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THE QUEST FOR COOPERATION IN HARSH SOCIAL DILEMMAS

Leading-by-example and face-to-face communication in the Claim Game.

MASTER THESIS

WARD DE ROOIJ- 332454

ABSTRACT

Previous research has identified leading-by-example, by a democratically elected leader, and continuous face-to-face communication among the most successful cooperation enhancing solutions, in both give-some and take-some games. The present study examines whether these solutions are also effective in the recently introduced Claim Game; a give-some, take-some laboratory game that is much more representative of harsh real-world social dilemmas, as it extends the strategy space of the public goods game by allowing for claims. I found that both solutions are indeed effective in increasing cooperation in the Claim game; and although a combination of both solutions is also effective, it is not more effective compared to the individual solutions. Adding communication to the leading-by-example treatment did however increased leader cooperation, and altered the way people tried to convince an another. Further I found that communication in the Claim Game is not just 'cheap talk', people tend to keep their word. And consistent with previous research I found that leader preferences, influence cooperation rates. Finally this study demonstrates that communication can be simulated in a web survey, and that the thought of communication can be enough to increase cooperation.

AUTHOR: **WARD DE ROOIJ**

STUDENT NUMBER: 332454WR

THESIS SUPERVISOR: JAN STOOP

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INTRODUCTION

Since the dawn of time, humanity has been challenged with the quest for cooperation. Especially in those situations, in which it is not in one's self interest to cooperate, but cooperation is in the interest of the group. These situations, in which the seemingly rational behaviour of the individual, results in collective irrationality (Kollock, 1998), are called social dilemmas. Many of the world's most pressing problems represent social dilemmas (Van Lange, Joireman, Parks, & Van Dijk, 2013), not only those that we see on the news or read about in the papers, but also those we experience in daily life. A single employee has little incentive to put a large amount of effort into his work. But if all use this line of reasoning, a company will go bankrupt and all employees are worse off. Why should a single fisherman not catch as many fish as he is capable off? Yet if all fisherman do this, a species of fish might go extinct, and none of the fisherman is able to make a living. Most problems that involve more than one individual, have therefore at least some aspects of a social dilemma.

Consequently the wellbeing and prosperity of relationships, teams, organisations and society as a whole is challenged by these social dilemmas (Van Dijk, Parks, & Van Lange, 2013). Organisations function better when staff all strive to achieve targets, teams are better off if all team members deliver maximum effort, and sometimes making some (small) sacrifices benefits both parties in a relationship. A healthy environment can only be maintained if all involved parties restrain use of scare resources, and prevent pollution. And the whole world is a happier place if nations do not get bogged down in an arms race. Therefore cooperation is something we would want to increase, or at the very least know how it can be increased if necessary.

Solving social dilemmas is however not an easy task, being that one of the main characteristics of a social dilemma is that no matter the actions of others, it is always in the self-interest of a single actor to defect (i.e. act in a selfish manner). So how can a team member be motivated to do his bit and pull up his socks? How can fisherman be discouraged from overharvesting? How can manufacturers be deterred from polluting our air? And how can peace be maintained among nations? These fascinating questions have lead me to dive into this subject, and set me on a quest for cooperation. Mainly because the topic of social dilemmas and cooperation touches on the basic questions about human nature. Are humans naturally good or bad? And what are the primary motives for their actions? A lot of concepts, from all fields of research, are linked to this concept of cooperation in social dilemmas. This is what makes the topic of cooperation so interesting to research, but this is also what makes it so complicated.

Social dilemmas are not only present when problems arise, but are also at the base of all economic systems (Baron, 2007). After all each individual benefits by consuming as much as possible, and working as little as possible. Yet if all behave accordingly, there would be nothing to consume. Hence all economic systems are in fact social dilemma solvers, that make sure the total workload is shared, and consumption is limited to what is available. Ergo both capitalist and communist systems require money in return for consumption, and work (i.e. labour) in return for money. However, this is not the only solutions people have come up with to resolve social dilemmas. Effective solutions have been found that (partially) solve the dilemma by either motivating individuals to voluntary decide to cooperate, or by making structural changes to the features of the dilemma. The present study is interested in both these motivational and structural solutions, which will therefore be discussed elaborately in the literature review.

Many other scholars are apparently also fascinated by the dynamics of social dilemmas, since research on this topic is abundant. Experimental research in this area has revolved around several classic social dilemma laboratory set-ups, such as the public goods game. These games simplify the social dilemma so the behaviour and actions of individuals can be studied in a

controlled environment. Yet in some cases these games might be oversimplified, and it is questionable whether behaviour in these games still represents the behaviour of actors in real-world social dilemmas. Subsequently in recent studies, such as the one by Van Soest, Stoop, & Vyrastekova (2016), laboratory games more adapted to fit harsh real-world social dilemmas have been established. One of these games will be discussed in detail in the literature review.

GOAL & AIMS

Hence the goal of the present research is to find the most effective cooperation enhancing solutions, and in what way, shape or form they are most effective. Hereafter these solutions will be put to the test in an experiment, utilising a laboratory game that represents the harshness of real-world social dilemmas. To find an experimental game that suits the present research, an extensive literature review is conducted. This review starts off by answering what a social dilemma actually is and what games are used to study these dilemmas in a laboratory setting. The give-some public goods game, and the take-some common pool resources game are discussed, and it is examined if, and how observed outcomes in these games differ from the expected outcomes. The Claim Game, a give-some, take-some game, is introduced as most suited for the present study, and is examined in detail.

The quest continues by an examination of the solutions so far found and studied in the literature, and which ones are considered most effective. The motivational solution communication and the structural solution leadership are identified among the most successful solutions, therefore these solutions are further examined. For both communication and leadership, I examine if, why, how and when they are effective, and whether they are effective in both take-some and give-some games. The literature review identifies (continuous) face-to-face communication as the most effect from of communication, and leading-by-example (by a democratically elected leader) as one of the most effective forms of leadership (in the short run); for both give-some and take-some games.

As a result I expect both solutions to also be effective in the Claim Game. Further, I not only expect the combination of both solution to be effective, but I also expect it to be more effective compared to the individual solutions. Therefore I state the following hypotheses and research questions.

HYPOTHESES

H_1: Face-to-face communication is effective in increasing cooperation in the Claim Game.

H_2: Leading-by-example, by a democratically elected leader, is effective in increasing cooperation in the Claim Game.

H_3: The combination of face-to-face communication and leading-by-example, by a democratically elected leader, is effective in increasing cooperation in the Claim Game.

H_4: The combination of face-to-face communication and leading-by-example, by a democratically elected leader, is more effective in increasing cooperation in the Claim Game, compared to the individual solutions.

RESEARCH QUESTIONS

To test these hypotheses the following research questions need to be answered.

1) *Is face-to-face communication effective in increasing cooperation in the Claim Game?*
2) *Is leading-by-example effective in increasing cooperation in the Claim Game?*
3) *Is the combination of face-to-face communication and leading-by-example effective in increasing cooperation in the Claim Game?*

4) *Is the combination of face-to-face communication and leading-by-example more effective in increasing cooperation in the Claim Game, compared to the solutions on their own?*

After these questions have been answered, the quest for cooperation can be completed by answering the main question:

How effective are both face-to-face communication and leading-by-example, and a combination of these solutions, in increasing cooperation in the Claim Game?

A laboratory experiment is designed to examine how effective both face-to-face communication and leading-by-example (by a democratically elected leader), and the combination of the two are in increasing cooperation in the Claim Game. However because of time and monetary constraints, it is up to future research to conduct the experiment, and a survey is designed that is able to approximate the findings in the actual lab experiment.

SIGNIFICANCE

What sets this study apart is that it is the first to examine the effectiveness of both communication and leadership in the Claim Game. As a matter of fact, being that this game was only introduced and published this year, I am the first to research any solution in this game. This not only puts the effectiveness of these solutions to the test, but also provides further inside into the dynamics of the Claim Game. Also although both much researched, the combination of face-to-face communication and leading-by-example has to my best knowledge never been studied before. Hence the interaction between the two is as yet unknown; will the possibility of communication only strengthen the effectiveness of leading-by-example, or is the opposite true?

LITERATURE REVIEW

SOCIAL DILEMMA

This chapter will discuss these situations that are called social dilemmas, in which the narrow self-interest of the individual conflicts with the interest of the whole. Then it will be discussed which games are used to study these dilemmas in a laboratory setting, and which game I am interested in. To conclude several solutions for the free-riding problem will be discussed, and those that have proven to be most effective will be discussed in the subsequent sections.

WHAT IS A SOCIAL DILEMMA?

'A situation in which individual rationality leads to collective irrationality' is a spot on definition of a social dilemma provided by Kollock (1998). More comprehensively, in a social dilemma a group of people faces a situation defined by the following two characteristics (definition first used by Daws (1980):

1. Every individual in the group is able to receive a higher pay off if (s)he decides to make a selfish choice rather than making a cooperative choice; independent of the choices of the other group members.
2. Every individual in the group will receive a lower payoff if everyone decides to make a selfish choice rather than a cooperative choice.

In the literature, this seemingly rational behaviour of making a selfish choice is also called 'free-riding' or *defecting*. Acting in a way that is best for the group is called *cooperating*. A large proportion of the literature is devoted to how this free-riding problem can be solved.

Many of the problems we face today are social dilemmas, examples are therefore countless. One of the most used example is that of environmental pollution; every person gains from not taking action to reduce the detrimental effects on the environment of their actions, yet if everyone acts in this selfish manner, in the long run, all of us will be worse off. Another classic example is the one by Hardin (2009), described in his article on 'The Tragedy of the Commons'; each farmer stands to gain from letting their cows graze on a common pasture, but if all would do this the pasture would disappear. Along the same line the example of fisherman, that are off course best off catching as much tuna as they can, however when all would do this, tuna would go extinct and all fisherman would be worse off. In addition to these commons problems, lots of social dilemmas revolve around public goods and facilities. Each individual is, for instance, better off by cheating on his or her taxes, but if all do this more resources have to be spent on enforcement and/or it is no longer possible to establish or maintain public facilities. And it could be reasoned that well insured elderly people stand to gain by visiting their doctor every week, yet if everyone would do this insurance premiums would skyrocket. Social dilemmas are however not limited to the space of society and global problems, but can also be found on an interpersonal level. For instance when working on a project with a group of people; everyone gains by putting in as little effort as possible, however if everyone behaves in this manner, the project will never be realised and all are worse off. It can therefore be concluded that social dilemmas are all around us, and a large proportion of the world's most pressing problems can be characterised as a social dilemma. Further they can be found on all levels from the interpersonal level to the global scale.

The true tragedy of a social dilemma is that it is by definition characterised by at least one *deficient equilibrium*. As Kollock (1998) describes, in a deficient equilibrium none of the group members has an incentive to change his or her behaviour (*equilibrium*), but there is at least one

other outcome in which everyone is better off (*deficient*). Thus in a social dilemma a group of people may be fully aware of how their actions lead to a unfavourable outcome, and meanwhile be unable to do anything about it. This is because each individual has a dominant strategy, which will result in the best outcome for this individual regardless of the actions of the others (in most social dilemmas, not always). This dominant strategy is to defect. Therefore for each individual there is no doubt about what is the "rational" thing to do (according to Game Theory), yet if all make this "rational" decision everyone will be hurt.

LABORATORY GAMES

Many different laboratory games for studying social dilemmas exist, but a few have dominated the literature for the last decades: the prisoners dilemma (PD), the public goods game (PGG) and the commons dilemma or common pool resource (CPR) game. These games are analogous to many situations in the real world in which the interest of the individual conflicts with the interest of the group. They are used to study the circumstances in which individuals choose to cooperate or defect, what the motives and reasons are for this behaviour, and if and how individuals can be motivated to behave otherwise.

For the sake of completeness I will shortly discuss the prisoners dilemma. Then I will discuss the public goods game, also called a give-some game; and the common pool resource game, also called a take-some game. Note though that in real-world circumstances social dilemmas are often much more complicated and harsh than these games. This is what I am interested in, therefore the Claim Game, a harsh laboratory game that incorporates elements of both give-some games (PGG) and take-some games (CPR) introduced by Van Soest, Stoop & Vyrastekova (2016) will be discussed in detail at the end of this chapter.

PRISONERS DILEMMA

The prisoners dilemma (PD) is one of the most studied social dilemmas, especially in the early social dilemma literature, and its origins can be found in the story of two people being suspected of committing a crime. The prosecutor is convinced that they are guilty but lacks the evidence, and therefore separates the two and both are offered the following choices: confess (defect), or deny involvement (cooperate). The outcome of this dilemma is dependent on the choices of both individuals. When both confess (defect), both will be sent to jail for 6 years; and when both deny involvement (cooperate), both will go to jail for 2 years. However, when one confesses (defect) and the other denies involvement (cooperate), the individual that confessed will be set free while the other will be sent to jail for 8 years. The dilemma in this game is that no matter what the other person decides, both individuals will always be better off by defecting. However if both defect, than both of them will be worse of, compared to when they both cooperate. In a typical PD laboratory experiment there is usually a (positive) monetary payoff structure. Classically it is played by two subjects, but it can also be extended to several people. PD type situations are very common in real life. For instance when making an unsecured transaction (Kollock, 1998), such as trading used goods online. If I buy something online from another individual, it is tempting for me not to send a check and for the other individual it may be tempting not to ship the goods. However when we both defect, we are both worse off.

PUBLIC GOODS GAME

The public goods game (PGG) is a give-some game and is also called the Voluntary Contribution Mechanism (VCM). It is a real classic within the world of experimental economics, for decades scientist have used this game to try and understand human behaviour in social dilemma situations. The majority of the more recent literature revolves around this game. A public goods dilemma consists of a potential conflict between group members over the contributions needed

to create a common good that is shared by all group members (Stroebe & Frey, 1982; Van Vugt & De Cremer, 2003). The common good can be everything from a group facility to the successful performance of a task, as long as it is something from which all may benefit regardless of whether they helped to provide the good (i.e. non-excludable and nonrival) (Kollock, 1998). The PGG is a simplified (laboratory) version of these real world type of conflicts, used to research how individuals behave in these situations.

As in all social dilemmas, the central problem arising in the PGG is that of *free-riding* (Kerr, 1983; Olson, 2009). Each group member must decide whether to contribute (cooperate) towards the creation of the collective good or to free ride on the contributions of others. Off course (economically) it is more attractive for every individual to free ride on the contributions of others. However if too many individuals fail to contribute to the public food, the good may not be created at all (or only to a small extent), which leaves every member in the group worse off. Seen from the viewpoint of the collective, cooperation is therefore the best strategy. Group members may not be willing to cooperate though, because not contributing (defecting) is always the most attractive option and an individual group member that does contribute can end up being exploited by the group members that decided to defect. In the book by Komorita & Parks (1994) this is called the "sucker's payoff".

