communication as a commitment and promise-giving device that upholds one's desire to be chosen by others.

I conduct an experiment, consisting of three parts. In **PART I**, I elicit subjects' cooperative type. **PART II** is designed to explore how pre-play communication affects cooperation. The design makes successful cooperation fairly simple to achieve. I minimize the coordination problem by randomly placing two and two subjects in *potential* partnerships. However, only those who *mutually* choose one another, engage in a prisoner's dilemma game. Those who do not form a mutual partnership, are excluded from the current period. The game continues for ten periods.

Two subjects who can form a partnership are randomly assigned to either the "Communication" or the "No communication" condition. Subjects in a potential pair assigned to the "Communication" condition, may communicate with each other through a chat room prior to the partner choice in each period. Those assigned to the "No communication" condition, may not communicate with each other. In **PART III**, I re-elicit participants' cooperative type.

Results show that pre-play communication is positively associated with increased overall contributions. More specifically, Cooperators contribute more, when able to communicate, compared to Cooperators who may not communicate. Finally, pre-play communication does not affect payoff or subjects' probability of successfully forming a mutual partnership, overall. However, Free Riders who may communicate with their potential partner, are more likely to form a mutual partnership and they are granted higher payoffs, compared to Free Riders who are not able to communicate.

The conversation topic that occurs most frequently in the chat room is *Commitment and Recruitment words*, mostly used by Cooperators. *Singular Pronouns* (e.g. *I* and *you*) is the

second most prevalent conversation topic, mostly used by Free Riders. Other frequently used conversation topics are *Earnings and Tactics* as well as *Plural Pronouns* (e.g. *we* and *us*).

This thesis yields three main contributions to the experimental literature on cooperation and communication. First, how chat room communication affects cooperation between two individuals. Second, whether individuals with different cooperative dispositions perform *differently* when they may communicate, compared to those who cannot communicate. Third, *how* individuals use communication to attract potential partners.

The rest of this thesis proceeds as follows. Chapter 2 offers an overview of the related experimental literature. Chapter 3 provides a summary of the experimental design and procedure of the controlled lab experiment as well as the procedure for classification of cooperative types. Chapter 4 presents the main findings regarding the effect of communication, overall, and for different cooperative types. I explore the language subjects use in the chat room, in Chapter 5. Chapter 6 contains some concluding remarks.

CHAPTER 2: RELATED LITERATURE

2.1 THE EFFECT OF COMMUNICATION

Findings from related literature show that communication enhance cooperative behaviour in social dilemmas (Dawes, McTavish and Shaklee 1977; Isaac and Walker 1988; Sally 1995; Bochet, Page and Putterman 2006). Dawes, McTavish and Shaklee (1977) investigate how communication affects subjects' behaviour in an eight-person commons dilemma. They find that defection from cooperation is significantly lower when individuals are able to communicate *relevant* information with each other, compared to the conditions where no communication or only irrelevant communication is allowed.

Similarly, Isaac and Walker (1988) find that people increase their individual contributions and cooperate more efficiently, thereby improving group optimality significantly, when they are able to communicate freely. In a meta-analysis of experiments from 1958 to 1992, Sally (1995) find that communication significantly increase cooperation by 45 percentage points in repeated games. Bochet, Page and Putterman (2006) investigate the effect of communication in an N-person game. They also find that communication significantly increase cooperation.

Furthermore, the effect of communication depends on the communication medium. Communication seems to be most efficient when the subjects are not anonymous, and are able to express both their voice and facial expressions. Thus, face-to-face communication is found to increase cooperation most efficiently (Sally 1995; Frohlich and Oppenheimer 1998; Bochet, Page and Putterman 2006). However, Sally (1995) find that communication through audio-visual conferences among subjects also increase cooperation significantly.

Computerized experiments including communication through written messages have become more frequently used over the last few decades. Researchers have investigated how anonymous,

written messages that removes the presence of facial expressions and voice, affect cooperation, compared to face-to-face communication. Frohlich and Oppenheimer (1998) investigate the effect of communication through e-mail in a prisoner's dilemma game. They find that the efficiency of cooperation increases significantly when allowing e-mail communication, compared to a condition with no communication. Still, the effect is smaller, compared to that of face-to-face communication.

Bochet, Page and Putterman (2006) allow communication through a chat room, in addition to a condition with no communication and one with face-to-face communication. Subjects able to communicate through a chat room significantly increase their average contributions, compared to the baseline with no communication. However, their average contribution is significantly lower than that of subjects allowed to communicate face-to-face.

Following Bochet, Page and Putterman (2006), I allow subjects in the "Communication" condition to communicate through a chat room. I investigate whether pre-play communication between the two subjects in a potential partnership affects their probability of forming a partnership, their contributions and their payoff.

2.2 COOPERATIVE TYPES

Research shows that peoples' cooperative dispositions are heterogenous and stable over time. Both Fischbacher, Gächter and Fehr (2001) and Fischbacher and Gächter (2010) elicit subjects' type using a variant of the "strategy method", developed by Selten (1967). The authors in both papers distinguish between Conditional Cooperators, Free Riders and Others. Conditional Cooperators' contributions are expected to be positively correlated with their beliefs about other individuals' contribution, whereas Free Riders are characterized as pure selfish. Conditional Cooperators are expected to contribute more, on average, compared to Free Riders.

Kurzban and Houser (2005) also elicit subjects' type. They classify them as Reciprocals (i.e. Conditional Cooperators), Free Riders and Unconditional Cooperators. Unconditional Cooperators are expected to contribute a great deal of their endowments all the time, regardless of their beliefs about other individuals' contribution.

I follow Fischbacher, Gächter and Fehr (2001) and Fischbacher and Gächter (2010) in eliciting subjects' type using the strategy method. I explore whether different types are affected *differently* by the opportunity to communicate. I also re-elicit individuals' type at the end of the experiment, to investigate whether communication changes the composition of different types in my sample.

2.3 WHY DOES COMMUNICATION MATTER?

> The willingness to enter into and honour commitments […] does indeed represent something wonderful, mysterious, and fundamental about human nature. The challenge of future research is to dispel the mystery. (Kerr and Kaufman-Gilliand 1994, 527)

It seems the ability to communicate shifts peoples' focus from *individual* to *collective* gain. Why does this happen? Both Dawes, Van De Kragt and Orbell (1988) and Kerr and Kaufman-Gilliand (1994) suggest that individuals' *promises* or *commitments to cooperate* leads to higher rates of cooperation. The social contract formed through these promises may influence peoples' preferences and create empathy and a sense of *group identity*, which in turn may alter their behaviour (Dawes, Van De Kragt and Orbell 1988; Sally 1995).

Wilson and Harris (2017) classify words subjects use in a chat room in three topics, including recruitment words, scavenging words and substantives. Recruitment words are words that subjects use to *encourage* or *persuade* each other to cooperate. Scavenging words include words that focus on *strategies* or *tactics*, and words that will affect participants' outcome.

Wilson and Harris (2017) also emphasize the function of specific substantives, such as *we* and *us*, to create a common identity when subjects pursue a common end. If these substantives creates a common identity, or a sense of group identity, they may influence peoples' behaviour.

Furthermore, communication may influence peoples' expectations and beliefs about others' behaviour. If the promises or commitments from others to cooperate seem credible, a person may alter her behaviour as she wishes to live up to others' expectations and avoid guilt (Charness and Dufwenberg 2006).

Following Wilson and Harris (2017), I classify words subjects use in the chat room in different conversation topics. I examine which topics are the most prevalent in the chat room and how subjects use words affiliated with the most prevalent topics. Finally, I explore whether different cooperative types use each conversation topic more or less frequently than others.

CHAPTER 3: THE LAB EXPERIMENT

I will begin this chapter by explaining the main features of the experimental design. I conduct a controlled lab experiment consisting of the following three parts, which I will explain in detail[1]. PART I: Type elicitation. PART II: Repeated prisoner's dilemma game with either communication or no communication. PART III: Type re-elicitation. Furthermore, I address the experimental procedure in addition to the procedure for classification of cooperative types.

3.1 EXPERIMENTAL DESIGN

I conduct a two-person repeated prisoner's dilemma (PD) game to examine the effect of communication. The PD game takes place within *potential* pairs of two subjects, with mutual partner choice. If the two potential partners do not mutually choose one another, none of them will engage in the game in the current period. If both subjects actively choose one another, they will form a partnership in the current period. If so, they will engage in the PD game which involves a production decision. This is the only way to earn a payoff in the current period. **TABLE 1, PANEL A** shows the payoff matrix in the PD game for a partnership between subject *i* and *j*.

Both subject *i* and subject *j* receive ten *blue* (private good) experimental currency units (ECU) each in the PD game. They may choose to keep some number of blue units to themselves, and some to produce *red* (public good) units with the other person. Their decision to contribute to the production of the public good is made privately and simultaneously.

Each blue unit used to produce the public good, is equal to 0.7 red units for subject *i* and 0.7 red units for subject *j*, creating a social dilemma. Total number of red units produced in each

[1] A detailed overview of the instructions from the lab experiment is provided in Appendix A.

period, is given by the sum of *i* and *j*'s contributions of blue units, x_i and x_j. Each blue and red unit is equal to one point, which is equivalent to one Norwegian kroner. The payoff for subject i, π_i, in each period is:

$$\pi_i = 10 - x_i + 0.7(x_i + x_j) \quad [1]$$

TABLE 1: PARTICIPANTS' CHOICES.

PANEL A: PAYOFF MATRIX IN THE PRISONER'S DILEMMA GAME.

	COOPERATE ($x_j = 10$)	**DEVIATE** ($x_j = 0$)
COOPERATE ($x_i = 10$)	(14, 14)	(7, 17)
DEVIATE ($x_i = 0$)	(17, 7)	(10, 10)

PANEL B: STRATEGY MATRIX WITH MUTUAL PARTNER CHOICE.

	STAY	**LEAVE**
STAY	Prisoner's dilemma game	(0,0)
LEAVE	(0,0)	(0,0)

TABLE 1, PANEL B shows the strategy matrix when partnership is based on mutual partner choice. The dominant strategy in the partners choice is always to STAY within a partnership. Furthermore, the dominant strategy is always to contribute zero to the production of the public good, and thereby DEVIATE in the PD game (**TABLE 1, PANEL A**).

As subjects are placed in potential partnerships, it is likely that the regression model errors are correlated within each pair, or cluster. When I analyse the data, I cluster the standard errors on partnership level, and assume that the regression model errors are independent across clusters (Angrist and Pischke 2014).

Note also that if subjects do not successfully form a mutual partnership, they cannot choose to contribute to the production of the public good. If so, I cannot observe how much they would have contributed, given the opportunity. The contribution variable in my sample is thus affected by a selection bias, as I may only observe subjects' contributions if, and only if, they successfully form a mutual partnership. When analysing the results in Chapter 4, I can therefore not measure the *causal effect* of communication on contribution for all participants. I can only measure how the opportunity to communicate affects the contributions of those who successfully form a partnership. Following Heckman et al. (1998), I provide a more detailed explanation of the selection bias in Appendix B.