In its simplest form the (one-shot) PGG works as follows. A group of N subjects are all given an endowment in an experimental currency called ECU or tokens. Each individual subject can than choose to allocate a proportion of that endowment to a public good (account). The endowment they choose not to put into the public good goes into their private account. The total amount of contributions that are made into the public good (account) by all subjects is than summed, multiplied by a certain factor and divided equally among all subjects. Contribution decisions are made simultaneously, therefore subjects do not know what the other subjects decision will be. After all players have made their decisions, each individual is informed about their individual payoff. This individual payoff consist of the tokens that were kept in the private account and the tokens that were distributed among all subjects from the public good.

Note that in order for there to be a social dilemma in the PGG, the multiplication factor needs to be larger than 1, but smaller than the number of subjects (N). For example in a group of 4 people where each subject receives an endowment of 1 token. If the multiplication factor is smaller than 1 it is never beneficial to put anything in the public good, because the individual will always receive less then he put in. When the multiplication factor is larger than the number of subjects in the game, it is always beneficial for every subject to put all of their endowment into the public good. For instance when the multiplication factor in our example is 5. If a subject contributes 1 token he will always receive at least ((1x5)÷4) 1,25 in return, even when all other subject would not contribute to the public good. It would therefore never be in the self-interest of a subject not to cooperate, in other words there would not be a dilemma. In our example all multiplication factors larger than 1 and smaller than 4 result in a social dilemma. For instance when the multiplication factor is 3, contributing 1 token would result in ((1x3)÷4) 0,75 for every subject in the group. If nobody else contributes to the public good it would therefore be best to keep the tokens in ones private account. But if everyone cooperates the individual payoff is ((4x3)÷4) 3, which is more than the payoff when no one is contributing. However in the latter case, it would be even more attractive for a single subject not to cooperate (defect) because than his payoff is (((3x3)÷4) + 1) 3,25. This is where the real dilemma rises: a single individual is always better off by not contributing, and the individual self-interest and the interest of the group are opposed. In sum therefore the size of the multiplication factor should be chosen in a way to keep the personal interest of subjects opposed to the group interest.

EXPECTED OUTCOME VS. OBSERVED OUTCOME

To maximise the total group payoff, every subject has to contribute all of his or her tokens to the public pool. In the literature this is called the Pareto-optimal result. But (classic) economic game theory (i.e. rational choice theory or expected utility theory, which assumes that people are rational utility maximizing actors) suggests that the dominant strategy in the PGG is to contribute nothing to the public pool, because the payoff of each individual is larger when defecting as opposed to contributing. Or as Hauert (2005) describes it, any rational agent does best contributing zero, regardless of the decisions of other agents. In the literature this prediction of a non-cooperative outcome is called the Nash equilibrium (Andreoni, 1988), also referred to as the free rider hypothesis (Brubaker, 1975).

This free rider hypothesis has been extensively researched, and Marwell and colleagues were the first to test this hypothesis. Contrary to what is predicted by economic game theory, they found that contribution rates are rarely zero. Although contributions are still way below what is needed to achieve a Pareto-optimal result, subjects contribute on average between 40 and 60 percent of their endowment to the public account (Marwell & Ames, 1979; Alfano & Marwell, 1980; Marwell & Ames, 1981), with contributions ranging from non at all to contributing everything. They also observed that contribution rates decrease steadily over time, in other words over time more and more subjects start to become free-riders; however contributions only reach zero in the last period, even if the game lasts for as long as 50 periods (Gächter, Renner, & Sefton, 2008). One might think that the higher than expected contribution rates in the PGG are caused by the relatively small group sizes found in most laboratory experiments. However both Isaac, Walker, & Williams (Isaac, Walker, & Williams, 1994) and Diedrich, Goeschl, & Waichman (2014) found that cooperation rates in groups consisting of up to a hundred group members are not lower, if anything they tend to be higher.

WHY COOPERATE?

If rational economic theory predicts no cooperation, why is (some) cooperation observed in most studies? In the review by McCannon (2015) several probable causes for this observation are provided. The most likely explanation, according to the majority of studies, are social preferences, or what in the literature is called ‘other-regarding’ preferences (Fehr & Fischbacher, 2002), such as fairness, egalitarianism, altruism and inequality aversion. Because of these 'other-regarding' preferences, the utility function of each group member is to a certain extent dependent on the well-being of other group members. Therefore a trade-off exists between one's own payoff and the payoff of others, hence accounting for the lack of total free-riding behaviour (McCannon, 2015). Another possible explanation for the lack of total defection, McCannon continues, is that of psychological preferences such as guilt and guilt aversion. Whereas social preferences concern the outcome of the game, psychological preferences are concerned with the view of others on the strategy one has taken.

Some scholars are however not satisfied with the above mentioned explanations for cooperation in the public goods game. Could it be that the PGG is so oversimplified, that it is no longer a good predictor for behaviour in a social dilemma? Field research into real-world social dilemmas indeed tends to find lower cooperation rates than those observed in laboratory PGG experiments (Van Vugt, Van Lange, Meertens, & Joireman, 1996). Moreover other social dilemma laboratory games also do tend to find lower cooperation rates. For example the common pool resource (CPR) game, which will be discussed in the next section.

COMMON POOL RESOURCE GAME

In the PGG, an individual faces an immediate cost that generates a benefit that is shared by all, and is therefore also called a 'social fence'. Opposite to this is the CPR game, a take-some 'social trap' game, in which the individual is tempted by an immediate benefit that results in a cost

shared by all (Kollock, 1998). Traditionally this type of game is called the 'Tragedy of the Commons', as made famous by Hardin (2009). The story used in the article by Hardin is that of farmers having their cows graze on a common pasturage. For an individual farmer it is beneficial to have as much cows as possible grazing on the common piece of land, for he reaps the benefits but the cost of potential damage are shared by all. Yet if all farmers use this line of reasoning the pasturage will likely be destroyed and all will suffer. Therefore Kollock (1998) reasons that like public goods, commons are also non-excludible, but in contrast to public goods, benefits in the commons are rivalrous (i.e. subtractable). The resources I use (e.g. fish or fresh air) are no longer available to others. Therefore the issue in a commons dilemma is the carrying capacity, which depends on the replenishment rate. This determines the rate at which the benefits of the common can be used without the common being overharvested or exhausted.

Two types of experiments have traditionally been used to study CPR dilemmas; most used is the 'investment game', another much used game is the 'request game' (EconPort, 2006). The investment game was first introduced by Ostrom, Gardner, & Walker (1994) to test how individuals behave as a result of the institutional setting. Same as in the PGG, participants are given an endowment and are given the opportunity to invest (a proportion of) this endowment into a group account. However, unlike the PGG, the return on the investment of this group account is determined by the sum of all invested amounts. When the sum of investments is small, each participant receives a return larger than his or her investment. However when the sum of investments exceeds a certain level, each individual receives less than what he invested. Note that in this investment game the payoff of a participant is always positive when (s)he decides to contribute nothing to the group account. In the request game, introduced by Budescu, Rapoport, & Suleiman (1992) it is not possible for a participant to guarantee one's payoff by contributing nothing to the group account (i.e. the externalities traditionally associated with CPR cannot be avoided). A participant in this game has to choose an amount, between a and b, to request from a group account; however the exact value of this group account is unknown. Subsequently the return of each participant is dependent on the sum of all requests. When the sum of requests is lower or equal to the value of the group account, all will receive their requested amount. But when the sum of request is larger than the value of the group account, all will receive zero.

EXPECTED OUTCOME VS. OBSERVED OUTCOME

Again according to economic game theory people are expected to behave like rational, utility maximizing, individuals. In the CPR game it is in the self-interest of each individual to use as much as they can from the common-pool, regardless of the actions of the others. Therefore it is expected that individuals in a laboratory CPR experiment will not cooperate by moderating their consumption. Resulting in the resource being overused and/or depleted. So what is actually found in experiments? Although in most experiments (structured both as investment and request games) some cooperation is observed, cooperation rates drop very rapidly. At the beginning of these experiments cooperation rates somewhere between the Pareto-optimal and the Nash equilibrium are observed, and within two to three periods cooperation rates converge to the (selfish) Nash equilibrium (Van Soest, Stoop, & Vyrastekova, 2016).

Cooperation rates found in the CPR game are therefore much lower compared to those found in the PGG, and individuals do seem to behave more according to economic game theory. This is a remarkable finding, being that the CPR game is more or less an inverted PGG. Consequently both games are to a large extend similar, in the sense that both can be described as finitely repeated, multi-period, multi-person social dilemma games (Van Soest, Stoop, & Vyrastekova, 2016) and in both games the Nash equilibrium is for players to act in a self-interested, own payoff maximizing manner (i.e. cooperating as little as possible) (Lefebvre, 2013). It is therefore interesting to try

and understand what is causing this difference in cooperation rates. Is it the (more real-world like) uncertainty or the more complex optimal response functions in the CPR game that are debit to this observation? Or is it something else? Van Soest, Stoop, & Vyrastekova (2016) argue that the primary reason for the observed difference in cooperation rates is due to the fact that in the CPR game an individual is able to undo the good work of others, while in the PGG the worst an individual can do is free-ride on the benefits of the work of others (i.e. the choices of the other participants can yield negative returns). Therefore Van Soest, Stoop, & Vyrastekova (2016) introduce the Claim game (CG), with the goal to add the above described strategic interaction to the PGG.

CLAIM GAME

The claim game (CG) is a standard PGG, however participants are not only able to contribute to the public good, but can also take (i.e. claim) the contributions of others. After these claims are fulfilled, the remaining contributions are used to produce the public good. Note that the only real difference between the CG and the PGG is this enlargement of the strategy space for each participant. Other than that the CG is very much the same as the PGG. Like in the PGG a hundred percent cooperation is still the social optimum (i.e. Pareto-efficient outcome), that is the group will be best off if everyone contributes their full endowment. And the Nash equilibrium for all group members is still to defect, i.e. not to participate in producing the public good or in this case make a full claim on the contributions of others.

However, despite these seemingly small differences, Van Soest, Stoop, & Vyrastekova (2016) found that allowing individuals to undo the good work of others, has dramatic consequences for cooperation. Cooperation rates in the CG are therefore significantly lower compared to those in the PGG. From the very first period of the game, average contribution rates in the CG are even negative. On average no public good is created, that is the net investment in the public fund does not significantly different from zero. And almost all individuals that start out with relatively cooperative behaviour, show defecting behaviour later on in the experiment. Further when individuals in the CG observed other group members defecting (i.e. claimers), they were much more likely to defect as well, compared to when they observed defectors (i.e. free-riders or non-cooperators) in the PGG. Indeed being able to undo the good work of others seems to encourage selfish, non-cooperative behaviour.

Therefore Van Soest, Stoop, & Vyrastekova (2016) argue that not having the option to take from the public good, might be one of the main reasons for the observed (high) cooperation rates in the standard PGG. Hence the cooperation rates observed in the PGG might be exaggerated, because the consequences of extreme free-riding (i.e. taking from others) are not present. In real-world scenarios these consequences (e.g. uncertainty) are present. Examples of these real-world situations are abundant. An obvious example is that of corruption in government organizations, and charities with excessively high management salaries. Another clear example, provided by Van Soest, Stoop, & Vyrastekova, is that of a fishing pond in which a individual is not only able to not contribute (free-ride) by not restocking, but he can also take fish that are restocked by other members. A less obvious example is that of employees striking for better wages and one or more employees decide not to strike and go to work. These employees, that bail on the strike, do not only not contribute to the strike, but also possibly undo the effects of the strike. For more examples I refer to the earlier mentioned study by Van Soest, Stoop, & Vyrastekova (2016). As a matter of fact all situations in which the benefits of the public good (if created) are non-excludable and non-rivalry, but where the creation is not guaranteed because of the possibility that (some of the) contributions are undone by others are examples of the CG. Van Soest, Stoop, & Vyrastekova argue that often these are situations in which there is no or only partial enforcement of rules and/or regulations.

Because (as is explained later) this game will be used in my experimental design, I will explain the CG in detail in the laboratory setup developed by Van Soest, Stoop, & Vyrastekova (2016). A number of people are randomly matched to form a group and remain in this group for all the periods in the experiment. Every participant is assigned a number to represent their identity, so their real identity is kept anonymous. The game is repeated over multiple periods, and at the beginning of each period the participant receives an endowment consisting of a certain amount of experimental currency. Hereafter each participant has to decide to contribute (a part of) this endowment, contribute nothing, or make a claim on the contributions of the other participants. Each participant is allowed to claim any amount between 0 and the endowment amount. The participants has to represent this choice by choosing a number between minus the endowment and the endowment (e.g. -20 and 20), in which a negative number represents a claim from the public account, and a positive number represents a contribution to the public account.

After each round the sum of claims is subtracted from the sum of contributions. The remaining amount is multiplied by a certain factor and divided equally among all four members of the group. The earnings for each participant therefore consist of the initial endowment, minus the amount that contributed to the group account / or plus the amount claimed from the group account, and plus the payoff of the group account (as described above). However if the sum of claims is larger than the sum of contributions, there is first of all no payoff from to group account (zero) and secondly the claims cannot be satisfied. Therefore each participant that has made a claim receives a share of the contributed amount according to their share in the total amount claimed. After each period each participant is shown their own earnings and the contribution decision made by the other participants in the group.

The CG is perfectly suited for the present research. After all, this thesis is concerned with cooperation in harsh social dilemmas. Of all social dilemma laboratory experiments, the CG seems to be most adapted to fit (harsh) real-world social dilemmas, but is still simple enough to effectively study cooperation in a laboratory setting. Further in their paper Van Soest, Stoop, & Vyrastekova (2016) suggest that the CG could very well be used as a means to test economic instruments in a laboratory environment, improving the confidence in their effectiveness if the instruments manage to improve outcomes even in the harshest circumstance. This is exactly what I will do by testing the solutions, that have proven to be most effective in eliciting cooperation in the PGG (and the CPR game), in the CG. Putting these solutions to the 'ultimate test' while still using a laboratory setting.

SOLUTIONS IN A SOCIAL DILEMMA

The social dilemma research of the past decennia has been obsessed by finding solutions to the 'free-rider problem'. Because the Pareto-optimal outcome can only be achieved if all cooperate, cooperation is something we would want to increase. Several solutions have been identified that have shown to be effective in increasing cooperation in social dilemma situation. These solutions can be divided into two categories; individual or motivational solutions and structural solutions (Messick & Brewer, 1983; Van Vugt & De Cremer, 2003; Van Vugt, Snyder, Tyler, & Biel, 2000). Individual solutions rely on what motivates individuals in a social dilemma to voluntarily decide to cooperate. Most of the models found in the social dilemma literature do not take into account the outcomes of others. It is very questionable whether this is realistic. As Dawes (1980) reasoned "Few of us would accept $500 with nothing for our friend in lieu of $495 for each of us." (quoted in Kollock (1998). Individual or motivational solutions therefore assume that individuals are not completely egoistic, and thus also give some weight to the payoff of the others (Kollock, 1998). The most common and most effective individual solution is communication, which will be discussed elaborately in the next chapter. Structural solutions are about changing the rules or structural features of the game in a way that will result in more

cooperation (Van Vugt & De Cremer, 2003). One of the most studied and most acknowledged structural solutions is leadership, which has proven to be of major impact on cooperation rates and will therefore also be discussed in detail later.