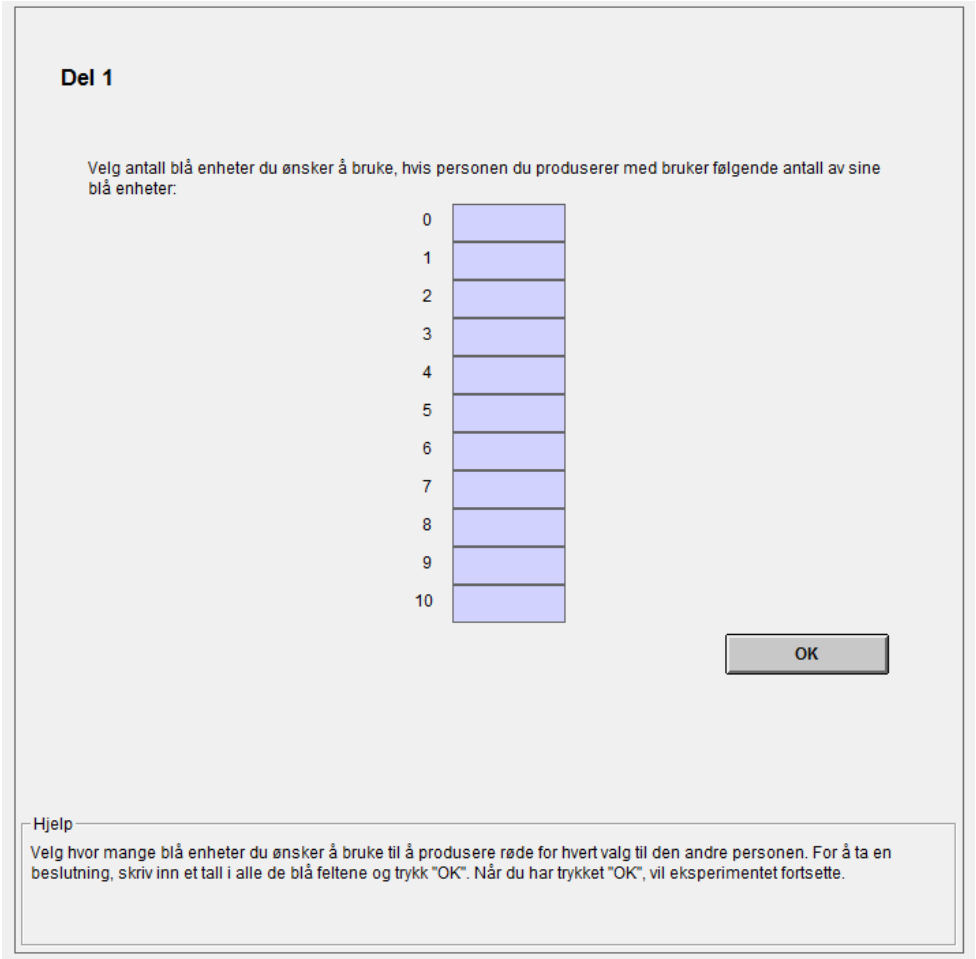
3.2 PART I

I elicit each subjects' type by implementing the strategy method (Selten 1967) as I conduct a one-shot PD game, following the design by Fischbacher, Gächter and Fehr (2001). In the first part of the experiment, the participants make two types of decisions; (1) an *unconditional* contribution, and (2) how much they are willing to contribute *conditional* on all possible contribution choices of another subject's contribution schedule. The contribution table thus utilizes the strategy method and elicits a contribution schedule for each subject in the experiment.

The strategy method is useful when gathering data for empirical analysis on subjects' behaviour, as it provides multiple observations for each participant. Furthermore, it provides me with contingent decisions for all possible choices that the subjects might choose, not only the ones they choose in the actual game (Brandts and Charness 2011). **FIGURE 1** displays the layout for the contribution table[2].

[2] I present four screen-shots from z-Tree in this chapter. English translation of the text in each screen-shot is provided in Appendix C.

FIGURE 1: CONDITIONAL CONTRIBUTION TABLE.



Both types of decisions may affect subjects' final payoff, which gives them a monetary incentive to take them seriously. They are told that a random draw will determine which of the two decisions that will affect their final payoff. For one randomly chosen subject, the conditional contribution table will be the relevant decision, while the unconditional contribution will be the relevant decision for another randomly chosen subject. The two randomly chosen subjects who's decisions are paired together, belong to the *same* treatment condition. Participants are not informed of this payment procedure.

3.3 PART II

Subjects are randomly assigned to one of two treatment conditions in PART II of the experiment, either the "Communication" or the "No communication" condition. **TABLE 2** displays the main features of the experimental design.

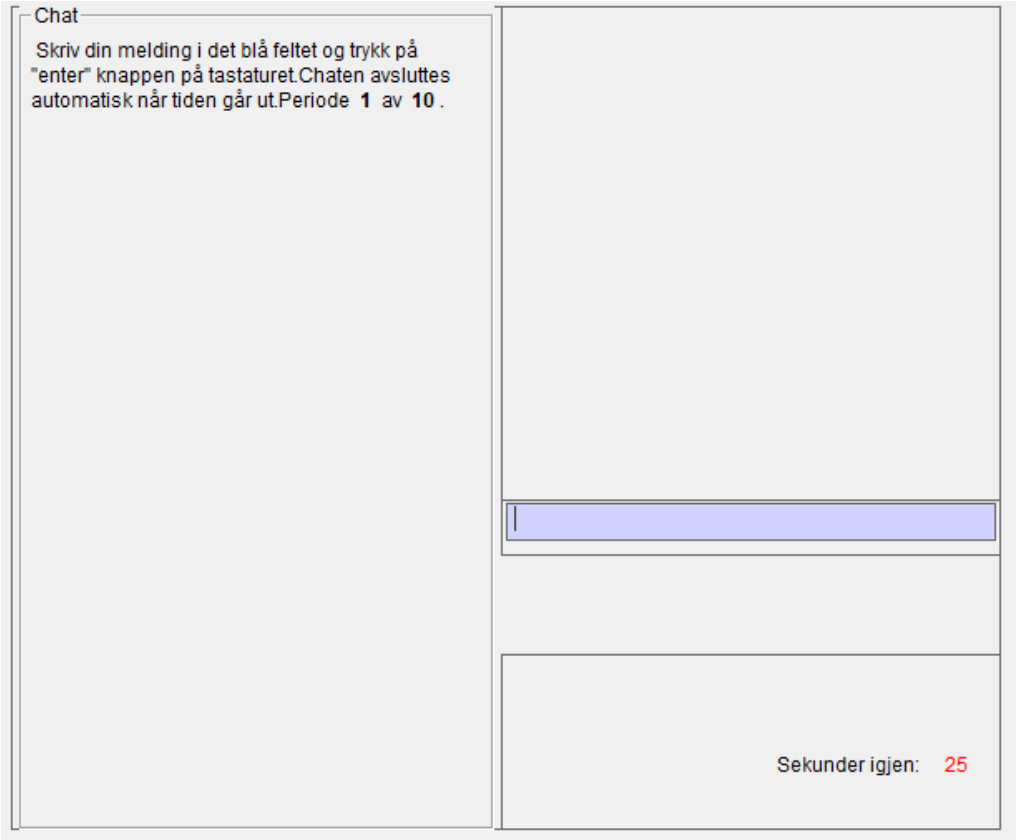
TABLE 2: MAIN FEATURES OF THE LAB EXPERIMENT.

"Communication"	Maximum 12 subjects per session, divided in 6 pairs.	A total of 100 subjects, 50 pairs and 9 sessions.
"No communication"	Maximum 12 subjects per session, divided in 6 pairs.	A total of 98 subjects, 49 pairs and 9 sessions.

Each subject is placed in a fixed *potential* partnership with one other subject. They are told that they will be given the opportunity to cooperate with the other person throughout this part of the experiment, consisting of ten periods. Furthermore, subjects are informed of their personal ID-number, and their potential partner's ID-number.

The two subjects who can form a partnership belong to the same treatment condition, though they are not given this information. Depending on their treatment condition, each potential pair proceeds to the partner choice with, or without, the opportunity to communicate first. Subjects in the "Communication" condition may communicate with their potential partner through a chat room in the beginning of *each* period. Subjects in the "No communication" condition may not communicate. The chat room automatically close after 25 seconds. From here on, participants in both the "Communication" and the "No communication" condition face the same decisions for the rest of the current period. **FIGURE 2** displays the layout of the chat room in the "Communication" condition.

FIGURE 2: CHAT ROOM.



The two subjects in a potential pair, may *mutually choose* to form a partnership. They make their decision simultaneously within ten seconds. Both subjects are informed that if any of them abstain from choosing one another, they do not form a mutual partnership. If so, they will both be excluded from the following production decision and their payoff in the current period will be equal to zero. The default choice is set to the subject's ID-number itself. To be able to move on to the production decision, each of them must *actively* choose one another. **FIGURE 3** displays the layout of the partner choice.

FIGURE 3: THE PARTNER CHOICE.

If the two subjects mutually choose one another, they form a partnership in the current period and proceed to the production decision. The production decision is designed as a prisoner's dilemma, and employs the payoff function as defined in equation [1], section 3.1. All participants engaging in the production decision, are endowed ten blue units (private good). The two subjects in each partnership make their production decision simultaneously within ten seconds. **FIGURE 4** displays the layout of the production decision.

FIGURE 4: THE PRODUCTION DECISION.

The default is set to zero, so that each subject must *actively* choose to produce the public good. As the production decision automatically ends, each subject is informed of her personal inventory of the private and public good from the current period. This marks the end of the current period, and the experiment will continue to the next period. When the ten periods are completed, PART III of the experiment begins.

3.4 PART III

To re-elicit subjects' type, they make the two decisions regarding their unconditional and conditional contribution again, identically as in PART I of the experiment. By re-eliciting subjects' type, I may examine whether pre-play communication affects the composition of types in my sample.

Participants are told that they have made the same decision before and that they, despite this, are free to make whatever choice they want in these new decisions. They are also informed that a random draw will determine which of the two decisions that will affect their final payoff. For one randomly chosen subject, the conditional contribution table will be the relevant decision, while the unconditional contribution will be the relevant decision for another randomly chosen subject. The two randomly chosen participants who's decisions are paired together, belong to *different* treatment conditions. This matching process ensures that all subjects are matched with someone else than any previous match in the experiment. Participants are not informed of this payment procedure.

As PART III of the experiment ends, all participants are asked to answer two questions. First, regarding their gender. Second, whether they have participated in economic experiments prior to this one.

3.5 EXPERIMENTAL PROCEDURE

Pilot experiments executed prior to the main experiment is important to ensure efficiency and minimize the chance of unreliable results (Sincero 2012). To make sure that z-Tree worked as planned, I executed several private pilots in the lab. Furthermore, I executed one external, participatory pilot to ensure that the instructions and information provided to the participants were correct, sufficient and efficient.

Six students were recruited to act as participants in the external, participatory pilot. This means that the subjects were informed that they were in a pre-test phase, and encouraged to make comments and suggestions regarding the experiment. Each of them contributed with valuable feedback regarding both the instructions and the information they were provided during the pilot. None of the participants in the external, participatory pilot were included in the main experiment.

The experiment was conducted February 14th, 2018 at the Citizen lab, Sofie Lindstrøms Hus in Rosenberg gate 35, at the University of Bergen. Participants were mainly recruited through *hroot* (Bock, Baetge and Nicklisch 2014). The invitation e-mail was sent out one week prior to the experiment[3]. In addition, students at the University of Bergen and at the Norwegian School of Economics could sign up through internal web pages. All participants were informed, both in the invitation e-mail and through the internal web pages, that they would receive 50 NOK as a show up fee.

All nine sessions were conducted on the same day, starting at 8.20 am. and lasting until the ninth session ended at 5 pm. A total of 198 students participated in the experiment, 100 in the "Communication" condition and 98 in the "No communication" condition. 18-24 subjects

[3] Details about the invitation e-mail is provided in Appendix D.

participated in each session. I used the program z-Tree 3.6.7 (Fischbacher 2007) to conduct the experiment.