COMMUNICATION

In this section I will discuss the literature relevant to the subject of communication as a cooperation enhancing solution in social dilemmas. Mentioned results and resources all consider the public goods game (PGG), unless it is stated otherwise. The goal of this literature review section is to come to a reasoned hypothesis on the effectiveness of communication in the Claim Game (CG). Further I want to examine why communication is effective and in what way, shape or form communication is most effective.

IS COMMUNICATION EFFECTIVE?

After decades of research no complete solution to the cooperation problem in social dilemmas has been found. However not much debate is needed to argue that communication is effective. For decades researches have systematically found the effectiveness of communication in social dilemma experiments. Communication is thought of as one of the most effective ways of promoting cooperation. Since a study by Deutsch (1958) found that allowing for a brief period of communication, prior to the allocation decision in a social dilemma, increased cooperation rates dramatically; a large amount of other studies have focused on this solution. One of the first studies to look into the effects of communication on cooperation rates was the one by Dawes, McTavish, & Shaklee (1977) who found an average cooperation rate of 72% when communication was possible, as opposed to 31% cooperation in the control group without this possibility. Sally (1995) conducted a study concerning the factors influencing cooperation in a social dilemma, and found that of all factors, communication was by far the most effective in promoting cooperation. Same as in the study by Dawes, McTavish & Shaklee, communication increased cooperation by as much as 40 percent. An experiment by Isaac & Walker (1991) found that communication remained effective, even when it was costly for subjects to communicate.

WHY IS COMMUNICATION EFFECTIVE?

What is it that makes communication such an effective solution? The observed improvement in cooperation in laboratory experiments happens after all, even though communication does not alter the dominance of the defection option (Orbell, Van de Kragt, & Dawes, 1988) or alter the dilemma in terms of the strategy space of subjects. Scholars have therefore tried to decipher the mystery of communication for years and years. For a possible answer to this question I turn to the study of Dawes, McTavish, & Shaklee (1977). Their study did not just test for the effects of communication versus non-communication; but attempted to find out what aspect of communication is responsible for the effect of communication on cooperation. Three hypothesized aspects of communication are defined at the start of their study. First of all people get to know each other, they call this humanization. Secondly people discuss the problem or dilemma at hand (discussion). Lastly people can make commitments towards one another about their behaviour and also elicit such commitments from others (commitment). To examine which of these aspects, if any, is responsible for the effectiveness of communication the subjects in their study were divided into four groups. The first group could not communicate at all, the second was allowed to communicate but about an irrelevant subject, the third group was asked to discuss the dilemma but were not allowed to make commitments afterwards and the last group was asked to both discuss the dilemma and make public commitments afterwards. This resulted in cooperation rates of 30% and 31% respectively for the first two groups, and 72%

and 71% respectively for the last two groups. Humanization on its own therefore did not seem to have a significant impact on cooperation, at least not in the short time span of ten minutes subjects were given in the experiment. Discussing the dilemma is clearly the main driver for the effectiveness of communication. The possibility to make a commitment did not seem to make a real difference. Bear in mind subjects were forced to make a commitment by the experimenters, also all subjects committed to cooperating regardless of what they intended to do (cheap talk).

Does this mean that humanization is not an important factor for yielding cooperative outcomes in a social dilemma? I would argue to the contrary. Levy et al. (2011) did an experiment in which one of the subjects in the group was able to communicate, and make contribution suggestions towards the other group members. Subjects seem to significantly follow this suggestion, resulting in increased cooperation. However when a similar message was generated by a computer, and therefore did not originate from a human, the suggestion was not followed resulting in less cooperation. One could therefore argue that although humanization might not be the driving force behind the effectiveness of communication, it might be a prerequisite for discussion and communication to be effective. The relative effectiveness of face-to-face communication as opposed to communication via written message (demonstrated later on), also implicates that humanization is an important aspect of communication.

The review by Messick & Brewer (1983) extends the research of Dawes, McTavish, & Shaklee (1977) and states four reasons to explain the effect of communication on cooperation. The first reason they extent on is the ability of subjects to make explicit *commitments* and promises. Though as seen in the study research by Dawes, McTavish and Shaklee (1977) it is questionable if this has any real impact on cooperation rates. A review by Kollock (1998) tells us that so far research has remain inconclusive about the effectiveness of this aspect of communication. The second reason is the possibility of subjects to *gather information* about the likely choices of the other subjects. Sally (1995) also mentions the increased expectation of cooperation from other players as a possible reason for increased cooperation. It is difficult to understand what effect this would have on cooperation though. For instance, if I believe most of the other subjects will cooperate, does that give me reason to cooperate or does it only increase the temptation to defect? The third suggested reason is that communication provides the opportunity of subjects to appeal to the moral of the others, in other words appealing to what is the 'right' or 'proper' thing to do. Messick & Brewer call this *moral suasion*. Lastly communication may create or reinforce a sense of *group identity*. A lot of research, like the one by Daws (1980), have since identified a strengthened group identity as one of the most important reason for the effects of communication on cooperation.

Group identity is explained as the feeling of belonging to a group. It is thought that group identity sets a norm of cooperation (Kerr, Garst, Lewandowski, & Harris, 1997), or as Elster (1986) puts it create a collective desirability for cooperative behaviour or a cooperative norm, and a bias against egoism. Van Lange, Joireman, Parks, & Van Dijk (2013) even stated that the strengthened sense of group identity results in a norm of (generalized) reciprocity. Tajfel & Turner (1979) explain that the belief that one is part of a group (group identity) is enough to provoke discrimination in favour of the in-group and against the out-group. This enables the individual to take 'social action'. Further the mere striving of an individual for positive social identity can be a reason for behaving cooperatively (Campbell, 1965).

To test for the importance of group identity Orbell, Van de Kragt, & Dawes (1988) conducted an experiment in which subjects were switched to another group after discussion had taken place. In their experiment half of the groups had no possibility of communication, and the other half of the groups participated in a group discussion at the beginning of the experiment. Further half of the groups were told that contributions would benefit their own group, the other half was told

that contributions would benefit another group. When no communication was possible a cooperation rate of 33% was found, regardless of whether contributions would benefit their own group or another group. For the groups in which communication was possible, if subjects were told that contributions would benefit another group, cooperation rates did not increase. However when subjects thought that contributions would benefit their own group, cooperation increased to 79% of the social optimum. This suggests that there is definitely something like *group identity* going on here.

Orbell, Van de Kragt, & Dawes (1988) extended on these findings by adding another manipulation to their experiment. Just before the subjects needed to made their contribution decision, groups that were told that their contributions would go to their own group, were now told that their contributions would go to another group, and vice versa. Results are very interesting. Groups that thought during group discussion that their contributions would benefit another group, did not increase cooperation when it was told that contributions would actually go to their own group during the contribution session. However for groups that thought during their discussion that contributions would benefit their own group, there was significantly more cooperation even when during the session it was told to them the contributions would actually go to another group. In the latter case cooperation rates were 59%, so although lower compared to when benefits of contributions would go to their own group, there was still a significant effect of communication on cooperation. As Baron (Thinking and Deciding, 2007) explains in his description of the experiment "it was as though, once the subjects understood the importance of cooperation, they realized that it did not matter much whether others had been involved in the discussion or not". This is a promising result for anyone that is looking to improve cooperation among strangers, which is the case in most real world social dilemmas. It could suggest that promoting cooperation between people that know each other, is a strategy to learn people to cooperate with strangers (Baron, 2007).

Conclusion - To conclude I can state that no complete model to explain the effectiveness of communication has been found. Nonetheless there are several factors of which the literature is quite sure that they influence the success of communication; these are: discussion of the dilemma, humanization, moral suasion and group identity.

WHICH TYPE OF COMMUNICATION IS MOST EFFECTIVE?

There have been multiple ways in which studies have allowed their participants to communicate with each other. A meta-analytic study conducted by (Balliet, 2009) found that face-to-face communication was more effective in enhancing cooperation than written messages. This finding was done by multiple studies and seems to be systematic, and at this point in time it is commonly accepted that face-to-face communication is (by far) the most effective way of communication when it comes to eliciting cooperation in a social dilemma (Rocco, 1998; Bos, Gergle, Olson, & Olson, 2001; Brosig, Weimann, & Ockenfels, 2003; Bochet, Page, & Putterman, 2006; Balliet, 2009; Koukoumelis, Levati, & Weisser, 2012). Some scholars, even find that contributions tend to increase to nearly 100 percent (full cooperation), when all participants are able to communicate face-to-face (Isaac & Walker, 1988; Kinukawa, Saijo, & Une, 2000). In a world that is more and more digital-oriented this seems to be an important finding. Meeting face-to-face and talking about the issue at hand increases the chance of a cooperative outcome.

Balliet (2009) provides several possible explanations for the finding of the relative effectiveness of face-to-face communication compared to other types of communication. He argues that because face-to-face communication is much more dynamic and fluid, comprehension is more likely to occur. Or plainly said, it is easier for people to get their point across when face-to-face communication is possible. Further subjects are able to discuss the problem more accurately and

efficiently. Individuals are used to following certain 'norms of discussion' in which someone raises a concern or idea and the other individual(s) address those thoughts. This increases the changes of subjects feeling 'like they are on the same page'. Written messages (and computer-mediated communication) do not always follow these 'norms of discussion'. This could hinder the formation of cooperative relationships or even leave individuals with many unanswered questions.

Secondly Balliet turns to social cues existent in face-to-face communication, as another explanation for its effectiveness. Most social cues are missing in written messages. These cues include verbal cues such as tone of voice, phrasing, fluency, manner of expressing moral rhetoric, volume of voice and speed of speech (Koukoumelis, Levati, & Weisser, 2012) and visual cues such as eye gaze or eye contact, body language, facial expression and even touch (Balliet, 2009). Bicchieri & Lev-On (2007) argue that these 'subtle cues' might communicate a lot about the sincerity of the message that is conveyed. Evidence for this can be found in the observation that merely being able to see each other during a social dilemma experiment increases cooperation (Boone, Declerck, & Suetens, 2008; Kurzban, 2001; Wichman, 1970). Wichman (1970) moreover found that while only seeing, or only hearing other participants does increase cooperation; the effect of both is relatively small compared to the effect of seeing and hearing the other participants at the same time. It can therefore be concluded that there clearly are certain cues present when allowed face-to-face communication, that are not present when writing a message or during computer-mediated communication. And these cues have a positive effect on cooperation rates (Balliet, 2009).

Bicchieri (2002) has a slightly different reasoning as to the effectiveness of face-to-face communication. In early studies she suggests and finds that what she calls 'the social norm of promise keeping' is what mediates the effect of communication on cooperation. This social norm is an unwritten rule that individuals use to control their behaviour in social situations. In her study of 2007 (Bicchieri & Lev-On, 2007) she finds that of all types of communication, face-to-face communication is most effective in eliciting this 'social norm of promise keeping behaviour'. Therefore face-to-face communication is most successful in eliciting cooperation. More studies regard this explanation as one of the most likely explanations for the effectiveness of face-to-face communication (Koukoumelis, Levati, & Weisser, 2012; Kerr, Garst, Lewandowski, & Harris, 1997).

Bicchieri & Lev-On (2007) however also provide another explanation. They find that in a lot of face-to-face communication a leader naturally emerges among the group. This leader makes suggestions that others are likely to follow, increasing cooperation. Therefore they suggest that the lack of a leader who can coordinate actions may be a reason that face-to-face communication is more effective than other types of communication.

Conclusion - I conclude that face-to-face communication is the most effective type of communication, explanations for this are that face-to-face communication is more dynamic and fluid, certain social cues are sent, a social norm of promise keeping is more likely to occur and a leader may naturally emerge.

WHEN IS COMMUNICATION MOST EFFECTIVE?

Between studies there has been al lot of variation as to when participants are allowed to communicate. The main communication moments found in the literature are prior to the first period, or continuous throughout all sessions. Research has resulted in mixed findings in the question of which is most effective in promoting cooperation. A recent meta-analytic study covering multiple experiments by Balliet (2009) found that repetition of communication seems

to only increase cooperation instead of inhibit it. However continuous communication was not significantly more effective in increasing cooperation compared to communication only prior to the game. He finds that communication has a sustained effect on cooperation, regardless of whether or not the possibility of communication is removed later on in the experiment. Kerr, Garst, Lewandowski, & Harris (1997) argue that the reason for this might be that discussing the social dilemma leads to a personal norm of cooperation, similar to the earlier discussed 'social norm of promise keeping', which remains present irrespective of further communication moments. Other studies, for instance the one by Jerdee & Rosen (1974), on the other hand do find that continuous communication results in (slightly) higher cooperation rates. Most of these studies attribute this finding to the phenomena of 'counter reinforcers'; that is individuals communicate social approval for cooperation and disapproval for defection (Frohlich & Oppenheimer, 1998; Ostrom & Walker, 1991; Jerdee & Rosen, 1974).

Balliet (2009) states that these findings do not necessarily have to be contradictory, as the positive and negative emotions as a result of the 'counter reinforcers' may also be present without further communication moments. The reasoning behind this is as follows. In the first and only communication period certain social norms are established. As a result of this individuals may, from then on, experience greater anticipated positive and negative emotions in response to the thought of cooperating and defecting (this is the concept of anticipated emotions). Miettinen & Suetens (2008) pose some evidence for this explanation and found that individuals experienced and anticipated more guilt in respect to a defecting decision when there was discussion prior to the experiment in which it was agreed not to defect.

A practical implication from this findings is that it may not be necessary for individuals and groups to have repeated face-to-face communication which maybe very costly. Balliet suggests that it can be enough to have a face-to-face discussion prior to the start of a project and use less costly communication methods (e.g. e-mail) during the lifetime of the project.

ONE-WAY VS. TWO-WAY COMMUNICATION

Several studies explored the effects of partial communication, also referred to as one-way communication, i.e. communication coming from only one member or a small part of the members. The study by Kinukawa, Saijo, & Une (2000) examined the differences between partial communication and full communication. In their final treatment all subjects could communicate face-to-face with all participants, in the other treatments participants were not able to communicate with all other group members. They found that the fewer the number of group members a subject can communicate with, the smaller average contributions rates are. In the full-communication treatment subjects contributed nearly 100 percent of their endowment.

The paper by Koukoumelis, Levati, & Weisser (2012) found that it was not necessary to have two-way communication to have a positive effect of communication on cooperation levels. But because there was no control group with two-way communication, the difference in cooperation rates between one- and two-way communication cannot be compared. Like Balliet (2009) they also found no difference in cooperation rates as a result of one-shot versus continuous communication. Koukoumelis, Levati, & Weisser (2012) therefore conclude that 'a one-shot (one-way) message before starting the interaction is sufficient to sustain the efficient outcome'.