Participants were randomized between the two treatment conditions *within* each session. Upon arrival, subjects were greeted by a lab assistant as they drew an identity tag from an urn on their way into the lab. They took a seat at any available computer, separated by partition walls. Each computer corresponded to either the "Communication" or the "No communication" condition. Subjects were not given this information.

In addition to the lab assistant, three experimenters conducted the experiment. As the experiment started, subjects were asked by one of the experimenters not to speak with each other, raise their hand if they had any questions and that they could withdraw for the experiment at any time. The same experimenter was available to enter the lab during the experiment if there were any questions. All other information was provided to the participants on the computer.

At the end of the experiment, subjects reported the letter on their identity tag (ranging from A to X) in a questionnaire. This allowed the two experimenters, seated in a separate control room during the entire experiment, to link each subject to their earnings as they prepared the payments.

Envelopes with participants' earnings were finalized and sealed by the two experimenters in the control room. All envelopes were marked with a letter corresponding to a subject's identity tag and handed to the experimenter in the lab. She handed them out to the subjects in exchange for their identity tag as they left the lab. The payment procedure ensured that none of the experimenters knew the amount each participant received, thereby ensuring the double blindness condition.

Each session lasted for approximately 35 minutes. On average, each participant earned 163 NOK (21.35 USD) in total. This equals an average hourly payment of 279 NOK (36.55 USD), well above average hourly wage for an undergraduate student in Norway.

3.6 CLASSIFICATION OF COOPERATIVE TYPES

All subjects made their *conditional* contribution choices both in PART I and PART III of the experiment. They chose the amount of their private good they would contribute, ranging from zero to ten ECU, conditional on another person's contribution of their private good. I use subject i's eleven conditional contributions choices, denoted as $y_i^k, k = 0, 1, 2 \dots 10$, to classify her cooperative type from the elicitation in PART I and the re-elicitation in PART III of the experiment.

I follow the classification procedure of Kurzban and Houser (2005), and elicit i's cooperative type based on her Ordinary Least Square estimated contribution profile (LCP). Equation [2] defines the LCP. The constant captures subject i's unconditional contribution, the slope measures her response to the partner's contribution and u_i^k is the error term.

[2] $$y_i^k = \alpha_i + \beta_i y^k + u_i^k$$

By creating cut-off values for subjects' estimated contribution profile, I classify each participant as a *Cooperator*, *Free Rider* or *Others*. Cooperators show a willingness to cooperate. Their LCP's are either always above 75 % of the endowment, as an Unconditional Cooperator[4], or within a band of 25 % of the endowment along the 45-degree line, as a Conditional Cooperator[5]. However, if a subject's LCP always lies below 25 % of the total endowment, she is classified

[4] Predicted contributions $\hat{y}_i^k \geq 7.5$ for all k (Unconditional Cooperator: 4.04 % in PART I, 4.55 % in PART III).
[5] Predicted contributions $-2.5 + k \leq \hat{y}_i^k \geq 2.5 + k$ for all k (Conditional Cooperator: 40.91 % in both PART I and PART III).

as a Free Rider[6]. Participants who do not follow any of the specified contribution profiles, are classified as Others.

TABLE 3 shows the distribution of cooperative types classified from the elicitation in PART I and the re-elicitation in PART III of the experiment. The overall composition of types classified from both the elicitation and the re-elicitation is nearly identical.

TABLE 3: CLASSIFICATION OF COOPERATIVE TYPES.

Type	**PART I**	**PART III**
Cooperator	89 (45, 44), **45 %**	90 (46, 44), **45 %**
Free Rider	35 (13, 22), **18 %**	33 (15, 18), **17 %**
Others	74 (40, 34), **37 %**	75 (37, 38), **38 %**
N	*198*	*198*

Note: PART I shows the number of subjects in the sample classified as each type from the elicitation. PART III shows the number of subjects in the sample classified as each type from the re-elicitation. Number of subjects in each treatment condition in parentheses ("No communication", "Communication").

The distribution of cooperative types in my experiment is fairly similar to findings from related literature. Fischbacher, Gächter and Fehr (2001) find that 50 % of the subjects in their sample may be classified as Conditional Cooperators and 30 % are classified as Free Riders. 55 % of the subjects in the sample of Fischbacher and Gächter (2010) are classified as Conditional Cooperators, and 23 % are classified as Free Riders. Kurzban and Houser (2005) classify 63 % of the subjects in their sample as Reciprocals (i.e. Conditional Cooperators), 20 % as Free Riders and 13 % as Unconditional Cooperators.

[6] Predicted contributions $\hat{y}_i^k \leq 2.5$ for all k.

CHAPTER 4: RESULTS

4.1 EFFECTS OF PRE-PLAY COMMUNICATION

RESULT 1: *Pre-play communication does not significantly increase the overall probability of forming a partnership.*

The two potential partners form a partnership in the current period if they *mutually* choose one another. If not, they are both excluded from the current period. Results indicate that the overall estimated probability of forming a partnership is nearly identical in both treatment conditions. Subjects in the "Communication" condition face a 4.50 percentage points (p=0.338) higher probability of successfully form a mutual partnership, compared to subjects in the "No communication" condition (column 1, **TABLE 4**).

TABLE 4: OLS REGRESSIONS. ESTIMATED EFFECT OF PRE-PLAY COMMUNICATION ON SUBJECTS' PROBABILITY OF FORMING A PARTNERSHIP.

	(1)	(2)	(3)	(4)
	All periods	**All periods**	**Periods 1 – 5**	**Periods 6 – 10**
Communication	0.0450	0.0843	0.0506	0.0230
	(0.0468)	(0.0697)	(0.0577)	(0.0543)
Period		0.0866***		
		(0.00656)		
Communication x Period		-0.00864		
		(0.00948)		
Female		-0.0608	-0.0968**	-0.0248
		(0.0393)	(0.0442)	(0.0449)
Participate		0.0137	0.00827	0.0191
		(0.0289)	(0.0394)	(0.0321)
Constant	0.649***	0.208***	0.514***	0.855***
	(0.0358)	(0.0578)	(0.0577)	(0.0605)
N	**1980**	**1980**	**990**	**990**
adj. R^2	**0.002**	**0.258**	**0.009**	**0.000**

Note: Cluster-robust standard errors in parentheses (clustered on 99 groups) * p<0.10, ** p<0.05, *** p<0.01. *Participate* indicates whether an individual has participated in an economic experiment prior to my experiment.

(1) Overall estimation results, with no controls.
(2) Estimation results, with controls.
(3) Estimation results in periods 1 – 5, with controls.
(4) Estimation results in periods 6 – 10, with controls.

Overall, participants successfully form a mutual partnership 64.9 % of the time in the "No communication" condition, and 69.4 % of the time in the "Communication" condition, on average. This equals a 6.9 % difference in average partnership formation between the two treatment conditions.

Subjects in the "Communication" condition are 5.06 percentage points (p=0.383) more likely to successfully form a mutual partnership in periods 1 – 5, compared to subjects in the "No communication" condition in the same five periods (column 3, **TABLE 4**). Furthermore, in periods 6 – 10, participants who may communicate are 2.30 percentage points (p=0.672) more likely to form a mutual partnership, compared to participants in the same five periods who may not communicate (column 4, **TABLE 4**).

Communication does not seem to significantly affect the probability of successfully forming a mutual partnership, overall. Subjects in both the "No communication" and the "Communication" condition seem to follow a similar, increasing likelihood of successfully forming a partnership throughout the game.

RESULT 2: *Subjects contribute significantly more in the "Communication" condition, compared to the "No communication" condition, given that they successfully form mutual partnerships. The difference increases over periods.*

Results indicate that subjects who successfully form a partnership in the "Communication" condition contribute 12.79 percentage points (p<0.1) more, overall, compared to those who form partnerships in the "No communication" condition (see column 1, TABLE E1, Appendix E). This equals a 21.11 % difference in overall average contributions between the two treatment conditions. Thus, in line with findings of Isaac and Walker (1988) and Bochet, Page and Putterman (2006), subjects make higher contributions when they may communicate.

Furthermore, results indicate that participants who successfully form partnerships in periods 1 – 5, make nearly identical contributions in both treatment conditions[7]. However, the difference in estimated contributions between the two treatment conditions increase throughout the game. Subjects who successfully form mutual partnerships in periods 6 – 10, are estimated to contribute 15.90 percentage points ($p<0.01$) more in the "Communication" condition, compared to the "No communication" condition (column 4, TABLE E1, Appendix E).

FIGURE 5, PANEL A illustrates participants' average contribution in each period, by treatment condition. When no communication is allowed, subjects' average contribution decreases as of period 5. Subjects in the "Communication" condition *stabilize* their average contribution on approximately 73 % of their endowment as of period 2, and throughout the rest of the game.

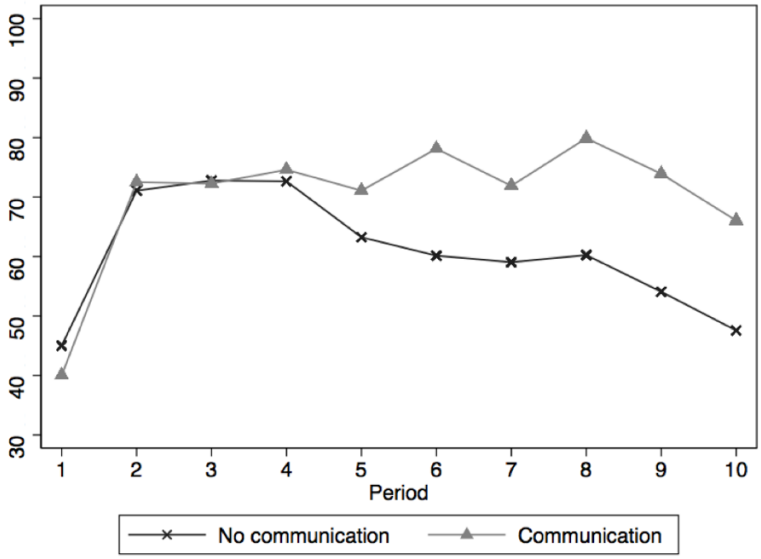
FIGURE 5, PANEL B illustrates how communication is estimated to affect participants' contribution, compared to participants in the "No communication" condition, by period. Subjects in the "Communication" condition is estimated to make significantly higher contributions than subjects in the "No communication" condition in period six, eight, nine and ten.

Recall that different cooperative types are expected to contribute differently (Fischbacher, Gächter and Fehr 2001; Fischbacher and Gächter 2010). If types who typically contribute more, are more likely to form partnerships when they can communicate, compared to a situation where they cannot not, this could offer an explanation to my result. I will investigate the effect of communication on Cooperators' and Free Riders' probability of forming a mutual partnership in section 4.2, Result 4.

[7] In periods 1 – 5, subjects are estimated to contribute 0.0401 percentage points ($p=0.993$) more in the "Communication" condition, compared to the "No communication" condition (see column 3, TABLE E1, Appendix E).

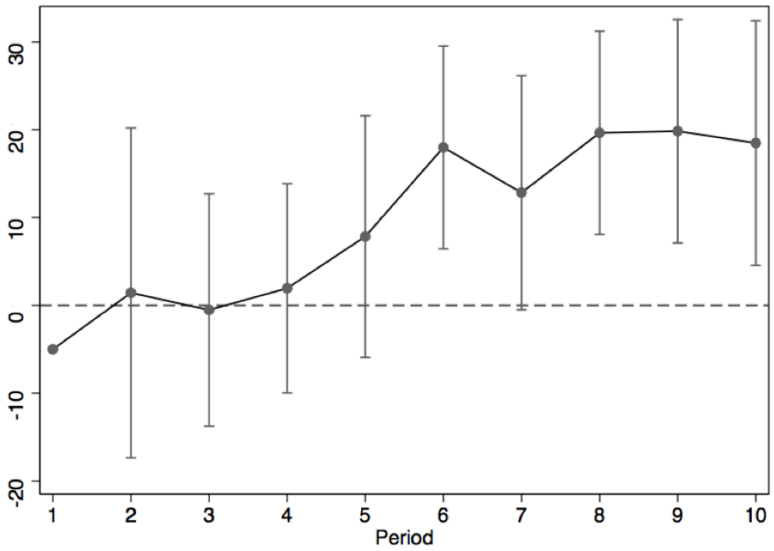
FIGURE 5: AVERAGE AND ESTIMATED CONTRIBUTIONS.

PANEL A: AVERAGE CONTRIBUTION (%), BY PERIOD AND TREATMENT CONDITION.



Note: Figure 5, Panel A shows subjects' average contribution in the "No communication" and the "Communication" condition, by period.

PANEL B: ESTIMATED *DIFFERENCE* IN CONTRIBUTIONS BETWEEN TREATMENTS, WITH 95 % CIS.



Note: Figure 5, Panel B is based on results from an OLS regression estimating the difference in average contributions between the "Communication" and the "No communication" condition, by period, for subjects who successfully for mutual partnerships. The OLS regression does not include any controls and standard errors are clustered on partnership level. The gap between the solid and the dotted line, illustrates the marginal difference (percentage points) in average contributions in the "Communication" condition, compared to the "No communication" condition.

RESULT 3: *Pre-play communication does not significantly increase subjects' overall individual payoff.*

Payoff is defined as the number of ECUs each subject earns in one period, including the amount she keeps as a private good and the sum of own and partner's contribution to the public good. Payoff is equal to zero if participants do not form a mutual partnership. The economically efficient outcome, is when each subject earns 14 ECU[8]. This is the maximum efficient individual payoff.

Results do not indicate that subjects in the "Communication" condition earn a significantly higher average payoff, compared to subjects in the "No communication" condition. Participants who may communicate, is estimated to earn 6.53 percentage points (p=0.152) more, overall, compared to participants in the "No communication" condition (see column 1, TABLE E2**,** Appendix E). This equals a 11.41 % higher average payoff for subjects in the "Communication" condition, compared to the "No communication" condition, overall. Thus, communication does not seem to improve the group optimality significantly[9].

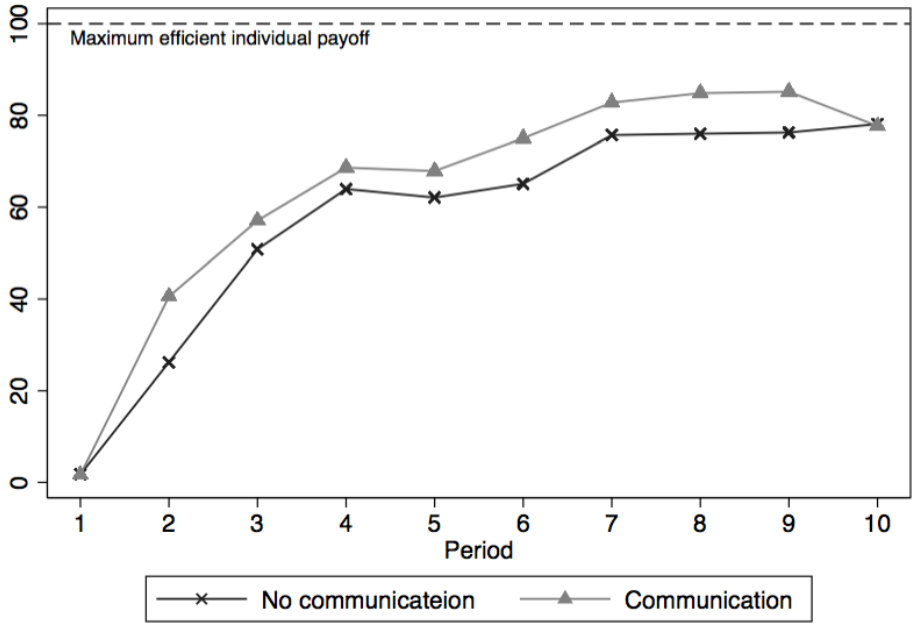
FIGURE 6 illustrates subjects' average payoff in each of the ten periods, by treatment condition. Participants in both the "Communication" and "No communication" condition, increase their average payoff throughout the game. Furthermore, the estimated effect of communication on subjects' payoff seem to be evenly distributed across the ten periods of the game. Subjects able to communicate, are estimated to earn a somewhat higher payoff in both the first five and last five periods of the game, compared to subjects in the "No communication" condition[10].

[8] The values of my payoff variable ranges from 0 to 17. I re-scale the payoff variable so that subjects' payoff may be expressed as the percentage of the maximum economically efficient individual payoff, 14. The formula is as follows: $\frac{Payoff}{14} * 100 = Percentage\ of\ maximum\ efficient\ individual\ payoff.$

[9] My results do not match those of Isaac and Walker (1988), who find that communication improves group optimality significantly.

[10] Subjects in the "Communication" condition are estimated to earn 4.95 percentage points (p=0.361) more in periods 1 – 5, compared to subjects in the "No communication" condition in the same five periods. In periods 6 – 10, subjects in the "Communication" condition is estimated to earn 6.19 percentage points (p=0.232) more,

FIGURE 6: AVERAGE INDIVIDUAL PAYOFF (%), BY PERIOD AND TREATMENT CONDITION.



Note: The figure shows subjects' average payoff in the "Communication" and the "No communication" condition, by period. The average payoff is illustrated as the percentage of maximum efficient individual payoff.

4.2 COMMUNICATION AND COOPERATIVE TYPES

I use the cooperative types, classified from the elicitation in PART I of the experiment, to both estimate and compare how pre-play communication affects *Cooperators* and *Free Riders*.

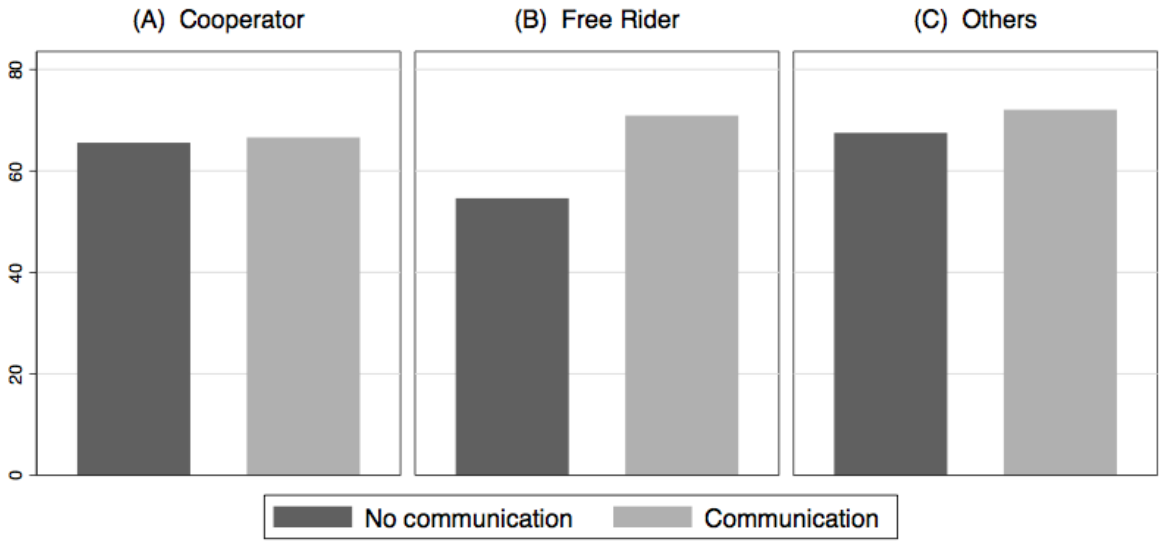
RESULT 4: *Free Riders significantly increase their probability of forming a partnership in the "Communication" condition, compared to Free Riders the "No communication" condition.*

A Free Rider is 16.3 percentage points ($p<0.1$) *more* likely to successfully form a mutual partnership in the "Communication" condition, compared to the "No communication" condition (see column 2, TABLE E3, Appendix E). **FIGURE 7** (B) illustrates the percentage of formed mutual partnerships in each condition for Free Riders. A Free Rider successfully forms

compared to those in the "No communication" condition. See results from OLS regressions in column 3 and 4, TABLE E2, Appendix E.

a mutual partnership 54.6 % of the time in the "No communication" condition, and 70.9 % of the time in the "Communication" condition. This equals a 29.9 % difference between the two treatment conditions.

FIGURE 7: % OF SUCCESSFULLY FORMED MUTUAL PARTNERSHIPS, BY TYPE AND TREATMENT CONDITION.



Note: The figure is based on average successful partnership formation for each cooperative type in the "Communication" and the "No communication" condition.

Surprisingly, Cooperators do not seem to experience a similar effect of communication on their likelihood of forming a mutual partnership, as Free Riders do. Results indicate that a Cooperator in the "Communication" condition is 1.04 percentage points (p=0.878) more likely to successfully form a mutual partnership, compared to a Cooperator in the "No communication" condition (see column 1, TABLE E3, Appendix E). This equals a 1.6 % difference, overall, as Cooperators in the "No communication" and "Communication" conditions form mutual partnerships 65.6 % and 66.6 % of the time, respectively (see **FIGURE 7** (A)). Thus, Cooperators' probability of successfully forming a mutual partnership is nearly identical in both treatment conditions.

Furthermore, I examine if the effect of pre-play communication affects Free Riders' estimated probability of forming a partnership differently than that of Cooperators. Compared with the "No communication" condition, Free Riders in the "Communication" condition increase their estimated probability of forming a mutual partnership by 15.3 percentage points (p=0.130) more than Cooperators do in the "Communication" condition (see column 2, TABLE E3, Appendix E).

My results might seem surprising, as related literature suggests that Cooperators are preferred as partners when one may choose a partner (Frank 1987). However, as participants have to form mutual partnerships to earn money, it creates incentives for the Free Rider to *mimic* a Cooperator's behaviour in the chat room. If they do so, this might offer an explanation for my results.

RESULT 5: *Cooperators contribute significantly more in the "Communication" condition, compared to Cooperators in the "No communication" condition.*

Results from column 1, **TABLE 5** indicate that a Cooperator in the "Communication" condition is estimated contribute 13.37 percentage points ($p<0.05$) *more*, compared to a Cooperator in the "No communication" condition. This equals a 19.5 % difference between the two treatment conditions, overall. A Cooperator contributes 68.61 % of her endowed units in the "No communication" condition, compared to 81.98 % in the "Communication" condition, on average.

Free Riders also contribute more when they are able to communicate with their potential partner, compared to when they are not, on average. However, the difference is not significant. A Free Rider in the "Communication" condition is estimated to contribute 14.42 percentage points (p=0.159) more overall, compared to a Free Rider in the "No communication" condition

(column 2, **TABLE 5**). This is equal to a 34.8 % difference in estimated contributions between Free Riders in the two treatment conditions.

TABLE 5: ESTIMATED CONTRIBUTION (%), BY TYPE AND TREATMENT CONDITION.