Two explanations are given for this finding. The first is that it may be that a one-way, one-shot message is enough to establish a norm a norm of pro-social (cooperative) behaviour (Kerr, Garst, Lewandowski, & Harris, 1997; Balliet, 2009). The second explanation is that the one person that is communicating (communicator) may be able to permanently alter the preferences and beliefs of the other subjects (Foss, 1999; Bicchieri, 2006). Koukoumelis, Levati, & Weisser (2012) provide a third explanation. They argue that if the communicator is able to influence

subjects towards conditional cooperation, contributing could become a new equilibrium, in the sense that every subject is willing to match the average contribution, which in turn is influenced by the contribution suggestion of the leader.

Note however that a study by Brosig, Weimann, & Ockenfels (2003) found that the finding of the effectiveness of one-shot, one-way communication, did not apply when subjects were exposed to speech of another group. Only an in-group communicator is therefore effective, which can probably be explained by the earlier mentioned social identification theory (Tajfel & Turner, 2004).

Conclusion - It can be concluded that although most studies have found that continuous communication throughout all periods of the experiment is most effective in eliciting cooperation, it is ambiguous whether it is significantly more effective compared to communication only prior to the experiment. Further I conclude that full communication among all subjects is most effective, although a one-way message may already be able to increase cooperation.

IS COMMUNICATION EFFECTIVE IN LARGE GROUPS?

Multiple studies have shown that group size has a positive effect on the communication-cooperation relationship (Balliet, 2009). That is the larger the group, the more effective communication is at improving cooperation, relative to a control group of no-communication. What causes this positive relationship between group size and the communication-cooperation relationship? Before I can answer this question it is important to note that multiple studies have found a negative effect of group-size on cooperation (Hamburger, Guyer, & Fox, 1975; Olson, 2009), so the larger the group the smaller the cooperation rates. An explanation for this effect is given by Kerr (1989), who argues that lower cooperation rates in larger groups may be caused by a lower perceived sense of individual and collective self-efficacy. Communication may be able to buffer for this effect, and increases the sense of self-efficacy, thereby reducing the negative effect of group size on cooperation levels. Most scholars agree that this is the best explanation for this effect at this point in time (Balliet, 2009).

IS COMMUNICATION EFFECTIVE IN TAKE-SOME GAMES?

In the discussion so far I have focused on the give-some PGG, and have demonstrated that under those circumstances (face-to-face) communication is an effective cooperation enhancing solution. The CG that is examined in this thesis is however a give-some, take-some game. Therefore to come to a reasoned hypothesis it is useful to also look into the effectiveness of communication in a take-some game (public-bad or CPR game). The CPR game is one of the only games in which the choices of the other participants can yield negative returns, in consequence it could represent the claim side of the CG.

To come straight to the point multiple studies found a positive effect of face-to-face communication on cooperation rates in CPR experiments (Ostrom & Walker, 1991; Ostrom, Gardner, & Walker, 1994; Ahn, Ostrom, & Walker, 2010). The study by Ahn, Ostrom, & Walker (2010) conducted an experiment among subjects from 41 different countries, and over a time span of 9 years. They found that face-to-face communication played a major role in allowing groups to find cooperative solutions in CPR experiments. The research by Ostrom & Walker (1991) did not only found that face-to-face communication was highly effective in a repeated CRP game (cooperation increased from 30% to 98%), they also looked into what happened when communication was costly. It was found that even though when communication was costly, a barrier was created and the effectiveness of communication decreased, still all groups

were able to provide the communication mechanism and all groups significantly showed increased cooperation levels. Further evidence for the effectiveness of communication is provided by Isaac & Walker (1991), who find that communication is still effective in more complex environments; Hackett, Schlager, & Walker (1994) find that this finding holds even when subjects are heterogeneously endowed. Moreover field experiments, such as the one conducted by Cardenas, Ahn, & Ostrom (2004), found that communication helped groups to reduce total extraction and increase group and individual earnings. The latter study also found that when communication was repeated earnings were even higher.

In the book by Ostrom, Gardner, & Walker (1994) it is explained how communication is used by subjects in a CPR game. Namely, players use it to: calculate coordinated yield-improving strategies, devise verbal agreements implementing these strategies and deal with nonconforming players.

Conclusion - Overall I conclude that there is significant evidence that like in give-some games, face-to-face communication is effective in increasing cooperation in take-some games.

HYPOTHESIS

The literature review on communication has shown that communication is an effective solution for increasing cooperation in a social dilemma, mainly because the dilemma can be discussed and subjects can identify with the group. It has also become clear that continuous face-to-face communication throughout all periods and among all subjects is the most efficient type of communication. Lastly it was shown that (face-to-face) communication is also effective in increasing contributions in take-some games.

As a result of these findings I state the following hypothesis:

H_1: Face-to-face communication is effective in increasing cooperation in the Claim Game.

LEADERSHIP

This section is devoted to the solution of leadership as a cooperation enhancing solution in social dilemmas. Mentioned results and resources all consider the public goods game (PGG), unless it is stated otherwise. The goal of this literature review section is to come to a reasoned hypothesis on the effectiveness of leadership in the Claim Game (CG). Further I want to examine why leadership is effective and in what way, shape or form leadership is most effective.

Although leadership has long been studied by political and management science, it has only recently come to the attention of (experimental) economists (Komai, Grossman, & Deters, 2011). But what actually is leadership? Tom Landry, considered one of the greatest American football coaches, described leadership as *"Getting someone to do what they don't want to do, to achieve something that they want to achieve".* In regards to the subject of social dilemmas, leadership can therefore be described as a process of influence to achieve certain goals that are important to a group of people (Van Vugt & De Cremer, 2003; Bass, 1990; Chemers, 2001; Haslam, 2001; Hollander, 1985; Yukl, 1989).

IS LEADERSHIP EFFECTIVE?

It is important to note that introducing a leader in a (laboratory) social dilemma does in no way alter the allocation decision every individual has to make. Standard economic theory therefore suggests that this solution should have no impact on the behaviour of individuals in a social

dilemma, and will not make individuals behave more cooperative. Yet practice shows otherwise. Multiple studies have shown that leadership does influence people's behaviour and laboratory experiments have shown that leadership is one of the most capable solutions to elicit cooperation in small groups (Levine & Moreland, 1998; Messick & Brewer, 1983; Van Vugt & De Cremer, 1999; De Cremer & Van Knippenberg, 2003).

IS LEADERSHIP ALWAYS EFFECTIVE?

Nevertheless studies have shown that there are instances were leadership is relatively ineffective in encouraging cooperation. Levy, Padgitt, Peart, Houser, & Xiao (2011) for instance found that while good leaders can obtain high levels of cooperation, reaching almost Pareto-efficient group outcomes; bad leaders can even have a negative effect on cooperation rates. They find that the reason for this is that group members treat the contribution signal of the leader as the upper bound (maximum) for their contribution decision. On average a follower will therefore never contribute more than the leader. An individual leading-by-example that sets a bad example by making only a small contribution, will be followed by small contributions.

Another example of the limitations of the effectivness of leadership is provided by Levati, Sutter, & Van Der Heijden (2007). They found that when group members were not equally endowed (i.e. heterogeneous endowments), and this inequality in endowments is common knowledge, leadership had only a relatively small impact on cooperation rates compared to a situation with homogeneous endowments. Moreover when group members did not know the distribution of endowments at all, leadership was almost completely ineffective (even when the leader is given an actual power base).

Further the effectiveness of leadership is mediated by whether or not a group is willing to elect a leader. This was shown in the experiment on leading-by-example by Güth, Levati, Sutter, & Van Der Heijden (2007). Groups first had to take a vote on whether to install a leader or not, what they call endogenous determination of leadership. Their results show that only 40% of groups was willing to appoint a leader. However groups that did establish a leader showed far greater cooperation levels.

Lastly and perhaps most importantly as both Dannenberg (2015) and Güth, Levati, Sutter, & Van Der Heijden (2007) conclude at the end of their studies; high levels of cooperation as a result of leadership cannot be sustained in the long run by merely leadership-by-example or leadership-by-words. They argue that to sustain these high levels of cooperation, leaders need to be given an actual power base.

Conclusion –Most studies have found leadership to be one of the most effective cooperation enhancing solutions in the PGG. There are however instances in which its effectiveness is limited, e.g. bad leadership, heterogeneous endowments, limited knowledge of endowments, limited willingness to elect a leader and an insufficient power base.

WHY IS LEADERSHIP EFFECTIVE?

Whether they are aware of it or not, the main task of most leaders is that of a 'social dilemma solver'. He or she makes sure that the conflict between the self-interest of the individual and the interest of the group is resolved. The primary task for a manager within any organisation is to make sure that all team members contribute towards the completion of a task. For a political leader the most important task is to ensure everybody contributes to establish and maintain the public facilities that are needed to keep a healthy and prosperous society (Van Vugt, Snyder, Tyler, & Biel, 2000). Hence the concept of leadership is inextricably linked to (solving) social dilemmas. After all if everyone is heading in the same direction, there would be no point in

having a leader. One of the main reasons a leader is effective is therefore that the task of preventing free-riding is an integral part of the role of a leader (Van Vugt & De Cremer, 2003; Olson, 2009; Yamagishi, 1986).

According to De Cremer & Van Knippenberg (2003) leaders have multiple ways to elicit more cooperation; they can monitor contributions and behaviour of group members, give advice and provide feedback, set a good example and sometimes reward group members for good behaviour or punish them from bad behaviour. Because people are inclined to reciprocate kind intentions, follow norms and mimic the behaviour of others (Dannenberg, 2015); this could explain the effectiveness of leadership, and leading-by-example in particular.

Dannenberg, and many other scholars alike, uses the concept of conditional cooperation to explain for the effect of leadership on cooperation. A large proportion of people can be classified as what in the literature is called a 'conditional cooperator', meaning they choose to contribute if they believe enough people will cooperate as well. A leader may be able to induce this belief, thereby enhancing overall cooperation. In a laboratory study Vyrastekova & Garikipati (2008) show that conditional cooperation is indeed responsible for a large part of the effectiveness of leadership.

Conclusion - To conclude I can state that the main factor responsible for the effectiveness of leadership is the fact that preventing free-riding is an integral part of the concept of leadership. Further the concept of 'conditional cooperation' also seems partially responsible, as well as other factors such as the ability of a leader to set a good example, and the inclination of followers to reciprocate kind intentions.

WHEN IS LEADERSHIP EFFECTIVE?

Although many reasons are provided by the literature for the effectiveness of leadership, in the previous section we have seen that there are cases in which leadership is not effective or even contra productive. Therefore I ask myself the question what it is that determines whether or not leadership is effective and when it is effective. De Cremer & Van Knippenberg (2003) find that cooperation is for a large part dependent on the reaction of group members towards the leader, which in turn is dependent on members perception of the outcomes and the procedures used to receive those outcomes. These are the concepts of outcome favourability and procedural fairness, frequently recurring in the literature.

The relationship between these concepts and cooperation with a leader is described by De Cremer & Van Knippenberg (2003) as follows. When outcomes are favourable, average cooperation rates are high and not affected by the procedures used by the leader to come to these outcomes. However when outcomes are unfavourable contribution rates by individual group members are significantly influenced by the (perceived) fairness of procedures that are used by the group leader. De Cremer & Van Knippenberg therefore conclude that when group members perceive procedures as fair, they trust the leader in being able to produce favourable outcomes, which makes their behaviour more group-orientated (and vice versa); this was also found in the studies by Cremer & Vugt (2002) and Tyle & Degoey (1995). Brockner, Siegel, Daly, Tyler, & Martin (1997) find the same, but articulate the finding more broadly by stating 'procedural fairness communicates trustworthiness, which directly influences cooperativeness'.

So if it takes favourable outcomes and procedural fairness to have group members support leaders and engage in cooperative behaviour (De Cremer, 2000; Yamagishi, 1986; De Cremer & Van Knippenberg, 2003); what is perceived as a favourable outcome and what is perceived as a fair procedure to reach those outcomes? The role of the leader is complicated because group

members have mixed motives; on the one hand they have incentives to defect to increase their personal payoff, on the other hand they have incentives to cooperate to increase the group payoff or to make sure the common good is created. Most scholars however recognise that most importantly a leader is expected to make sure to discourage group members from defecting as much as possible, for instance by rewarding cooperation and by punishing defection (Van Vugt & De Cremer, 1999). But the leader meanwhile also has the task to ensure a positive group ambience so that group members, especially those that were already contributing, feel good about being a part of the group and are inclined to cooperate and contribute to the prosperity of the group (Van Vugt, Jepson, Hart, & De Cremer, 2004).

Note that the above was found in laboratory settings with an already established leader. This is also referred to as structural cooperation (Van Vugt & De Cremer, 1999; De Cremer, 2002). What does the literature tell us about situations in which a leader is not yet established? Studies by social psychologists have shown that in situations where there are unequal and inefficient outcomes, group members prefer to establish a leader, as opposed to continuing the game in the same way (De Cremer & Van Knippenberg, 2003). This is called instrumental cooperation (Yamagishi, 1986). Group members choose a leader as an instrument to provide more favourable outcomes. Van Vught & De Cremer (2003) argue that this is in line with the notion of self-interest, because if the leader is able to solve the free rider problem all members in the group will benefit. The study by Güth, Levati, Sutter, & Van Der Heijden (2007) shows that the effectiveness of leadership is mediated by whether or not a group is willing to establish a leader. In their study groups first had to take a vote on whether to install a leader or not (they call this endogenous determination of leadership). Their results show that only 40% of groups were willing to appoint a leader. Though groups that did appoint a leader showed far greater cooperation levels.

As can be expected leaders' personal traits and characteristics also seem to play a role in the effectiveness of leadership. Leaders considered 'high-status' were more successful in encouraging group members to contribute in the study by Kamru & Vesterlund (2010). They explain this by arguing that when a leader is seen as a person with high social status, followers might want to associate themselves with these figures, and therefore be more inclined to follow their allocation decisions. This finding seems important, because in real world situations the leader often has a 'higher social status' than the average member of the group (Jack & Recalde, 2015). A study by Gächter, Nosenzo, Renner, & Sefton (2012) found that leaders that were more cooperatively inclined themselves were also more successful in eliciting cooperation from the other group members. Lastly a study by Drouvelis & Nosenzo (2013) reported that the degree of social similarity between leader and followers was also of significant influence on cooperation rates. In some cases a high degree of social similarity resulted in 30% higher cooperation rates. Drouvelis & Nosenzo therefore suggest that promoting a shared group identity may be a useful instrument for encouraging contributions.