	(1) **Cooperator**	(2) **Free Rider**	(3) **Others**
"No communication"	68.61	41.41	56.85
"Communication"	81.98	55.83	74.24
Estimated treatment effect	*13.37***	*14.42*	*17.39****

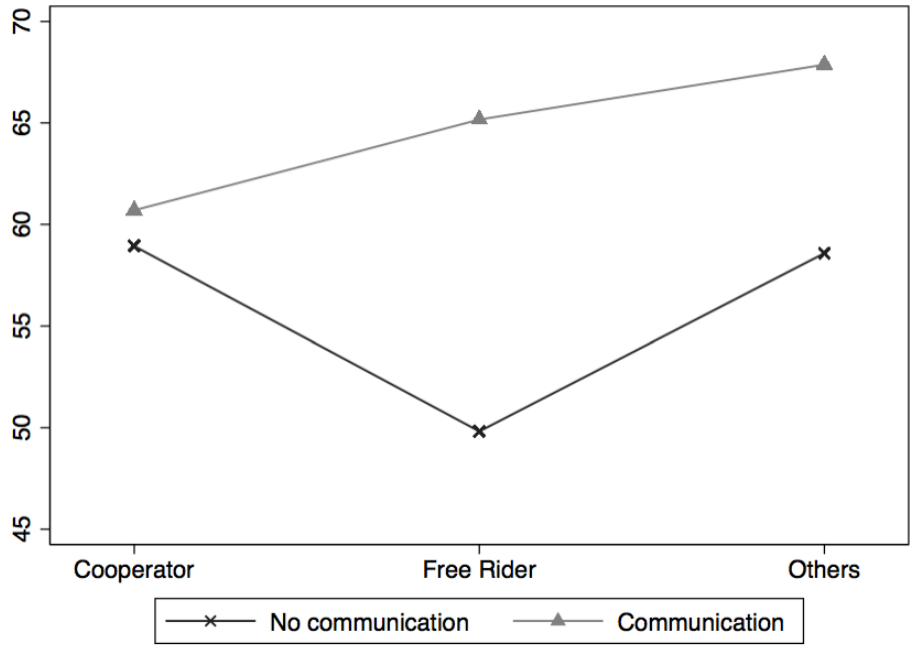
Note: The estimations in TABLE 5 corresponds with the OLS regressions in TABLE E4, Appendix E with no controls and standard errors clustered on partnership level. * p<0.10, ** p<0.05, *** p<0.01.

Results indicate that a Free Rider in the "Communication" condition increases her estimated contribution by 1.056 percentage points (p=0.928) more than a Cooperator in the "Communication" condition, compared to their respective estimated contributions in the "No communication" condition (column 2, TABLE E4, Appendix E).

RESULT 6: *Free Riders significantly increase their individual payoff in the "Communication" condition, compared to Free Riders in the "No communication" condition.*

A Free Rider's estimated average payoff is 15.35 percentage points (p<0.1) *higher* in the "Communication" condition, compared to a Free Rider in the "No communication" condition (see column 2, TABLE E5, Appendix E). She thereby increases her average payoff by 30.8 %, from 49.82 % of her efficient individual payoff in the "No communication" condition, to 65.17 % in the "Communication" condition. This is illustrated in **FIGURE 8**.

FIGURE 8: OVERALL AVERAGE INDIVIDUAL PAYOFF (%), BY TYPE AND TREATMENT CONDITION.



Note: The figure shows the average payoff for each type in the "Communication" and the "No communication" condition. The average payoff is illustrated as the percentage of maximum efficient individual payoff, equal to 14 ECU.

FIGURE 8 also illustrates a Cooperator's average payoff in the "Communication" and the "No communication" condition. She is estimated to earn 1.75 percentage points (p=0.798) more in the "Communication" condition, compared to a Cooperator in the "No communication" condition (see column 1, TABLE E5, Appendix E). This equals to a 3 % increase in average individual payoff.

Furthermore, I examine if the effect of pre-play communication affects Free Riders' estimated probability of forming a partnership differently than that of Cooperators. A Free Rider in the "Communication" condition is estimated to increase her average payoff by 13.59 percentage points (p=186) more than a Cooperator in the "Communication" condition, compared to their respective estimated payoff in the "No communication" condition (column 2, TABLE E5, Appendix E).

Recall that a Cooperator in the "Communication" condition is estimated to contribute significantly more, compared to a Cooperator in the "No communication" condition. However, her average payoff in the "Communication" condition does not seem to increase significantly, compared to the payoff of a Cooperator in the "No communication" condition. Thus, a Cooperator in the "Communication" condition does not gain from contributing more, compared to a Cooperator in the "No communication" condition.

CHAPTER 5: *HOW* DO PARTNERS COMMUNICATE?

Recall, from the introduction in Chapter 1, one of the key issues motivating this thesis. I wish to explore *how* individuals use language to affect each other's behaviour. So, how may we explain why communication seems to positively affect contributions, overall? More specifically, why do Cooperators significantly increase their contributions when they may communicate? Finally, why are Free Riders the ones that end up earning more and are more likely to successfully form mutual partnerships, compared to Free Riders who may not communicate?

I study the language potential partners use in the chat room to explore if the way they communicate may explain these results. First, I do a quantitative text analysis to get an overview of the most prevalent conversation topics in the chat room. Second, I explore the language further, by doing a qualitative text analysis in section 5.2.

5.1 CONVERSATION TOPICS

I choose to do the quantitative text analysis in STATA to create a "bag-of-words" representation of free-form text (Williams 2015) [11]. However, the method provides me with a large number of "bags", too many to present the content of the chat in a meaningful way. I therefore manually classify the most interesting "bags" in six topics.

I base the affiliation of each "bag" to their respective topic on their context in the chat, and on conversation topics presented in related literature (Charness and Dufwenberg 2006; Wilson and Harris 2017). The six topics I have chosen, are listed below. The list includes all "bags-of-

[11] I use the `txttool` command in STATA for the quantitative text analysis.

words" affiliated to each topic. Norwegian translation of each bag-of-word is provided in Appendix F.

TOPIC 1: SINGULAR PRONOUNS.
I, you, me, your, yours, my, mine.

TOPIC 2: PLURAL PRONOUNS.
We, us, our.

TOPIC 3: COMMITMENT AND RECRUITMENT.
Both, together, promise, pinkey, 10, ten, give, giving, much, more, most, increase, contribute, go, best, agree, fair, share, cooperate, betray, full, jackpot, choose, good, fine, nice, excellent, wonderful, superb, perfect, sweet, happy, cool.

TOPIC 4: EARNINGS AND TACTICS.
Earn, profit, count, maximize, largest, bet, gain, payoff, money, invest, points, plan, tactic, suggest, suggestion, alert, produce, production, blue, red, deal, formula, agreement, negotiate.

TOPIC 5: CONFUSED.
Confused, misunderstand, understand, realize(d).

TOPIC 6: REGRET AND EMOTIONS.
Forgiven, sorry, wrong, failed, loosing, feel, fair, cowardice.

Any written message in the chat may be characterized as an *entry*, no matter if it is only one word or number, or if it is a full sentence. There is a total of 1529 entries in the chat. Each entry is made by a subject whose type I have elicited in PART I of the experiment. There are 44 *Cooperators* who made a total of 577 entries, 22 *Free Riders* who made a total of 407 entries and 34 subjects classified as *Others* who made a total of 545 entries in the chat. Thus, Free Riders are the ones that make entries in the chat room most frequently, overall[12].

TABLE 6 shows the number of entries that include a word affiliated to each topic in different parts of the game, overall and by each cooperative type. Average number of entries per subject is listed in parentheses.

TABLE 6 also shows which of the defined conversation topics that are the most prevalent in the chat. Subjects seem to use the chat room mostly to convey commitments and recruitment words

[12] On average, a Free Rider makes approximately 19 entries in the chat room throughout the game. A Cooperator makes 13 and Others make 16 entries, on average.

(TOPIC 3). Other topics that frequently occur in the chat room are pronouns, both singular (TOPIC 1) and plural (TOPIC 2), as well as earnings and tactics (TOPIC 4). I will refer to these four topics as the *overall prevalent topics*.

TABLE 6: TOPICS, OVERALL AND BY COOPERATIVE TYPE.

Conversation topic		(1) **Overall** (n=100)	(2) **Cooperator** (n=44)	(3) **Free Rider** (n=22)	(4) **Others** (n=34)
TOPIC 1	**All periods:**	**172 (1.72)**	**55 (1.25)**	**61(2.77)**	**56 (1.65)**
	Period 1-5:	83 (0.83)	23 (0.52)	26 (1.18)	34 (1.00)
	Period 6-10:	89 (0.89)	32 (0.73)	35 (1.59)	22 (0.65)
TOPIC 2	**All periods:**	**71 (0.71)**	**32 (0.73)**	**16 (0.73)**	**23 (0.68)**
	Period 1-5:	47 (0.47)	18 (0.41)	12 (0.55)	17 (0.50)
	Period 6-10:	24 (0.24)	14 (0.32)	4 (0.18)	6 (0.18)
TOPIC 3	**All periods:**	**365 (3.65)**	**162 (3.68)**	**69 (3.14)**	**134 (3.94)**
	Period 1-5:	197 (1.97)	84 (1.91)	42 (1.91)	71 (2.09)
	Period 6-10:	168 (1.68)	78 (1.77)	27 (1.23)	63 (1.85)
TOPIC 4	**All periods:**	**114 (1.14)**	**47 (1.07)**	**24 (1.09)**	**43 (1.26)**
	Period 1-5:	70 (0.70)	23 (0.52)	14 (0.64)	33 (0.97)
	Period 6-10:	44 (0.44)	24 (0.55)	10 (0.45)	10 (0.29)
TOPIC 5	**All periods:**	**18 (0.18)**	**7 (0.16)**	**7 (0.32)**	**4 (0.12)**
	Period 1-5:	11 (0.11)	4 (0.09)	3 (0.14)	4 (0.12)
	Period 6-10:	7 (0.07)	3 (0.07)	4 (0.18)	0 (0.00)
TOPIC 6	**All periods:**	**19 (0.19)**	**5 (0.11)**	**3 (0.14)**	**11 (0.32)**
	Period 1-5:	11 (0.11)	2 (0.05)	2 (0.09)	7 (0.21)
	Period 6-10:	8 (0.08)	3 (0.07)	1 (0.05)	4 (0.12)

Note: TOPIC 1: Singular Pronouns, TOPIC 2: Plural Pronouns, TOPIC 3: Commitment and recruitment, TOPIC 4: Earnings and tactics, TOPIC 5: Confused, TOPIC 6: Regret and emotions.

5.2 THE QUALITATIVE TEXT ANALYSIS

I explore *how* subjects use language to affect each other's behaviour by investigating the conversations more thoroughly. A qualitative analysis of the content of participants' conversations may provide some understanding of their behaviour, and thus my results presented in Chapter 4. I study the conversations in detail, focusing on the four overall prevalent topics in the chat room.

Example entries from the chat transcripts, representing conversations concerning each of the four overall prevalent topics, are presented below[13]. The example entries are from random sessions and periods throughout the *whole game*. I will use these examples to further illustrate how subjects use the chat room.

I also consider the difference in number of entries per subject affiliated with each of the prevalent topics for Cooperators and Free Riders. The example entries presented below are written in different fonts, each determined by the senders' cooperative type (`Cooperator`, Free Rider and *Others*).