To end this section it must be said that however straightforward it may seem to establish leadership as a logical solution for social dilemmas, it is important to understand that leadership is a complex, often laborious, sometimes even costly process. It requires members to negotiate about all the different aspects that are involved when it comes to leadership. *How should the leader be selected?* By appointment, election, or volunteering? *Where should the leader come from?* From inside of outside of the group? *What power base should the leader have?* Only leading-by-word or leading-by-example or an actual power base by being able to reward or punish? *What style of leadership works best?* Task-orientated or relation–orientated? *What personal attributes should the leader have?* Highly skilled or highly committed? (Bass, 1990; French & Raven, 1959; Hollander, 1985; Levine & Moreland, 1998; Yukl, 1989). And after all that has been discussed and decided, it is still up to the individual group members to choose whether

or not to cooperate with the leader (Lippitt & White, 1968; Tyler & Degoey, 1995; Van Vugt & De Cremer, 1999). It is also unlikely that the individual group members will be solely focused on the instrumental role of the leader as a resolver of the social dilemma that is at hand. Likely personal characteristic and likability of the leader is also taken into consideration in the decision to follow this person. This further complicates the use of leadership as a solution in social dilemmas. Be that as it may, in the remainder of this chapter I will try to decipher the concept of leadership the best I can, with the knowledge available at this point in time.

Conclusion – It can be concluded that the effectiveness of a leader is to a large extent dependent on the behaviour of the leader and the reaction of the group towards this leader and his or her behaviour. This is especially the case when a leader is determined exogenously, when a leader is established endogenously it is almost certain (s)he will be effective. In the first mentioned case the reaction toward the leader will dependent on whether or not outcomes are favourable, and when they are not on the perceived procedural fairness to reach those outcomes. For a positive perception to be established it is important a leader discourages free-riding as much as possible, and creates a positive group ambiance, also his personal traits and characteristics and the degree of social similarity are important.

WHICH TYPE OF LEADERSHIP IS MOST EFFECTIVE?

Not necessarily does the leader in a social dilemma experiment have any special abilities, it could be one of the group members that is only being distinguished as the leader by occupying the leadership position (Komai, Grossman, & Deters, 2011). In most research however the leader is given its legitimacy by somehow differentiating him or her from the other group members. Consequently the concept of leadership has been given shape in many different forms throughout the social dilemma literature. Howbeit some types of leadership return frequently in the literature, those will be discussed in this section.

LEADING-BY-EXAMPLE

Studying the literature it is striking that the vast majority of experimental studies on the subject of leadership in social dilemmas have focused on leading by example (Drouvelis & Nosenzo, 2013; Brandts, Rott, & Solà, 2015; Koukoumelis, Levati, & Weisser, 2012). In a laboratory setup leading-by-example is usually given shape in the form of a sequential version of the voluntary contribution mechanism (PGG) (McCannon, 2015) in which one group member, 'the leader', is the first to make his or her contribution decision, the other group members simultaneously make their contribution decision right after. The idea of this kind of leadership is that the first mover, i.e. the leader, will influence the contributions of the other group members (Jack & Recalde, 2015).

IS LEADING-BY-EXAMPLE EFFECTIVE?

To get straight to the point, the majority of studies on this subject find that average contribution rates are higher in the presence of a 'leader' that is instructed to lead-by-example, as opposed to without the presence of such a leader (Koukoumelis, Levati, & Weisser, 2012). Also in virtually all experiments on leading-by-example contribution rates by leaders and followers are highly correlated, that is people really seem to follow the leader (Moxnes & Van Der Heijden, 2003; Gächter & Renner, 2004; Güth, Levati, Sutter, & Van Der Heijden, 2007). In addition to experimental research, the effectiveness of leading-by-example has also been demonstrated in empirical settings. For instance with respect to charitable fundraising. A study by Vesterlund (2003) showed that when well known persons make a donation to a certain cause, and this was publicly announced, others often tend to follow.

WHY IS LEADING-BY-EXAMPLE EFFECTIVE?

In a simple public goods experiment by McCannon (2015), one of the members was randomly selected as the 'leader'. This entailed that (s)he was allowed to make his/her contribution decision before the others (followers) and this decision was made public before the other members were to decide on their contribution decision. He found that followers adapted a 'quasi-matching type of strategy', or put simply when the leader contributed more, the followers contributed more and when the leader chose to free-ride the followers did so as well. For leading-by-example to be effective it is therefore essential that the leader sets a good example. When a bad example is set by only contributing a small amount, cooperation fails (Moxnes & Van Der Heijden, 2003). Interestingly however, when an individual is selected as the leader, this individual consequently contributes a larger amount (on average) then he would when a 'normal' group member in a standard PGG. This is not only found in experimental research, but in field research this finding also holds, or is maybe even stronger. In the field research by Jack & Recalde (2015) for instance total contributions increased by approximately 20% when a group is led by a leader that leads by example. Also the leader himself contributed significantly more when he was put into this position, relative to being a 'normal' group member.

Despite the fact that followers tend to follow the leader, they contribute significantly less than their leaders. This finding is systematic and has been replicated by multiple studies (Güth, Levati, Sutter, & Van Der Heijden, 2007). As a result over time leaders decrease their contributions as well, and average contributions decrease. Further in some studies this has shown to make subjects reluctant to be a leader(-by-example), as they become aware that followers are exploiting them. The phenomenon of decreasing (leader) contributions can most likely be explained by peer-pressure (Falk & Ichino, 2003; Mohnen, Pokorny, & Sliwka, 2008) and social preferences such as conditional cooperation (Levati, Sutter, & Van Der Heijden, 2007). Because of this Drouvelis & Nosenzo (2013) state that the effects of leading-by-example could be called ambiguous, and although most studies find a strong positive effective of this type of leadership on cooperation levels (Güth, Levati, Sutter, & Van Der Heijden, 2007; Levati, Sutter, & Van Der Heijden, 2007; Pogrebna, Krantz, Schade, & Keser, 2011) some studies did not find this positive effect (Haigner & Wakolbinger, 2010; Potters, Sefton, & Vesterlund, 2007; Rivas & Sutter, 2011).

HOW EFFECTIVE IS LEADING-BY-EXAMPLE?

The effectiveness of leading-by-example is dependent on the same factors earlier mentioned. Especially conditional cooperation is mentioned by scholars as a possible explanation (e.g. Fischbacher, Gächter, & Fehr (2001). Güth, Levati, Sutter, & Van Der Heijden (2007) even state the finding of the effectiveness of leading-by-example in their study is evidence for the existence of conditional cooperation. If followers are conditionally cooperative and leaders anticipate this, it pays off for the group if the leader makes high contributions. Secondly the reciprocity mechanism is also emphasised by scholars as responsible for the effectiveness of leading-by-example (e.g. Fehr & Gächter (2000). Leaders that set an example by making a high contribution, are followed with high contributions from others (Meidinger & Villeval, 2003; Potters, Sefton, & Vesterlund, 2005; Potters, Sefton, & Vesterlund, 2007; Gächter, Nosenzo, Renner, & Sefton, 2012). Also the leader has a strong incentive to make a (large) first-mover contribution, because research has shown that free-riding by a leader in a 'leading-by-example' situation is immediately punished by its followers; in the sense that they will contribute less than their best response function predicts (Andreoni, Brown, & Vesterlund, 2002; Gächter, Nosenzo, Renner, & Sefton, 2010).

However what makes leading-by-example different from other types of leadership is that, according to the literature, it is to a large extent dependent on the availability of information.

Levati, Sutter, & Van Der Heijden (2007) for instance found that leading-by-example is almost ineffective when information on the distribution of endowments is incomplete. And Potters, Sefton, & Vesterlund (2007) found that in asymmetric information settings, where leaders have private information about the marginal returns from contributing, leadership is seen as a signalling mechanism for information. Consequently when leaders are given information about the marginal returns of contributing to the public account, leadership is more effective in promoting cooperation. Another example is when it is uncertain or unknown what the value of a common good is, and the leader has an information advantage over the other group members. In that case the leader is able the signal the value of the good by making either a low or a high contribution (Hermalin, 2007; Vesterlund, 2003; Potters, Sefton, & Vesterlund, 2005; Andreoni, 2006). Hermalin (1998) suggests that followers choose to follow the leader because they believe that the leaders have better information about the best action to take, than they have themselves. Although the level of elicited cooperation will depend on the information that is possessed by the leader, according to Jack & Recalde (2015) information signalling is always cooperation enhancing. Remember that in real world situations it is very common for leaders or authorities to have superior information about the value of a public good, therefore this aspect of the leading-by-example mechanism is very relevant.

I conclude this section with the experimental study by Rivas & Sutter (2008) in which one group member, 'the leader', did not contribute before, but after the others. Their results suggest that in this case leadership was no longer an effective cooperation enhancing solution. It is therefore clear that it is not the sequentiality that makes leading-by-example effective, but it is the fact that an example is set, reacting to the behaviour of group members is apparently not enough.

LEADING-BY-WORDS

Leading-by-words usually consists of a one-way message by the 'leader' to the other group members. In most studies this message contains a non-binding pledge to make a certain allocation decision (Dannenberg, 2015), in other studies the messages contains a suggestion encouraging a certain contribution (Levy, Padgitt, Peart, Houser, & Xiao, 2011). After this message is received all group members simultaneously make their contribution decisions. The effectiveness of this type of leadership has been demonstrated in several studies (Koukoumelis, Levati, & Weisser, 2012; Houser, Levy, Padgitt, Peart, & Xiao, 2007). Brandts, Rott, & Solà (2015) studied how cooperation can be revived after a decline in contribution rates. Four treatments were investigated; restarting the game, providing advice on preventing decay, leading-by-words and a combination. Their results indicate that a one-way free form message sent by the leader was by far the most effective intervention for encouraging contributions in the long run. The effect size of this treatment was larger than the effect of the other two treatments, and the combination of all three solutions did not outperform the single effect of leading-by-words on cooperation. Further they found that the effect of leading-by-words increased when repeated. After a second message was send by the leader, contributions increased immediately and little to no decay did occur. Because of the relative ineffectiveness of the advice treatment opposed to the leading-by-words treatment, Brandts, Rott, & Solà argue that it is 'people oriented communication' as opposed to 'production oriented communication' that matters.

Levy, Padgitt, Peart, Houser, & Xiao (2011) had a 'leader' send a message to the other group members at the start of each round. This message always consisted of the same identical suggestion in the form of "Lets contribute ..... E$ to the group account.", in which the leader could only fill out the suggested amount to contribute. For all group members it was common knowledge that every group member received the same message from the leader, and that the message was only a (unenforceable) suggestion. The study also tested for the effects of a signal-only treatment, in which a similar message was send but this time it was randomly generated by

a computer, and subjects were informed of this. Their results suggest that leading-by-words is able to encourage more cooperation. Further, similar to the findings by Brandts, Rott, & Solà (2015), contribution suggestions by a human leader were followed (much) more closely than the contribution messages originating from a non-human source.

At this point I can conclude that both leading-by-example and leading-by-words have proven to be effective cooperation enhancing solutions. The question that remains is whether one of these solutions is significantly more effective. The paper by Dannenberg (2015) answers this question. Their study focused on how able different forms of leadership are in encouraging cooperation in a PGG. Their results show that compared to a situation without leadership, leading-by-example has a (very) significant impact on cooperation, while the impact of leading-by-words on cooperation is only small. When appointed to lead-by-words, leading-by-words even had a small negative effect on cooperation. It can therefore be concluded that leading-by-example is more effective in eliciting cooperation as opposed to leading-by-words. Note however that Dannenberg concludes with the finding that both leading-by-example and leading-by-words are not able to sustain high levels of cooperation in the long run. Leaders need to be given an actual power base to be able to sustain high levels of cooperation.

ACTUAL POWER BASE

Several studies have looked into what they call 'institutional interventions', which are interventions that enhance the power of the leader.

EXCLUSION POWER

The most common way of empowering leaders is by granting them exclusion power. In these studies the leader, after observing all contributions, is allowed to punish one group member by excluding him or her from the next period. It is important to realise that punishment via exclusion is not only costly for the excluded member, who does not benefit from the public good that period. But it is also costly for the other members in the group, after all it reduces the number of potentially contributing members. However even though excluding a member is costly, leaders empowered with the sanctioning device of exclusion power trigger higher contributions compared to leaders without this formal power (Güth, Levati, Sutter, & Van Der Heijden, 2007; Rivas & Sutter, 2008; Levati, Sutter, & Van Der Heijden, 2007), and are also able to sustain these cooperation levels in the long run (Güth, Levati, Sutter, & Van Der Heijden, 2007). Interestingly Güth, Levati, Sutter, & Van Der Heijden (2007) further found that while leaders merely leading-by-example often refuse to act as leader (because they feel exploited), leaders with exclusion powers usually want to remain leaders. The above findings are important because exclusion power may be very common in real life. For example in clubs, were club member can use the club goods without rivalry in consumption, but the management of the club does have the power to dismiss or suspend a member (Güth, Levati, Sutter, & Van Der Heijden, 2007).

REWARD & PUNISHMENT

Although a lot of research has been done into the effectiveness of rewarding and punishing devices in the PGG (e.g. Ostrom, Walker, & Gardner (1992), Fehr & Gächter (2000) and Sutter, Haigner, & Kocher (2006), only little research has focused on concentrating these rewarding and punishing devices into the hands of a single leader. In the studies in which all group members had rewarding and punishing options at their disposal, it was found that a reward mechanism was able to encourage contribution (compared to no reward), but a punishing mechanism was even more effective and more stable in eliciting cooperation (Andreoni, Harbaugh, & Vesterlund, 2003; Sutter, Haigner, & Kocher, 2006; Sefton, Shupp, & Walker, 2007). Sahin, Eckel, & Komai

(2015) studied the reward mechanism in the context of a single leader. A single group member, the leader, was allowed to reward other group members. In another treatment the leader could punish other group members. They find that punishment works better than reward, but cooperation rates are still much higher in the rewarding treatment as opposed to having no leader at all. The same finding was done by Gürerk, Irlenbusch, & Rockenbach (2009), although in their study leaders were able to choose between the incentive scheme of rewarding and punishing. Leaders initially had a preference for using the reward incentive and move more and more towards the punish incentive over time. On average, cooperation rates are higher when the punishment incentive scheme is used most of the time (Gürerk, Irlenbusch, & Rockenbach, 2009; Rivas & Sutter, 2008).

Conclusion – It can be concluded that leading-by-example is more effective compared to leading-by-words, but to sustain cooperation in the long run leaders need to be given formal powers such as exclusion power or rewarding and/or punishing devices.

DIFFERENCE BETWEEN LEADER SELECTION METHODS?

The most common leader selection methods in the social dilemma literature are democratically electing a leader by voting, (randomly) appointing a leader and volunteering for the role of leader.

ELECTION

By utilising a democratic voting system a leader is established in these studies. Although there is not a large amount of literature available on this topic, all studies unanimously find that this solution is (very) effective in eliciting cooperation (Levy, Padgitt, Peart, Houser, & Xiao, 2011). To demonstrate how this works I will elaborate with an example on how the leader actually is elected in such an experiment. The experiment in the study of Levy et al. (2011) was divided into two stages, in which the purpose of the first stage was to (democratically) elect a leader. In this stage the subjects first had to play 5 rounds of a standard PGG, and before the 6th round started were asked to write a 'platform'. This 'platform' writing consisted of writing a message in regards to the contribution decision in the PGG. The messages were then distributed among all group members, and members were asked to vote on one of the platforms. Subjects were then informed whether or not he or she wrote the winning platform. The subject that wrote the winning platform was elected leader; the identity of the leader was not announced.