TOPIC 1: SINGULAR PRONOUNS

Entries affiliated with TOPIC 1 are typically instructions, questions about their potential partner's future choices and conditional or unconditional information about their own future choices. Subjects explicitly separate between their own and their potential partner's decisions, as they use words such as *me*, *I* and *you*.

[13] The original example entries in Norwegian is provided in Appendix G.

Session 2, period 3
224: *You have to choose me.*
Session 3, period 1
323: I choose 10 in the first period, if you choose something else it means I cannot trust you :)
Session 3, period 5
330: *But you have to choose me*
329: Yes
Session 4: period 5
421: How much do you use for production? I always choose 10, don't know if that matters to you
Session 4, period 3
427: How many do you take?
428: *6*
427: I'll take 7 if you choose me
428: *Okay*
Period 10
427: How many do you take?
428: *I'll take 2*
427: 3
428: *What about you?*
428: *Okay*
Session 5, period 8
523: I through in my small blue

Note: Each entry is made by a Cooperator, Free Rider or *Others*.

We know, from column 2 and 3, **TABLE 6** that Free Riders make entries affiliated with TOPIC 1 more often, compared to Cooperators, when considering all periods of the game. This is also true in the first five and last five periods of the game.

Recall that Free Riders in the "Communication" condition seem to be more likely to successfully form partnerships and they are estimated to significantly increase their payoff, compared to Free Riders in the "No communication" condition. This is not the case for Cooperators. As Free Rides use singular pronouns more often, compared to Cooperators, I wonder if this might be an effective strategy to persuade others to cooperate. If so, it would contradict the results of Wilson and Harris (2017). They find that participants rely extensively on words that seem more unifying (such as *we* and *us*) to persuade one another to cooperate, compared to words affiliated with my defined TOPIC 1.

TOPIC 2: PLURAL PRONOUNS

Subjects who make entries affiliated with TOPIC 2 mostly expresses a desire to reach an agreement regarding a common strategy with their potential partner. By using words such as *we* and *our*, a participant *includes* the other person in the decision, in contrast with many of the entries affiliated with TOPIC 1. These kind of words may create a common identity between the

two subjects, which again is associated with higher levels of cooperation (Dawes, Van De Kragt and Orbell 1988; Wilson and Harris 2017). As participants have to mutually choose one another to be able to earn money, it seems beneficiary to promote intentions of cooperation by referring to themselves and their potential partner as a common unit.

Session 1, period 1
121: `Do we agree that we go all in? It will result in the greatest payoff`
122: `Yes`
Session 1, period 2
123: *Okay! Do we choose each other then?*
124: `Yes`
Session 1, period 1
130: `What do we choose?`
129: *Give 10 kr together in 10 rounds?*
Session 3, period 3
323: We choose each other each round, 10 each round?
323: ?
324: Okay
Period 4
323: We choose each other for the rest of the rounds?
323: 10 each round?
324: Yes
Session 3, period 4
328: `Should we do 10?`
327: `Yes`
328: `Okay`
327: `:)`
Session 3, period 6
330: *Nice, we continue like this?*
329: `Yes`
330: *:D*
Session 5, period 2
532: *Give 10 each? Maximize each of our profit + fair*
532: *Cool?*
531: *Okay*
Session 6, period 1
627: *Hey, think the smartest thing is if we choose each other*
Session 7, period 1
729: `We earn the most if both of us go all in, full production`

Note: Each entry is made by a `Cooperator`, Free Rider or *Others*.

Entries including plural pronouns are equally made by Cooperators and Free Riders, when considering all periods of the game (column 2 and 3, **TABLE 6**). This makes it somewhat difficult to distinguish whether this is an effective strategy to increase cooperation.

However, Free Riders make entries affiliated with TOPIC 2 somewhat more often in periods 1 – 5, compared to Cooperators in the same five periods. They might use this kind of language to mimic cooperative intents in the first half of the game because they will gain from cooperation (Frank 1987; Page, Putterman and Unel 2005). In the last five periods of the game, Cooperators make entries affiliated with TOPIC 2 more often**,** compared to Free Riders in the same periods. Thus, Cooperators seem more keen to maintain a common identity with the other subject all the way to the end of the game.

TOPIC 3: COMMITMENT AND RECRUITMENT

TOPIC 3 is the most prevalent of all conversation topics, overall. Entries affiliated with TOPIC 3 express *commitments* to cooperate as well as explicit wishes to *recruit* a partner and to cooperate in the production stage, usually by contributing the entire endowment. In addition to commitments and recruitment words, entries affiliated with TOPIC 3 also include a lot of positive words such as *nice*, *superb* and emoticons made of punctuations expressing smiles and even hearts. I interoperate the conversations as encouraging and positive.

Session 1, period 2
124: `10 each!`
124: `Go`
123: Okay! But do we choose each other then?
124: `Yes`
Period 10
124: `Don't let me down!`
123: Will never let you down <3 <3 <3
124: `10`
123: At least not on Valentines
124: `Pliz`
Session 2, period 3
230: Nice!
229: `Continue like this 10?`
230: Continue like this?
229: `Yes`
229: `Easy`
230: Wonderful ;)
Period 4
230: Boom
229: `Keep it on 10!!`
230: Cracking the system
229: `Hahaha`
Period 5
229: `Hell yeah`
230: And if one of us chickens out just a little, we have the right not to contribute?
230: Okay? :P
Session 3, period 1
327: `Should we work together?`
328: `Yes`
327: `Okay`
Period 8
327: `This is fine`
328: `Good, this is working out fine:)`
327: `:)`
328: `10 again then?`
327: `Yes`
Period 9
328: `Same? :)`
327: `Yeah :)`
328: `Superb :)`
327: `Nice :)`
Period 10
327: `Feel that we make a good team`
328: `Yes :)`
327: `:)`
328: `One last time now :)`
327: `Yes`
Session 3, period 1
332: `10 each, then we both get 14 points? :)`
331: *Should we go all in?*
332: `Yess`
332: `Let's do it :D`
Session 8, period 3
828: *Hi, I have a lot of points, cooperate with me :)*
827: *I have 4*
827: *Should we cooperate?*
Period 4
828: *Hi, I have 5 blue and four red*
827: *Have 3 blue and 10 red*
828: *Cooperate?*
827: *Cooperation is best*
828: *Oh yes!*

Note: Each entry is made by a `Cooperator`, Free Rider or *Others*.

Wilson and Harris (2017) find that the groups that cooperate most efficiently in their experiment, are also the ones that use the most recruitment words, such as *together*, in the chat room. I explore whether the cooperative type that expresses the most commitments and recruitment words in the chat, benefit in the same way in my experiment.

Cooperators make entries including commitments and recruitment words more often, compared to Free Riders, overall (column 2 and 3, **TABLE 6**). The two cooperative types seem to make the same number of entries per subject affiliated with TOPIC 3 in periods 1 – 5. In periods 6 – 10, the number of entries per subject decays for both cooperative types. However, Cooperators maintain a higher number of entries per subject affiliated with TOPIC 3 in periods 6 – 10, compared to Free Riders in the same periods of the game.

Furthermore, we may consider each type's use of commitments and recruitment words in the chat room in light of the results from section 4.2. Cooperators express commitments and wishes to cooperate more often, compared to Free Riders. Still, Cooperators do not seem to achieve significantly higher levels of successful partnership formation or payoff, compared to Cooperators in the "No communication" condition. However, they do seem to contribute more themselves, when able to communicate. The opportunity to *express* these commitments and recruitment words in a chat room, may affect their *own* behaviour and lead to higher levels of contributions.

TOPIC 4: EARNINGS OR TACTICS

Entries affiliated with TOPIC 4 express a desire to reach an agreement and to cooperate, as those affiliated with TOPIC 2 and TOPIC 3, but they do not necessarily use the same kind of language. Entries affiliated with TOPIC 4 suggests that the participants are focused on agreeing on a *plan* or a *tactic* that maximize their expected payoff, rather than cooperation being the goal in itself.

Session 2, period 1
225: *Hi, we are betting max?*
226: *5?*
225: *10!*
Session 3, period 2
332: *Max points? 10 each?*
331: Sounds good
Period 5
331: We do 10 again 12?
332: *Should we just continue like this all the way maybe?*
332: *Yes*
331: (y)
Session 7, period 1
729: `We earn the most if we both go full production`
729: `Are you in?`
730: *Yes*
Period 8:
729: `Do you have a plan?`
730: *Eeh no*
729: `Should we do 5?`
730: *Yes*
Session 8, period 5
821: 8?
822: Sure
821: Deal
822: Deal
Period 6:
821: How many points?
822: 8?
821: Deal
Session 8, period 6
823: Suggestions on a new tactic?
823: Both do 10?
824: `If we were to give 10 each every time, we would obviously get the most`
823: Or both do a little less
Session 8, period 1
825: *High production?*
825: *Tarzan*
825: *Hahhaha*
826: *High*
Period 6
825: *Do we go hard again?*
825: *I am pro*
826: *Yes*
825: *All in*
826: *That is how both of us get the most without fucking the other one*
Session 8, period 1
828: *I suggest that we both choose to use 10 every other time, I think that is how we get the most points together*

Note: Each entry is made by a `Cooperator`, Free Rider or *Others*.

Free Riders seem to make entries affiliated with TOPIC 4 somewhat more often than Cooperators, overall (column 2 and 3, **TABLE 6**). Recall that Free Riders significantly increase their payoff when able to communicate, compared to when they may not. Entries regarding earnings and tactics may be a useful strategy to encourage contributions by others, and thus increase one's own earnings.

Furthermore, Free Riders make entries including words associated with earnings and tactics more often in periods 1 – 5, compared to Cooperators in the same periods (column 2 and 3, **TABLE 6**). Thus, Free Riders seem keen to make agreements and earn money early on in the game. In periods 6 – 10, however, Cooperators make entries affiliated with TOPIC 4 more often, compared to Free Riders in the same periods.

CHAPTER 6: CONCLUDING REMARKS

The experimental literature commonly invokes that (i) communication enhances cooperative behaviour in social dilemmas and that (ii) subjects' cooperative dispositions are heterogenous. This thesis uses the experimental method to investigate how chat room communication affects individuals' behaviour in a social dilemma. More importantly, I combine (i) and (ii) by investigating whether communication affects the probability of forming partnerships, the contributions and the payoff of individuals with different cooperative dispositions *differently*. I also explore the *language* potential partners use in the chat room.

Results show that communication does not affect subjects' overall probability of forming a mutual partnership or their overall payoff. As participants in my experiment do not face a complex coordination problem involving many participants, this might explain why communication does not significantly improve in the efficiency, overall, as the literature would suggest (Wilson and Harris 2017; Bochet, Page and Putterman 2006). However, subjects who *do* engage in the production by mutually choosing one another, significantly increase their overall contributions when they may communicate, compared to those who cannot communicate.

Complementing the results of Fischbacher, Gächter and Fehr (2001), Kurzban and Houser (2005) and Fischbacher and Gächter (2010), I find that subjects display heterogenous cooperative dispositions. My results add to the experimental literature on communication by showing that when no communication is possible, it pays to be willing to cooperate, as Cooperators perform better than Free Riders. They are more likely to form mutual partnerships and they earn a higher payoff, compared to Free Riders. Cooperators also contribute more to the production of the public good than Free Riders do. Thus, when two people rely on a mutual

agreement to work together and when their actions are the only form of expression, it pays to be willing to cooperate.