APPOINTMENT

In these experiments the experimenters randomly appoint one of the group members the leader role. Most studies find that a randomly appointed leader is somewhat effective (Levy, Padgitt, Peart, Houser, & Xiao, 2011), other studies find that a leader selected in this manner is not effective (Rivas & Sutter, 2008). Güth, Levati, Sutter, & Van Der Heijden (2007) examined whether it mattered in what way the leader is appointed. They argue that in real world scenarios it is rarely the case that leadership remains in the hands of one individual, but leadership often rotates among the members of a group or organization. Universities and political organizations elect their presidents for a limited time for instance. Their study compares a treatment in which leadership is granted to a single members to a treatment in which leadership rotates among all group members; and the order of this rotation is known by all. However their results indicate that there is no significant difference between the two. Therefore they suggest that what matters is the presence of a leader and his powers.

VOLUNTEERING

The idea of voluntary leadership has so far been the most popular way to select a leader in the social dilemma literature. In most of these studies voluntary leadership is implemented by allowing any group member to (voluntary) contribute before the others (Arbak & Villeval, 2013; Rivas & Sutter, 2011). In some studies however a specific group member was given the choice to contribute before or after the other group members (Haigner & Wakolbinger, 2010). All studies found that this type of leadership selection results in high contribution levels, higher than when the leader was exogenously selected (McCannon, 2015). Except Arbak & Villeval (2013) who found that voluntary leaders are not necessarily more influential than randomly-chosen leaders.

Interesting to note is that when given the choice most people do not want to be the leader, and only a few people are willing to be the leader (e.g. found by Haigner & Wakolbinger (2010), Güth, Levati, Sutter, & Van Der Heijden (2007) and Dannenberg (2015). It is believed this is because leading-by-example usually only increases the followers payoff but not the leaders payoff (Dannenberg, 2015). However individuals that are willing to lead voluntarily, always contribute more than leaders who indicated not being willing to be the leader. And still enough people are willing to fill the position of the leader for this type of leadership selection to be effective. (Arbak & Villeval (2013) provide several reasons for this behaviour. Some leaders expect that their good behaviour will be reciprocated by the other group members. Others may be genuinely altruistic and are mainly concerned with the welfare of the group, regardless of the personal costs. And lastly there is also some evidence that some leaders are primarily concerned with a desire to display a positive social image.

ELECTING, APPOINTING OR VOLUNTEERING?

As can be seen above, the literature has shown that both electing a leader (Güth, Levati, Sutter, & Van Der Heijden, 2007; Levati, Sutter, & Van Der Heijden, 2007), appointing a leader (Levy, Padgitt, Peart, Houser, & Xiao, 2011) and volunteering (Haigner & Wakolbinger, 2010; Rivas & Sutter, 2011; Arbak & Villeval, 2013; McCannon, 2015) are to a certain extent effective in eliciting cooperation. The question now remains which one is most effective.

De Cremer & Van Dijk were one of the first to study the differences between different leader selection methods. Their studies demonstrate that how people are selected for the role of leader determines (to a large extend) the degree of cooperation from leaders and other group members (De Cremer & Van Dijk, 2008). Cooperation rates seem to be higher when a leader is elected instead of appointed. A recent study by Levy, Padgitt, Peart, Houser, & Xiao (2011) did the same finding and concludes that an elected leader is more effective in encouraging high contribution rates compared to a randomly selected leader; even though the randomly selected leader was still effective in eliciting cooperation. As a reason for this finding they argue that being elected as a leader might make a leader feel more obligated to encourage desirable behavior. Rivas & Sutter (2008) compared the effectiveness of exogenous leadership, i.e. random appointment of a leader, opposed to endogenous leadership, i.e. voluntary leadership. In the endogenous treatment any group member can volunteer to be the leader by being the first to contribute to the public pool. In the other treatment the leader was randomly selected by the experimenters. They find that volunteering to be the leader (endogenous leadership) increases contribution significantly, whereas an exogenous selected leader was not necessarily effective in eliciting more cooperation.

Conclusion - The literature clearly demonstrates that of the three mentioned leadership selection methods, random appointment of a leader is the least effective. Although it seems that electing a leader is most effective or at least the most stable leader selection method, to our best knowledge no study has yet compared the effectiveness of a voluntary leader compared to an elected leader.

IS LEADERSHIP EFFECTIVE IN TAKE-SOME GAMES?

In this thesis I want to test the robustness of leading-by-example as a cooperation enhancing solution in the CG. We have seen that leading-by-example is effective in the PGG. To make a reasoned hypotheses it is also useful to look into what the literature tells us about the effectiveness of leading-by-example in public bad games, take-some games or CPR games. The public bad (CPR) game, of all social dilemma games, represents the claim side of the CG the best, because it is one of the only games in which the choices of the other participants can yield negative returns.

Although in their experiment leaders were confederates who were instructed to set very good examples (Van der Heijden & Moxnes, 2013), in the study by Moxnes & Van Der Heijden (2003) the positive effect of leading-by-example was found in a public bad experiment. Although the effect was only small, it was significant. On average leaders set a good example, and the contributions to the public bad by followers were on average lower in the presence of a leader. However the effects of leadership varied from round to round with variations in leaders investments. In a more recent study Van der Heijden & Moxnes (2013) found the same, and also found that leaders tend to set good examples by investing less in the public bad than do followers (even better examples were set when it was less costly).

Conclusion - Overall I conclude that there is significant evidence that like in give-some games, leading-by-example is effective in increasing cooperation in take-some games.

HYPOTHESIS

The literature review on leadership has shown that, although there are some exceptions, leadership is an effective solution for increasing cooperation in a social dilemma, both in give-some and take-some games. This is mainly because preventing free-riding is an integral part of leadership, and because people are 'conditionally cooperative', good examples by a leader are followed. But the effectiveness does depend on the reaction of the group towards the leader, which in turn depends on outcome favourability and procedural fairness. It has also become clear that leading-by-example is more effective compared to leading-by-words, but to sustain cooperation in the long run leaders need to have an actual power base (in the short run it does not seem to matter). Democratic election seems to be the most effective way to establish a leader, although it is ambiguous whether it is more effective compared to a voluntary leader.

As a result of these findings I state the following hypothesis:

H_2: Leading-by-example, by a democratically elected leader, is effective in increasing cooperation in the Claim Game.

COMBINATION OF SOLUTIONS

To my best knowledge little to no research had been done on the combination of leadership and communication as a solution in a social dilemma. For that matter little research is available on any combination of solutions. The few studies I have found will be discussed here, so I can come to a reasoned hypothesis on the effectiveness of a combination of solutions in the Claim Game at the end of this chapter.

One of the few studies utilising a combination of solutions is the one by Bochet, Page, & Putterman (2006), who studied the combination of communication and punishment in a social dilemma. The punishment incentive scheme was however not in the hands of a single leader, but

every group member had the opportunity to reduce one another's earnings. They find that (face-to-face) communication is so effective that adding a (costly) punishment option, especially when taken into account the cost of punishment, does not significantly or effectively increase the level of contributions or earnings. The study by Ostrom (2012) however found that the treatment in which communication and punishment opportunities were combined, was by far the most successful and effective in eliciting high cooperation rates of all treatments in their lab experiment. Ostrom therefore argues that when participants in a social dilemma are able to engage in a serious discussion, they have much less need to punish one another, thereby improving efficiency. Another study that examined a combination of solutions is the one by Brandts, Rott, & Solà (2015), who studied how cooperation can be revived after a decline in contribution rates. Four treatments were investigated; restarting the game, providing advice on preventing decay, leading-by-words and a combination. In their study leading-by-words proved to be very effective, but no combination with the other two treatments outperformed the pure effect of leading-by-example on its own.

No other studies were found that show any similarity to the combination of solutions I am studying in this thesis. On the basis of these studies I state that combinations of solutions have shown to be effective, but it is ambiguous whether they are more effective than the isolated effects of the single solutions.

COMBINATION OF LEADING-BY-EXAMPLE AND FACE-TO-FACE COMMUNICATION

In the literature review on leadership it has been found that the effectiveness of leadership is to a certain degree dependent on the reaction of the group towards the leader. The degree of social similarity and the feeling of being part of the group are important for this reaction to be positive. In the literature review on communication I have seen that communication is effective in strengthening this feeling of group identity and establishing a more positive group ambiance (humanization). Therefore communication could make group members more inclined to behave in a group oriented manner and react positively towards a leader. Further the possibility of communication enables the leader to provide group members with feedback and advice. For a leader the possibility of communication could mean that (s)he is confronted with his or her behaviour in a negative way, when (s)he acts in an unfair way or when (s)he sets a bad example (shaming). This could make the leader more inclined to make sure his or her procedures are fair (procedural fairness) and that (s)he sets a good example. Overall I conclude that when face-to-face communication is possible I expect that the leader is better able to discourage group members from defecting. Therefore I do not only expect this combination of solutions to be effective, but I also expect it to be more effective than the solutions on their own.

In line with this reasoning I state the following hypotheses:

H_3: The combination of face-to-face communication and leading-by-example, by a democratically elected leader, is effective in increasing cooperation in the Claim Game.

H_4: The combination of face-to-face communication and leading-by-example, by a democratically elected leader, is more effective in increasing cooperation in the Claim Game, compared to the individual solutions.

EXPERIMENT

In this section I describe the experiment that could be done to test the hypotheses stated in this thesis. Because of time and monetary constraints I will not be able to conduct the described experiment. I will therefore do a secondary study consisting of a web survey to find results, which is described in the next chapter. It is up to future research to conduct the actual laboratory experiment.

EXPERIMENTAL DESIGN

Goal of this experimental design: To examine how effective both face-to-face communication and leading-by-example (by a democratically elected leader), and the combination of the two are in increasing cooperation in the Claim Game (CG).

The CG, as introduced by Van Soest, Stoop, & Vyrastekova (2016), will be used as the social dilemma simulating game in this experiment. To answer the questions raised in this thesis and test the hypotheses, the experiment will consist of four separate treatment groups:

- Treatment 1: Claim game.
- Treatment 2: Claim game + Face-to-face communication.
- Treatment 3: Claim game + Leading-by-example.
- Treatment 4: Claim game + Face-to-face communication + Leading-by-example.

To ensure a between-subject design, each participant only takes part in one treatment. Participants are randomly arranged into groups of four and remain in the same group for the entire experiment (i.e. mechanism of partner matching). Decisions made during the experiment remain anonymous. This is done by assigning each subject a random number, participants will not learn which number belongs to which subject. Each experimental session consist of 25 periods. The payoff of each participant consist of the cumulative earnings during all these periods. At the end of the experiment each participant will be paid their earnings by bank transfer. The experiment is conducted in a laboratory setting, and will be programmed in z-Tree (Fischbacher, 2007). This allows for minimal experimenter-subject interaction during sessions, and ensures that all experiments are conducted under equal control conditions.

NUMBER OF PARTICIPANTS

For this study to have sufficient statistical power, it is important to have enough participants. To calculate the minimum number of participants the g-power tool is used. Before this test can be run, the appropriate effect size needs to be determined. Because the actual effect size cannot be known before the study is conducted, I will use another data set to predict the likely effect size. I chose to use the data set by Oprea, Charness, & Friedman (2014), which compared the effect of communication versus no-communication in the PGG[1].

Using Cohen's d I calculate an effect size (d) of 0.946, which is considered a relatively large effect size. The g-power tool provides us with a sample size of 25 for each treatment group[2]. I therefore estimate the minimum number of participants for the entire experiment to be between 100 and 200 subjects.

MONETARY REWARD

[1] Their data suggests: mean contribution - no communication: 4.21, communication: 11.94; standard deviation - no communication: 6.28; communication: 9.70.
[2] Using significance level of 0.05 and a power of 0.95.

I want to create a link between behaviour and outcome, and therefore, real incentives are used. In all conditions, points represent money, with 100 points worth €1 (i.e. one point worth €0,01). Therefore at the end of the experiment a participant is paid €4 for their participation, plus what they earned during the experiment at the given exchange rate. This reward system is explained to participants at the beginning of the experiment, as to make sure they know that the money they earn in the experiment depends upon their investment decisions and those of the other members in their group.

PROCEDURE

Participants are invited to the laboratory for a study on 'economic decision making'. The laboratory room consist of a room with four computer cubicles and a separate (small) room with a chair in each corner to allow for face-to-face communication. Upon arrival each participant will be seated in one of the computer cubicles. Then, a booklet will be given to the participants containing the instructions for the experiment. Participants are allowed 5 minutes to go through the set of instructions. After these 5 minutes have passed, and all participants have read the instructions, the experimenter starts a video that will play simultaneously on the computer screen of each participant, with an audio source that can be heard in the entire room. The video further clarifies the experiment, and also ensures common knowledge because the instructions are for everyone to hear (i.e. every participant knows that all group members have the same information). After the video ends all subjects have to answer test questions via their computer terminal. These questions have to be answered correctly in order for the experiment to continue. This is to make sure that all subjects understand the instructions before the experiment begins, and to ensure that they are aware of the payoff-maximizing strategy. Only after every participant has answered all the test questions correctly, the experiment will start. During the experiment there is complete monitoring, meaning that each subject learns the actions of the other participants after each round. To do this after each period subjects are shown a screen with the following information:

- *Their own earnings.*
- *The actions and earnings of the other subjects (subject are assigned a random number).*
- *Their cumulative earnings so far in the experiment.*

During the entire experiment participants will be able to request this information of all past periods.

TREATMENT 1: CLAIM GAME - BASELINE

The first treatment is the control treatment group. In this treatment the CG, as described in the literature review, is introduced. No further manipulations will be present. The same experimental instructions as used by Van Soest, Stoop, & Vyrastekova (2016) will be used, so results can be compared.

In the instructions participants are introduced to the present study and it is explained that the purpose of the study is to examine how people make contribution decisions facing situations in which money could be earned for themselves and for the group. Specific instructions about the task, which have the formal properties of the Claim Game are given to the participants at this point. More specifically, each participant will be told that there are several contribution sessions (25 in total) and that they all receive an endowment of 20 points at the beginning of each session (to ensure common knowledge of the homogeneous endowment conditions). They can choose to either contribute any amount between 0 and 20 to the group fund, or claim any amount ranging from 0 to 20 points from to group fund. To make their contribution or claim decision, the subjects has to fill in a number [-20, 20] in the software's user interface. The amount remaining

in the group fund[3] is multiplied by two (2) and then divided equally among all group members (that is the benefits of the group project are non-excludable). If the group as a whole contributes a large portion of their endowments, group members will all receive more. But it might be tempting not to contribute, because everyone receives an equal part of the benefits of the group project, plus the money they decide to keep for themselves. Therefore regardless of the actions of the other participants, in order to maximize one's own payoff it is always beneficial to defect (by not cooperating or by making a claim). Various examples are given to clearly illustrate the game.