However, when subjects may communicate, and express themselves through language as well as actions, Free Riders end up being the winners. They are more likely to successfully form mutual partnerships, compared to Cooperators. Furthermore, Cooperators increase their contributions even more when they may communicate, compared to Cooperators who cannot. Free Riders, as a group, might gain from the Cooperators' generosity as they end up earning more than them, when both are able to communicate. To gain further insight and thus try to understand why different types benefit differently from communication, I examine how subjects express themselves in the chat room.

Cooperators seem to behave according to their commitments. They cooperate and contribute most of their endowments, on average. Even though Free Riders also make commitments to contribute and suggest common strategies, they do not seem to keep all of their promises. They are more likely to form mutual partnerships, compared to Cooperators, but Free Riders only contribute about half of their endowments, on average. Thus, Free Riders' commitments seem to be partly cheap talk (Farrell 1987).

Free Riders use singular pronouns as they give instructions to their potential partner and make attempts to reveal the other person's future decisions, more often than Cooperators do. An example entry from a Free Rider might be "I'll take 7 if you choose me" (session 4, period 3, subject 427). This might be a more efficient strategy, as Free Riders are the ones that end up benefiting from the opportunity to communicate through higher levels of payoff. Thus, when two people rely on a mutual agreement to work together, and when they may express themselves using *language* as well as actions, actions do not necessarily speak louder than words.

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APPENDIX A: INSTRUCTIONS

This is an experiment on decisions. You are guaranteed **50 kroner** as a show up payment. In addition, you will earn **points** during the experiment which will be converted into kroner. Your total payoff will be paid out to you in a closed envelope at the end of the experiment. This will be done **anonymously**. We first ask you to read the instructions. The experiment consists of three independent parts, what you do in one part does not affect the other two parts.

You and another person can produce red units. Both of you will receive 10 blue units each which you can use in the production of red units. The number of red units depends on the number of blue units you and the other person use in the production.

1 blue unit = 1 point = 1 krone

1 red unit = 1 point = 1 krone

After you receive 10 blue units you have to decide how many of the 10 blue units you wish to use to produce red units, and how many you wish to keep for yourself.
The person you are producing with will also decide on how many blue units this person wants to use in the production of red units, and how many to keep.

Your amount of points are determined as follows:
Endowment of blue units = 10 – (the amount of blue units you use to produce red units)
Endowment of red units = 0,7 x (the amount of blue units you use + the mount of blue units the other person uses)
Total number of points = endowment of blue units + endowment of red units

So that you may understand how your decisions affect your final payment, it is important that you read thoroughly through the examples on the next page. Please raise your hand if you have any questions.

Some examples:

1) If you and the other person uses 0 blue units each, then 0 red units will be produced. Each person will receive a total of:

   10 – 0 + 0,7 x (0 + 0) = 10 points.

2) If you and the other person uses 5 blue units each, then 7 red units will be produced. Each person will receive a total of:

   10 – 5 + 0,7 x (5 + 5) = 12 points.

3) If you and the other person uses 10 blue units each, then 14 red units will be produced. Each person will receive a total of:

   10 – 10 + 0,7 x (10 + 10) = 14 points.

4) If you use 0 blue units and the other person uses 10 blue units, then 7 red units will be produced.

   You will receive a total of: 10 – 0 + 0,7 x (0 + 10) = 17 points.

   The other person will receive a total of: 10 – 10 + 0,7 x (0 + 10) = 7 points.

Recall that 1 point = 1 krone

PART I

This is the **first part** of the experiment. You are randomly placed with another person which you can produce with. You will make the following decisions:

1) You have to choose how many of your 10 blue units you wish to use to produce red units.

2) You have to choose how many of your 10 blue units you wish to use, conditional on the contribution choices of the other person.

Neither you or the other person will be informed of each other's decisions.

A random draw will determine which of your two decisions that will be relevant for you final payoff. The points from this part of the experiment will be added to your total payoff.

PART II

This is the **second part** of the experiment. This part consists of **10** periods. Your payment is determined as before. You will have to make the same production decisions in each of the 10 periods.

In this experiment, you are **person *i***. You will keep this number throughout the entire experiment. You may choose to produce with one other person in each period. The person you may choose to produce with have also been given a number, and this number belongs to the other person throughout the entire experiment.

In each period, both you and the other person have to decide if you will produce together or not. Both of you have to choose each other for the production to take place. If you do not choose each other, no production will take place. If you miss a production period, your payoff will be equal to 0 in the current period.

If the production takes place, each period lasts for **10** seconds. By this time you have to decide how many of your blue units you wish to use to produce red units. This is done by entering your decision in the blue box on the screen. You have to click the "Update" button when you have decided how many blue units you wish to use to produce red units. The production stage is

automatically closed after 10 seconds, and the number of blue units you have entered is registered as your final decision.

At the end of each period, you will receive information about your endowment of blue and red units. The other person will also receive this information about its respective endowment.

This is the end of the instructions. Please raise your hand if you have any questions. If you are ready to continue the experiment, press the "Ready" button. The experiment will start when **everyone** have pressed the "Ready" button.

Chat message in the "Communication" condition

At the beginning of each period you will be given the opportunity to chat electronically with the other person. The chat will last for **25** seconds in each period. To safeguard you own anonymity, we encourage you not to specify any personal information in the chat room. We also ask you to avoid inappropriate language.

Partner decision message in both treatment conditions:

You are person ***i***. The person your chose, also chose you. You are producing with person ***j*** in this period.

Exclusion message:

You are person ***i***. The person you chose, did not choose you.

You will not participate in this production period. In this period, you earn **0 points**.

PART III

This is the **third part** of the experiment. This part consists of only **one** period. You are randomly placed with another person which you can produce with. This person is not the same person who you have produced with previously in the experiment. You will make the following decisions:

1) You have to choose how many of your 10 blue units you wish to use to produce red units.
2) You have to choose how many of your 10 blue units you wish to use, conditional on the contribution choices of the other person.

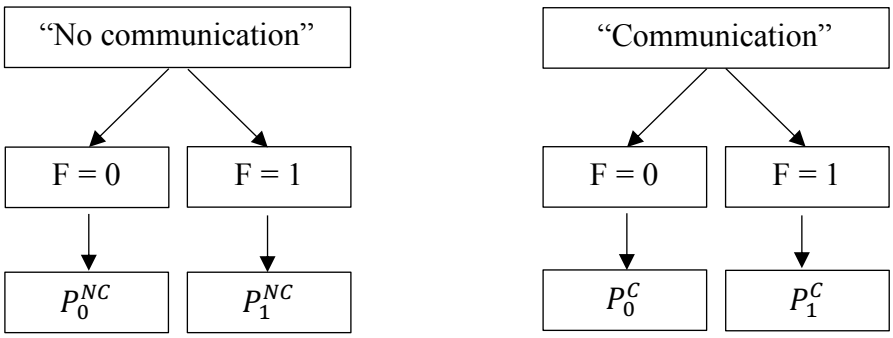
Neither you or the other person will be informed of each other's decisions.

A random draw will decide which of the two decisions will be relevant for you final payoff. The points from this part of the experiment will be added to your total payoff.

You face the same two decisions as in the first part of the experiment, but you are free to choose what you want to answer.

APPENDIX B: CONSIDERING THE SELECTION BIAS

I follow Heckman et al. (1998), as I explain how the contribution variable in my sample is affected by a selection bias. Let F = 1 signify the successful formation of a partnership, and F = 0 its absence. Furthermore, let P_0 and P_1 signify each participant's contribution to the production of the public good, when an unsuccessful and successful partnership is formed, respectively.



Note: NC = "No communication", C = "Communication".

The selection problem arises because I cannot observe both P_0 and P_1 for each participant. Furthermore, I only observe each participant's contribution (P) if F = 1, and not if F = 0. This makes P_0^{NC} and P_0^C in the illustration above, *hypothetical* contributions which I cannot observe. I observe P where $P^{NC} = FP_1^{NC} + (1 - F)P_0^{NC}$ in the "No communication" condition, and $P^C = FP_1^C + (1 - F)P_0^C$ in the "Communication" condition. Thus, I cannot measure the *causal effect* of communication on contribution for all participants, only how the opportunity to communicate *affects* the contributions of those who successfully form a partnership.

APPENDIX C: TRANSLATIONS OF THE SCREEN-SHOTS FROM Z-TREE

FIGURE 1: CONDITIONAL CONTRIBUTION TABLE.

Choose the amount of blue units you wish to use, if the person you produce with uses the following amount of its blue units. Help: Choose the amount of blue units you wish to use to produce red units for each choice made by the other person. To make a decision, write a number in each of the blue boxes and press "OK". When you have pressed "OK", the experiment will continue.

FIGURE 2: CHAT ROOM.

Write your message in the blue box and press the "enter" button on the keyboard. The chat room will automatically close when the time runs out. Period n of N.

FIGURE 3: THE PARTNER CHOICE.

You are person *i*. You may choose whether you wish to produce with person *j* or not. Help: If you want to produce with the other person, you must type the ID-number of the other person in the blue box and press "Update". You may update your choice as often as you like. If you do not want to produce with the other person, you do not type anything in the blue box. When time runs out, your current choice will remain.

FIGURE 4: THE PRODUCTION DECISION.

You were endowed 10 blue units and may now choose how many you would like to use. Help: To change your current choice, you must write a number in the blue box and press "Update". You may update your choice as often as you like. When time runs out, your current choice will remain.

APPENDIX D: INVITATION MAIL

Hei!

Du er invitert til et økonomisk eksperiment. Du vil motta 50 kroner for oppmøtet. I tillegg kan du tjene mer penger i løpet av eksperimentet. Hvor mye du tjener totalt, avhenger av valgene du tar. Eksperimentet går ut på å ta valg på en PC. Det er anonymt og det kreves ingen forkunnskaper for å delta.

Påmelding: #link

Eksperimentet tar omtrent 35 minutter, og finner sted onsdag 14. februar i Medborgerlaben, 2. etasje i Sofie Lindstrømshus, Rosenbergsgaten 35. Ved eventuelle spørsmål, send e-post til froydis.steine@student.uib.no

Hilsen Frøydis Sæbø Steine

Institutt for økonomi

APPENDIX E: SUPPLEMENTARY REGRESSION RESULTS

TABLE E1: OLS REGRESSIONS. ESTIMATED AVERAGE CONTRIBUTION (%) WITH AND WITHOUT COMMUNICATION.

	(1)	(2)	(3)	(4)
	All periods	**All periods**	**Periods 1 – 5**	**Periods 6 – 10**
Communication	12.79***	-9.904	0.0401	15.90***
	(4.747)	(6.815)	(4.846)	(5.140)
Period		-3.065***		
		(0.591)		
Communication x Period		3.067***		
		(0.864)		
Female		-11.52***	-11.13**	-11.88**
		(4.194)	(4.491)	(4.741)
Participate		8.337**	11.06**	6.873
		(4.152)	(4.584)	(4.492)
Constant	60.58***	83.95***	70.48***	60.26***
	(3.223)	(6.069)	(5.257)	(5.427)
N	**1330**	**1330**	**476**	**854**
adj. R^2	**0.029**	**0.078**	**0.041**	**0.081**

Note: Cluster-robust standard errors in parentheses (clustered on 82 groups in model (3) and 94 groups in model (1), (2) and (4)) * p<0.10, ** p<0.05, *** p<0.01. *Participate* indicates whether an individual has participated in an economic experiment prior to my experiment.

(1) Overall estimation results, with no controls.
(2) Estimation results, with controls.
(3) Estimation results in periods 1 – 5, with controls.
(4) Estimation results in periods 6 – 10, with controls.

TABLE E2: OLS REGRESSIONS. ESTIMATED EFFECT OF COMMUNICATION ON AVERAGE INDIVIDUAL PAYOFF (%).