Further, in this first treatment group, participants are instructed that communication with other group members is not allowed. Because I also want to control for the effects of non-verbal communication, in this treatment the participants will face individual computer terminals and will be separated by side-board "blinders". Thus making sure no way of communication is possible between the subjects. Because subjects interact only via computer terminals, they will not be able to tell who the other members of their group are (i.e. complete anonymity).

CLAIM GAME

Here the theoretical and methodical setup of the CG used in this experiment is shortly explained. The same parameters used in the study of Van Soest, Stoop, & Vyrastekova (2016) are used, except for the multiplication factor which is changed from 1.6 to 2 for simplification purposes.

Subjects are randomly matched in groups of four players (n=4), and interact repeatedly for 25 periods (T=25). At the beginning of every period, each subject will receive an endowment (e>0); in this experiment the endowment is 20 points (e=20). All subjects have to simultaneously make a decision. This decision is how much to contribute to, or how much to take from a public fund. The maximum amount a subject can contribute to or take from this public fund is equal to the received endowment (e). Any unit not contributed to the public fund, increases the payoffs of the subject in that round by one unit. At the end of each round, if the public fund is non-empty, a public good is created that benefits equally all subjects in the group (independent of their contribution or claim). The size of this public good is proportional, with a factor (α), to the public fund. To have a social dilemma $\alpha / n < 1 < \alpha$ is needed. In this experiment the size of this factor is equal to 2 (α =2).

If c_i denotes the action of a subject i, then the action set (i.e. all possible decisions) will consist of $c_i \in \{-e, \ldots, -1, 0, 1, \ldots, e\}$, so in this experiment it consists of $c_i \in \{-20, \ldots, -1, 0, 1, \ldots, 20\}$. With (positive numbers) $c_i \geq 0$ referred to as contributions, and (negative numbers) $c_i < 0$ referred to as claims. Note that in this experiment the maximum a subject can claim is equal to his endowment. A game design in which the maximum claim is not equal to the endowment is also possible.

The size of the public fund (PF) from which the public good is created, is equal to the sum of all contributions (G) minus to sum of all claims (C), or: PF = G – C.

- Sum of all contributions (G) is equal to: $G = \sum_{i=1}^{n} (1 - \delta_i) c_i$
- Sum of all claims (C) is equal to: $C = \sum_{i=1}^{n} \delta_i |c_i|$

To mathematically define this game, an indicator function δ_i is needed, which is equal to 1 if $c_i < 0$ (claim), and zero if $c_i \geq 0$ (contribution).

[3] The remaining amount in the group fund consist of the total contributions minus the total claims.

PAYOFF FUNCTION

The payoffs for a subject after each round are as follows. When the sum of claims is larger than the sum of contributions (G<C), there are not enough contributions to satisfy the claims. In that case the claims will be satisfied proportionally (c_i / C) to the share claim. The public fund will be depleted, so no public good will be created. If the sum of claims is smaller than the sum of contributions (G≥C), then the claims can be fully satisfied. The remaining points in the public fund (G-C) will then be used to create the public good. This is done by multiplying these points by 2. Subsequently this public good is divided equally among all (n=4) group members. The payoff function π_i of subject i (with decision c_i) is therefore[4]:

- $If\ \mathrm{G} \geq C, then\ \pi_i = e - c_i + \alpha(G - C)/n$
- $If\ \mathrm{G} < C, then\ \pi_i = \begin{cases} e - c_i & if\ c_i \geq 0 \\ e + \frac{|c_i|}{C} G & if\ c_i < 0 \end{cases}$

NASH EQUILIBRIUM

In the PGG there is only one Nash equilibrium: each subject contributes zero (0) in every period. The CG broadens the strategy set of the subject, in the case of this experiment to [-20, 20]. Therefore multiple Nash equilibrium exist, but all have one thing in common; the sum of all contributions will be zero (G = 0) in every period (the claims may vary in size). Thus in the Nash equilibrium of the CG no public good will be created. The social optimum (i.e. Pareto-optimal outcome) in the CG is reached if all subjects contribute their full endowment (20) to the public fund, payoff will be 40 for each subject. The difference between the PGG and the CG is the temptation to defect. The temptation to defect consist of the difference between the payoff when fully cooperating compared to the payoff when fully defecting (in a situation where all other players cooperate fully). Using the parameters of this experiments, in the PGG the maximum payoff when defecting is 10 points, whereas in the CG the maximum payoff is 20 points. Therefore the consequences of free riding in the CG are much more dramatic. Consider *table A1* for a full overview of the differences in consequences of defecting/cooperating between the PGG and the CG.

TREATMENT 2: CLAIM GAME + FACE-TO-FACE COMMUNICATION

The second treatment is the same as the previous treatment, with the difference that a face-to-face communication manipulation is added. Sessions under the face-to-face communication are therefore identical to the no-communication counterparts (treatment 1 & 3), except after the instruction period and before each of the twenty-five periods, all subject are invited to talk to the other three members of his or her group. This experiment uses the same face-to-face communications set-up used by Isaac & Walker (1988), Ostrom & Walker (1991), Bochet, Page, & Putterman (2006) and Kinukawa, Saijo, & Une (2000).

In the face-to-face communication treatment the following announcement is read to the group during the instruction video, and is also stated in the instruction booklet. The announcement is similar to that of Isaac & Walker (1988) and Ostrom & Walker (1991):

"Sometimes, in previous experiments, participants have found it useful, when the opportunity arose, to communicate with one another. We are going to allow you this opportunity between periods. There will be some restrictions:

[4] Variables in this experiment are: e = 20, n = 4 and α =2.

- You are not allowed to discuss side payments.
- You are not allowed to make physical threats.
- You are not allowed to see the information on the monitor of another participant.

Since there are still some restrictions on communication with one another, one of us will monitor your discussions between periods. To make this easier, all discussions will be at this site.

After you return to your terminals there will be no further discussion for that period. A maximum of four minutes will be allowed in any one discussion session, but you may unanimously agree to proceed earlier than that. We will be tape recording your discussions for our records."

The conversations take place in the four corners of a (small separate) room next to the computer terminals; and will be within earshot of the experimenters, to ensure the ground rules of no threats or offers of side payments are not violated. After the communication period, the subjects have to return to their seats and proceeded by making a (contribution or claim) decision for that period. This decision has to be made simultaneously, and to keep matters orderly, during the decision time (of 1 minute) there is no communication allowed. Although each subject is able to see the other members in his or her group during the communication periods (and therefore anonymity regarding group composition is lost), it is not possible to track the decisions of specific individuals. This is because subjects are not informed in advance on what numbers are used for reporting one another's actions (i.e. these numbers are assigned randomly). Recording the content of these communication sessions could prove useful when analyzing the data. Therefore one would want to place a camera in the room, however this would probably be too intrusive. Consequently the experimenter will stick to recording the audio, and makes notes of what happens during the communication periods.

The payoff function for every subject remains the same under the face-to-face communication treatment. Communication is after all just 'cheap talk', no real commitments that change the payoff function can be made. Indeed a subject will never know for sure if other subjects will keep their promises or conduct themselves in accordance with what they communicated.

TREATMENT 3: CLAIM GAME + LEADING-BY-EXAMPLE

Again the third treatment is similar to the control treatment, however after a certain number of rounds a person will be democratically elected to lead-by-example. Participants will be told that in groups, leaders a quite often necessary to uphold efficiency. Before a leader is selected, subjects will first learn what it means to be the leader in the experiment.

DEMOCRATICALLY ELECTING A LEADER

To accomplish leader selection, the same procedures used by Levy, Padgitt, Peart, Houser, & Xiao (2011) will be used. All subjects are potential leaders, and will have to compete on the basis of a proposed platform. This platform consist of a motivational message to the other members of the group. The first five sessions of the experiment will be exactly the same as in the base treatment (treatment 1). However after these five rounds, before the sixth round, each participant has to write a 'platform', and enter this message on his or her computer terminal. The content of this platform is unrestricted, and participant have 2 minutes to write it. To ensure effort on this part of the game, subjects will be paid €1,50 to write this platform. Subjects will be explained that after each group member has written his or her platform, each subject is shown the platform written by the other three participants, and has to vote for one of the platforms (subjects will not be able to vote for themselves). It is also explained that the participant that writes the winning, i.e. the platform that receives the most votes, will be elected leader. The computer will distribute a message to the winner stating "*You wrote the winning platform. From now on you will be the leader in the experiment.*" Participants that did not write the winning platform will be shown the

following message "*Group member ... wrote the winning platform, (s)he will be the leader in the experiment from now on.*" Only the winner will now the real identity of the winner / leader (because participants do not know which number belongs to which person). If there is a tie after voting, a run-off election is held.

LEADING-BY-EXAMPLE

The subjected that is elected the leader, will now be instructed to lead-by-example. How is leading-by-example simulated in a laboratory experiment? A lot of studies consider leading-by-example in laboratory experiments, in all of these studies leading-by-example is manipulated in more or less the same way. I will impose this treatment in the same way, inspired by the studies by Dannenberg (2015), Moxnes & Van Der Heijden (2003), Güth, Levati, Sutter, & Van Der Heijden (2007) and Brandts, Rott, & Solà (2015).

After the leader has been elected, the experiment will continue in the same way as the base treatment (treatment 1); with the difference that in the remaining 20 periods, the subject that wrote the winning platform, the leader, is the first mover and makes a commitment for that period by deciding on his/her contribution or claim decision before the other participants. The decision made by the leader is than communicated to the other three members of the group, the followers. After observing the leaders decision, these three members then simultaneously have to make their contribution or claim decision. The complete monitoring situation, in which all decisions and earnings by all group members are revealed to all participants, avoids informational asymmetries between the leader, whose investment is revealed, and the others (Moxnes & Van Der Heijden, 2003).

Leading-by-example does not affect the payoff function, therefore the payoff function is similar to that of the control treatment. The dominant strategies in the Nash equilibrium of the CG after all do not depend on the contributions of others, therefore a person leading-by-example will have no effect on the strategy space of a subject. The main difference compared to the base treatment (treatment 1) is that a form of sequentiality is introduced (simultaneous-sequential). Because there is no difference in the payoff function, leading-by-example should also have no effect on cooperation (according to economic Game Theory). Our literature review has however shown that leading-by-example does have a significant effect on cooperation in the PGG; will the same result be observed in the CG?

TREATMENT 4: CLAIM GAME + FACE-TO-FACE COMMUNICATION + LEADING-BY-EXAMPLE

In this treatment the two treatments described above (treatment 2 & 3) will be combined. It is important to mention that subjects will be told that the leader is not required to reveal his identity during communication sessions, because this would conflict with keeping the choices of each subject anonymous, and also results in a less controlled experiment.

SURVEY

For the complete survey, including instructions, see appendix B (English) an appendix C (Dutch).

Because of monetary and time constraints encountered while writing this thesis, I decided to do a secondary study that was more feasible to realize. This study consisted of a web survey in which participants were asked about the choices they would have made if they were to participate in the lab experiment. In other words, participants were presented with a number of hypothetical situations and had to indicate what their intentions would be in such a situation. Off course it is not possible to wrap the entire experimental design described in the previous section in a web survey. Our aim was therefore to design a study the results of which might say something sensible about the possible outcomes in the actual lab experiment.

A total of 108 subjects participated in the study (65 males and 43 females). The survey was done in Dutch, and all participants were from the Netherlands. Because some problems were encountered with the comprehension of the survey, and especially the experiment explained in the survey, I decided to target highly educated individuals. For a complete overview of the demographic characteristics of the participants I refer to the social demographics section in the results chapter.

METHODOLOGY

In a web survey it is not possible to provide participants with feedback of their earnings after a period, there are after all no other group members. Therefore I decided to research the choices individuals make only in the first period, making it a one-shot CG. The treatment groups in the web survey are the same as in the experiment. For all treatments the survey started by explaining the CG, this explanation was the same across all treatments. After the instructions and control questions, for each treatment group the treatment itself was introduced. The design of the game was exactly the same as the one used in the described laboratory experiment above. The only difference is that for simplification purposes I used real euro amounts, instead of points. A multiplication factor of 2 was used because this is simple for participants to understand and effective in creating the social dilemma.

The game was described as simple as possible to increasing the chance the participant understood the principles of the experiment. Also I decided not to go into too much detail about what would happen if there were more claims than contributions. The amount of text needed to explain this in detail would have made it only more difficult to understand the matter for the participant. Also an example of one game was given, and the earnings of each group member in the example experiment were explained in detail. To make sure people understood the experiment, the Claim game and the earnings of each participant in the experiment, a control question was designed. Participant had to answer this control question correctly in order to continue the survey. In this control question the participant was told the contributions by all group members, and was then asked to calculate his or her own earnings. Thus ensuring participants are aware what choices they had to make in the experiment, and what would be the consequences of those choices.

TREATMENTS

In the first treatment group the baseline treatment was tested (standard CG). After the instructions and the control questions the participant was asked to image him- or herself in the described experiment. Hereafter the participant was asked how much (s)he would contribute to

or claim from the group project in that situation. To make his or her choice the participant could only fill in one number; to claim an amount from the group project a number between -20 and 0, to contribute an amount to the group project a number between 0 and 20.

In the second treatment group face-to-face communication was introduced before the participant had to make his allocation decision. Face-to-face communication is perhaps the most difficult treatment to test in a web survey. To try and simulate this treatment, I asked participants to imagine themselves being in an experiment in which communication is possible, and to imagine themselves at the communication period before the first contribution round. To reinforce this effect I presented participants with an example of what one group member communicated to the group. To make sure this was a realistic message, I used a message that was given by a real participant in the study of Levy, Padgitt, Peart, Houser, & Xiao (2011). Then the participant was asked what he or she wanted to communicate to the other group members if in that situation. This way the participant was forced to imagine him- or herself having to communicate with a group at the start of the experiment. One could argue that communication is simulated in this way. After the participant had stated what he would communicate in the communication period, the survey continued in the same fashion as the first treatment group. With the difference that the participant was told that after (s)he made his or her contribution decision it was again possible to communicate with one another.

The third treatment was concerned with the simulation of leading-by-example in the Claim game. Before participants could be asked about their decision when a leader was present, first the (democratic) leader election process needed to be simulated. The voting process I simulated in the web survey was similar to that of Levy, Padgitt, Peart, Houser, & Xiao (2011). The participant was explained that in the experiment every member had to write a motivating message after which each member could vote for one of the messages. The member with the message that receives the most votes will be elected leader. The participant was then asked to enter the (motivating) message that (s)he would send to the other group members regarding the leader selection. After the participant had entered his or her message, (s)he was shown the three messages that were (supposedly) written by the other group members. Again I used real messages written by participants in the experiment of Levy, Padgitt, Peart, Houser, & Xiao. Then the participant was asked to vote for one of the messages. This completed the voting simulation.