	(1)	(2)	(3)	(4)
	All periods	**All periods**	**Periods 1 – 5**	**Periods 6 – 10**
Communication	6.531	6.139	4.953	6.198
	(4.524)	(6.367)	(5.400)	(5.152)
Period		7.281***		
		(0.582)		
Communication x Period		-0.103		
		(0.853)		
Female		-7.279*	-10.01**	-4.545
		(3.926)	(4.255)	(4.556)
Participate		1.041	-0.0442	2.126
		(3.130)	(3.935)	(3.627)
Constant	57.59***	22.16***	48.25***	76.16***
	(3.341)	(5.438)	(5.485)	(5.800)
N	**1980**	**1980**	**990**	**990**
adj. R^2	**0.005**	**0.222**	**0.011**	**0.011**

Note: Cluster-robust standard errors in parentheses (clustered on 99 groups) * p<0.10, ** p<0.05, *** p<0.01. *Participate* indicates whether an individual has participated in an economic experiment prior to my experiment.

(1) Overall estimation results, with no controls.
(2) Estimation results, with controls.
(3) Estimation results in periods 1 – 5, with controls.
(4) Estimation results in periods 6 – 10, with controls.

TABLE E3: OLS REGRESSIONS. ESTIMATED EFFECT OF COMMUNICATION ON THE PROBABILITY OF FORMING A PARTNERSHIP FOR EACH TYPE.

	(1)	(2)	(3)
	Partnership	**Partnership**	**Partnership**
Communication	0.0104	0.163*	0.0456
	(0.0671)	(0.0926)	(0.0534)
Cooperator		0.109	-0.0194
		(0.0843)	(0.0532)
Free Rider	-0.109		-0.129
	(0.0843)		(0.0826)
Others	0.0194	0.129	
	(0.0532)	(0.0826)	
Communication x Cooperator		-0.153	-0.0352
		(0.1000)	(0.0746)
Communication x Free Rider	0.153		0.117
	(0.1000)		(0.0965)
Communication x Others	0.0352	-0.117	
	(0.0746)	(0.0965)	
Constant	0.656***	0.546***	0.675***
	(0.0467)	(0.0861)	(0.0377)
N	**1980**	**1980**	**1980**
adj. R^2	**0.005**	**0.005**	**0.005**

Note: Cluster- robust standard errors in parentheses (clustered on 99 groups) * p<0.10, ** p<0.05, *** p<0.01.

(1) Overall estimation results, with *Cooperator* as baseline.
(2) Overall estimation results, with *Free Rider* as baseline.
(3) Overall estimation results, with *Others* as baseline.

TABLE E4: OLS REGRESSIONS. ESTIMATED AVERAGE CONTRIBUTION (%) FOR EACH TYPE WITH AND WITHOUT COMMUNICATION.

	(1)	(2)	(3)
	Contribution	**Contribution**	**Contribution**
Communication	13.37**	14.42	17.39***
	(6.285)	(10.17)	(5.375)
Cooperator		27.20***	11.76*
		(8.636)	(6.005)
Free Rider	-27.20***		-15.44**
	(8.636)		(6.825)
Others	-11.76*	15.44**	
	(6.005)	(6.825)	
Communication x Cooperator		-1.056	-4.024
		(11.60)	(7.951)
Communication x Free Rider	1.056		-2.968
	(11.60)		(10.99)
Communication x Others	4.024	2.968	
	(7.951)	(10.99)	
Constant	68.61***	41.41***	56.85***
	(5.270)	(6.261)	(3.115)
N	**1330**	**1330**	**1330**
adj. R^2	**0.092**	**0.092**	**0.092**

Note: Cluster- robust standard errors in parentheses (clustered on 94 groups) * p<0.10, ** p<0.05, *** p<0.01.
(1) Overall estimation results, with *Cooperator* as baseline.
(2) Overall estimation results, with *Free Rider* as baseline.
(3) Overall estimation results, with *Others* as baseline.

TABLE E5: OLS REGRESSIONS. ESTIMATED EFFECT OF COMMUNICATION ON INDIVIDUAL PAYOFF (%)

	(1)	(2)	(3)
	Payoff	**Payoff**	**Payoff**
Communication	1.754	15.35*	9.283*
	(6.823)	(9.020)	(4.971)
Cooperator		9.124	0.352
		(8.464)	(5.338)
Free Rider	-9.124		-8.772
	(8.464)		(7.874)
Others	-0.352	8.772	
	(5.338)	(7.874)	
Communication x Cooperator		-13.59	-7.529
		(10.20)	(7.460)
Communication x Free Rider	13.59		6.064
	(10.20)		(9.504)
Communication x Others	7.529	-6.064	
	(7.460)	(9.504)	
Constant	58.94***	49.82***	58.59***
	(4.813)	(8.074)	(3.328)
N	**1980**	**1980**	**1980**
adj. R^2	**0.008**	**0.008**	**0.008**

Note: Cluster- robust standard errors in parentheses (clustered on 99 groups) * p<0.10, ** p<0.05, *** p<0.01.

(1) Overall estimation results, with *Cooperator* as baseline.
(2) Overall estimation results, with *Free Rider* as baseline.
(3) Overall estimation results, with *Others* as baseline.

APPENDIX F: BAG-OF-WORDS IN NORWEGIAN

TOPIC 1: PRONOUN (SINGULAR).

Du, jeg, deg, meg, din, ditt, min, mitt.

TOPIC 2: PRONOUN (PLURAL).

Vi, oss, vår.

TOPIC 3: COMMITMENTS AND RECRUITMENT.

Begge, sammen, lover, pinkey, 10, ti, gi, gir, mye, mer, mest, øke, flere, bidra, kjør, best, enig, rettferdig, dele, samarbeid, svikt, full, pott, gass, velger, bra, fint, nice, glimrende, nydelig, supert, perfekt, sweet, happy, good, cool.

TOPIC 4: EARNINGS, TACTICS.

Tjene, profitt, uttelling, maksimere, størst, satser, gevinst, money, penger, investere, poeng, plan, taktikk, foreslå, forslag, varsle, produsere, produksjonsdel, produksjon, blå, rød, raud, deal, formelen, avtale, forhandle.

TOPIC 5: CONFUSED.

Forvirret, misforstå, forstå, confused, skjønte, skjønner.

TOPIC 6: REGRET, EMOTIONS.

Tilgitt, sorry, feil, feilet, taper, føler, rettferdig, feiger.

APPENDIX G: EXAMPLE ENTRIES IN NORWEGIAN

TOPIC 1: PRONOUN (SINGULAR), ALL PERIODS.

Session 2, period 3
224: *Du må velge meg*
Session 3, period 1
323: Jeg velger 10 i første runde, velger du noe annet betyr det at jeg ikke kan stole på deg):
Session 3, period 5
330: *men du må jo velge meg da*
329: `jepp`
Session 4: period 5
421: `Hvor mye produserer du med? Jeg velger alltid 10, vet ikke om det har noe å si for deg`
Session 4, period 3
427: Hvor mange tar du?
428: *6*
427: Jeg tar 7 hvis du velger meg
428: *ok*
Period 10
427: Hvor mange tar du?
428: *tar 2 stk*
427: tar 3
428: *hva med deg?*
428: *ok*
Session 5, period 8
523: slenger ut mine små blå

TOPIC 2: PRONOUN (PLURAL), ALL PERIODS.

Session 1, period 1
121: `Er vi enige om at vi kjører full pott? det vil jo gi størst uttelling`
122: `Yes`
Session 1, period 2
123: *Ok! Men velger vi hverandre da?*
124: `ja`
Session 1, period 1
130: `hva velger vi?`
129: *Gi 10kr sammen i 10 runder?*
Session 3, periode 3
323: vi velger hverandre hver runde, 10 hver runde?
323: ?
324: oki
Period 4
323: vi velger hverandre i resten av rundene?
323: 10 hver runde?
324: ja
Session 3, period 4
328: `skal vi legge inn 10?`
327: `ja`
328: `ok`
327: `:)`
Session 3, period 6
330: *nice, vi fortsetter sånn?*
329: `ja`
330: *:D*
Session 5, period 2
532: *Gi 10 hver? Maksimere hver vår profitt + rettferdig*
532: *Cool?*
531: *ok*
Session 6, period 1
627: *Hei, tror det lureste er at vi velger hverandre alle gangene*
Session 7, period 1
729: `Vi tjener mest hvis begge kjører full produksjon`

TOPIC 3: COMMITMENT AND RECRUITMENT, ALL PERIODS.

Session 1, period 2
124: 10 hver!
124: kjør på
123: Ok! Men velger vi hverandre da?
124: ja
Period 10
124: ikke svikt meg nå!
123: Vil aldri svikte deg <3 <3 <3
124: 10
123: Hvertall ikke på valentines
124: pliz
Session 2, period 3
230: nice!
229: fortsette sånn 10?
230: fortsette sånn?
229: jaa
229: lett
230: nydelig ;)
Period 4
230: boom
229: keep it on 10!!
230: cracking the system
229: hahaha
Period 5
229: hell yeah
230: og om en av oss feiger ut litt så har vi rett til å ikke bidra?
230: ok? :P
Session 3, period 1
327: skal vi jobbe sammen?
328: Gjerne
327: ok
Period 8
327: dette går jo bra
328: Dette funker jo bra :)
327: :)
328: 10 igjen da?
327: ja
Period 9
328: Samme? :)
327: yeah :)
328: supert :)
327: nice :)
Period 10
327: føler vi er et bra team
328: Jepp :)
327: :)
328: en siste gang nå :)
327: yes
Session 3, period 1
332: 10 hver så får vi 14 poeng begge to? :)
331: *skal vi gå for full pot ?*
332: jaa
332: Let's do it :D
Session 8, period 3
828: *hei, jeg har mange poeng, samarbeid med meg :)*
827: *jeg har 4*
827: *skal vi samarbeide?*
Period 4
828: *hei, jeg har 5 blå og fire røde*
827: *har 3 blå og 10 røde*
828: *samarbeide?*
827: *samarbeid er best*
828: *uye!*

TOPIC 4: EARNINGS OR TACTICS, ALL PERIODS.

Session 2, period 1
225: *hei, vi satser maks hva?*
226: *5?*
225: *10!*
Session 3, period 2
332: *maks poengsum? 10 hver?*
331: høres bra ut
Period 5
331: så da sier vi 10 igjen 12 ?
332: *Skal vi bare fortsette sånn hele veien kanskje?*
332: *ja*
331: (y)
Session 7, period 1
729: `Vi tjener mest hvis begge kjører full produksjon`
729: `Er du med?`
730: *ja*
Period 8:
729: `har du plan?`
730: *eeh nei*
729: `skal vi ta 5?`
730: *ja*
Session 8, period 5
821: 8?
822: Sure
821: deal
822: Deal

Period 6:
821: Kva mange poeng?
822: 8?
821: avtale
Session 8, period 6
823: forslag til ny taktikk?
823: begge tar 10?
824: `hadde vi gitt 10 hver gang begge to hadde vi jo åpenbart fått mest`
823: eller begge tar litt mindre
Session 8, period 1
825: *Hardt ut på produksjon?*
825: *tarzan*
825: *hahhaha*
826: *hardt ut*
Period 6
825: *går vi hardt ut igjen?*
825: *i e for*
826: *ja*
825: *all in*
826: *det er sånn begge får mest uten å fucke den andre*
Session 8, period 1
828: *jeg foreslår at vi velger å bruke 10 annenhver gang, da tror jeg vi får mest poeng til samman*