After this election process was completed two more questions were asked to see how much people would contribute in this leading-by-example treatment. The first question was to see how much a participant would contribute if another member was elected leader. In this question the participant was first told that another member was elected leader. And that this meant that this member must contribute or claim before the others, after which the other members must simultaneously decided how much to contribute or claim. Then it was told that the leader had decided to contribute his full endowment (€20) to the group project. And the participant was asked how much he or she wanted to contribute or claim from the group project. The second question was to see how much a participant would contribute if (s)he was him- or herself elected leader. In this question the participant was first told that (s)he was elected leader, and that this meant the (s)he had to contribute or claim from the group project before the other group members made their decision. The participant was then asked how much (s)he would contribute or claim as the leader.

In the fourth and last treatment the communication treatment and the leading-by-example treatment were combined. This was done by first introducing the participant to the concept of communication during the experiment and then asking them what they would want to communicate to the other group members (same as in the communication treatment). After this

leadership election was simulated and people were asked about their contribution (claim) choice both as a leader and a follower (same as in the leadership treatment).

BACKGROUND QUESTIONS

At the end of all surveys I asked several background questions. The reason for these question was to enable me to assess the survey response. This tells us to which kind of demographics the results of this research will be applicable. Also this enabled me to make sure that differences in outcomes between the surveys were because of the imposed treatments, and not because there were differences in demographics (i.e. ensure equal distribution). Because I aimed for a representative sample of the population, I need to know the distribution of the demographic characteristics of my respondents, to determine how close the sample replicates the population. I also might be able to differentiate between different sub-groups. However because our sample size is small, it is arguable that it is not possible to draw any statistically meaningful conclusions.

RESULTS

In this section the results of our (survey) study will be presented and discussed using statistical analysis. In total there were 108 participants in our study; 29 participants for both treatment 1 (T1) and 3 (T3), 25 participants for both treatment 2 (T2) and 4 (T4). In all treatments subjects made only one allocation decision, representing a one-shot dilemma. Except in the last two treatment groups, where leading-by-example was introduced, participants had to indicate what their contribution decision would be both as a leader and as a follower (but the game was still represented as a one-shot game). Only the contribution decisions were studied, so no results can be given regarding outcomes, payoffs or net group contributions within a CG group.

The data analysed in this section all originates from subjects that were able to correctly answer the control questions in the survey. Thereby I am reasonably sure that the choices made by the participants in this survey were made with sufficient knowledge of the social dilemma.

SOCIAL DEMOGRAPHICS

I will start with an examination of the demographic characteristics of the 108 subjects that participated in the web survey. About 60% of the subjects were male, and about 40% female. Most of the participants were older than 55 years (≈36%), only a few participants were younger than 25 years (≈5%), other participants were more or less equally divided among the other tree age groups: 25 – 35 years (≈22%), 35 – 45 years (≈18%) and 45 – 55 years (≈18%). Note that there are relatively few 'young individuals' in our study compared to other studies on laboratory experiments concerning social dilemmas (often their sample is drawn from the student population). The majority of the subjects was employed, either full-time (≈40%), part-time (≈11%) or self-employed (≈10%). Almost 19 percent of the participant was retired, and about 14 percent claimed not to work. Only a small percentage was a student (≈6%). Around 54% of the participant were married and around 19% were living together with a partner. 23% of participants were single, and a mere 5% was divorced or widowed.

Practically all participants were highly educated (HBO≈71%; WO≈20%), because highly educated people were targeted in order to make sure participants were able to understand the survey. Over 45% of the participants had a gross household income between €30,000 and €60,000, and almost a quarter of the participants had had a gross household income between €60,000 and €120,000. Almost nobody had a gross household income of more than €120,000, and just 12% of participants had a gross household income of less than €15,000. The remaining 18% of participants had a gross household income between €15,000 and €30,000. Subject were also asked about their field of study. By far the largest group did a study in the field of economics & management (≈28%), followed by exact, technology and ICT (≈18%) and social, behaviour and society (≈13%). Other noticeable groups were health, sport and exercise (≈11%) and education (≈10%); the other participants were divided over the remaining fields of study.

EQUAL DISTRIBUTION OF DEMOGRAPHICS

I also looked at the demographic distribution between groups. Gender ($\chi 2$=3.780, p=.286), marital status ($\chi 2$=9.663, p=.378), gross household income ($\chi 2$=10.462, p=.576), level of education ($\chi 2$=12.837, p=.615) and field of study ($\chi 2$=21.782, p=.862) were all equally distributed among the four treatment groups. It can be said that the subjects are similar in these demographic characteristics across the different treatment groups. However performing Chi-Square tests to test for equal distributions among the treatment groups for all of the demographic variables, I found that age ($\chi 2$=49.992, p<.001) and working situation ($\chi 2$=44.126, p<.001) are not equally distributed. A relatively large number of individuals older than 55 years

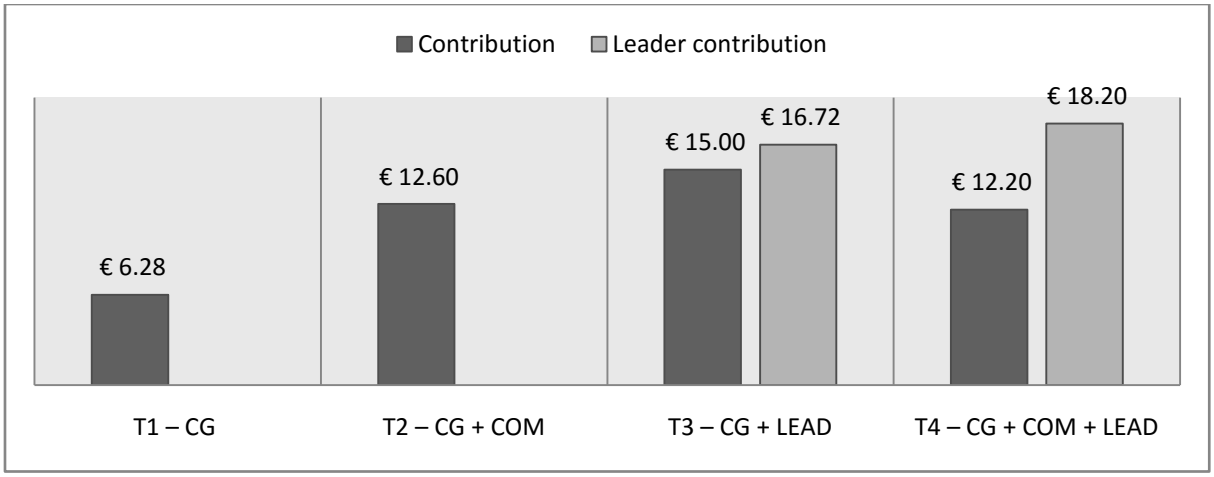
old is observed in the first two treatments, while a relatively large number of middle-aged subject is found in the last two treatments. Likewise a large number of retired subjects are found in the first two treatments, while a relatively large number of employed individuals is found in the last two treatments. This must be taken into consideration when analysing the data. The unequal distribution of demographic characteristics is most likely caused by the time the different treatment surveys were available to fill in.

DESCRIPTIVE STATISTICS

In this section a summary of the data will be presented by providing descriptive statistics and some simple tests. For an overview of average contributions in the different treatment groups, see *table A2*. *Table A3* provides an overview of the percentage of subjects that cooperated or claimed, and *table A4* of the percentage of partial and full contributors.

AVERAGE CONTRIBUTIONS BETWEEN TREATMENTS

***G1** - Average amount contributed to the group project in the four treatment groups.*



Legend

- **T1 - CG**: Treatment 1 – Claim Game (Baseline)
- **T2 – CG + COM**: Treatment 2 – Claim Game + Communication
- **T3 – CG + LEAD**: Treatment 3 – Claim Game + Leading-by-example
- **T4 – CG + COM + LEAD**: Treatment 4 – Claim Game + Communication + Leading-by-example (Combination)

TREATMENT 1: CLAIM GAME

In the baseline treatment (T1) the average investment in the group project was €6.28 (*SD*=€13.92), which is approximately 31% of the full endowment. Individual allocation actions range from full defection (-€20) to full cooperation (€20). The majority of subject still contributes to some degree in our baseline treatment (≈62%), while about 28 percent decides to claim and about 10 percent makes no contribution or claim at all; in the other treatment groups, contributing zero was practically not observed. Also notice that the percentage of full contributors is a lot lower compared to the rest of the treatment groups; only about 35% compared to about 60% or more for the other treatments. Compared to the study by Van Soest, Stoop, & Vyrastekova (2016), that used (almost) the exact same parameters and find that average contributions do not differ significantly from zero, the mean of contributions in our baseline treatment still seems to be high. To be sure of this finding I decided to test this finding for its statistical significance.

Q1 - Do contributions differ significantly from zero in the baseline treatment?

Before I started any statistical tests I first analysed the data for normality, to determine if parametric test can be used. Analysing the Q-Q Plots and using the Shapiro-Wilk Test of Normality, I found that the data is clearly not normally distributed (p<0.001 for all four treatment groups). Therefore non-parametric tests should be used.

However the only test to effectively test whether contributions differ significantly from zero is the one-sample t-test. Thus this test will be used, with the side note that it is actually not possible to use this test because the data is not normally distributed. The test shows that the null hypothesis, that the mean contribution level (M=6.28; SD=13.915) does not differ significantly from zero, should be rejected, t(28)=2.429, p=.022. *The contributions in the baseline treatment of the CG therefore significantly differ from zero.* This finding contrasts with the finding of Van Soest, Stoop, & Vyrastekova (2016). However the difference from zero is only small, the mean does for instance not significantly differ from 1 (one-sample t-test, t(28)=2.042, p=.051), and only a single period is examined in this experiment. In the first period of any laboratory social dilemma experiment contributions tend to be higher. Also because no real monetary incentives are involved in our study it could be that participants are mainly focused on giving socially desirable answers.

TREATMENT 2: CLAIM GAME + FACE-TO-FACE COMMUNICATION

In the face-to-face communication treatment (T2) the average investment in the group project was €12.60 (SD=€12.59), which is approximately 63% of the full endowment. Eighty percent of the subjects contributed in this treatment and the number of full contributors almost doubled (compared to T1) to about 64 percent.

TREATMENT 3: CLAIM GAME + LEADING-BY-EXAMPLE

In the leading-by-example treatment (T3) the average investment in the group project was €15.00 (SD=€7.79), approximately 75% of the full endowment. The highest percentage of cooperators was found in this treatment, more than 93 percent of the subjects contributed to some degree, of which about 59% were full cooperators. Also in this treatment there were no full defectors. The standard deviation in this treatment deviated from the other periods, it was only €7.79 compared to around €14.00 for the other treatments. This is probably due to the fact that little claims were made in this treatment.

TREATMENT 4: CLAIM GAME + FACE-TO-FACE COMMUNICATION + LEADING-BY-EXAMPLE

In the combined treatment (T4) the average investment in the group project was €12.20 (SD=€14.80), or approximately 61% of the full endowment. So interestingly after adding communication to the leading-by-example treatment, average contributions went back down from €15 to about €12; also the percentage of cooperators drops from about 93% to about 84%. Examining the descriptive data one can see that the cooperation data for the combined treatment (T4) is very similar to the data of the communication only treatment (T2). This finding is interesting and suggests that the combination of solutions might not be more effective than the stand-alone solutions, or in the case of leading-by-example it might even be less effective. However this finding first has to be tested for its statistical significance, which will be done in the next section. Notice that the combined treatment both has the highest percentage of full contributors; but also the highest number of full defectors. The reason for this finding could be that communication triggers a debate about the procedural fairness of a leader. However because of the small sample size it is very difficult and dangerous to make generalizations here.

The average contributions made by participants when asked about their allocation action if elected leader were very high compared to the other 'normal' contribution decisions in our study (and also compared to the followers contributions), €16.72 (SD=€4.87) for T3 (≈ 84% of full endowment) and €18.20 (s=€3.79) for T4 (≈ 91% of full endowment). Moreover for both

treatments 100% of the subjects cooperated, there were no defectors. The percentage of participants fully cooperating was 80% for the combined treatment (T4) and slightly less 65% for the leading-by-example treatment.

EFFECTIVENESS OF SOLUTIONS

In this section I will present results from the tests I have done, to examine the effectiveness of the solutions, and to find whether the hypotheses stated in this thesis need to be either rejected or accepted. I will start by testing if the cooperation rates (i.e. contributions) in the four treatments are significantly different from each other.

Q2 - Is there a significant difference in cooperation rates between the four treatment groups?

The obvious statistic test to test this hypothesis is the One-way Anova test. However the Anova test requires the data to be normally distributed, which is not the case for out data as was shown earlier, therefore a non-parametric test should be used. *A Kruskal-Wallis H test showed that there are significant differences in contribution levels between the four treatment groups, $\chi 2=8.272$, $p=.041$.* Analyzing the medians of the four treatment groups it can be observed that the main difference is between the first baseline treatment ground, and the 3 treatment groups in which a solution was examined (*Table A2*). Now follow up tests have to be done to compare the different groups to check which are different from each other.

FACE-TO-FACE COMMUNICATION

Q3 - Do individuals in the CG cooperate more in the communication treatment compared to the control treatment?

A Mann-Whitney U was used to find that contributions were greater in the face-to-face communication treatment (*M*=€12.60; *Mdn*=€20.00) compared to the baseline treatment (*M*=€6.28; *Mdn*=€10.00), *U*=252, *p*=.041. Consistent with my expectations, introducing the possibility of (continuous) face-to-face communication does increase contribution rates in the CG.

Therefore the first hypothesis cannot be rejected and I conclude that face-to-face communication is effective in increasing cooperation in the Claim Game (H_1).

On the basis of my findings in the literature review I conclude that the most probable reason for this finding is that communication offers the possibility to discuss the dilemma. Also communication could result in subjects attaching more importance to 'other-regarding preferences' in their utility function (which in turn could be because of humanization, moral suasion and group identity). I refer to the literature review on communication for a more extensive examination on the reasons for the effectiveness of communication. Moreover note that in my experiment communication was simulated by having subjects think about the possibility of communication. The results therefore suggest that merely thinking about the possibility of communication, is enough to induce increased cooperation levels. This is a finding on its own.

LEADING-BY-EXAMPLE

Q4 - Do individuals in the CG cooperate more in the leading-by-example treatment compared to the control treatment?

A Mann-Whitney U test indicated that contributions in the leading-by-example treatment (*M*=€15.00; *Mdn*=€20.00) are significantly greater compared to those in the baseline treatment

(*M*=€6.28; *Mdn*=€10.00), *U*=268.5 *p*=.012. In line with my expectations, introducing a democratically elected leader, that leads-by-example and sets a good example, does increase contribution rates in the CG. Note that in my manipulation of leading-by-example, the leader sets a good example by contributing the full amount, thus this finding is limited to leaders setting a good example.

Therefore the second hypothesis cannot be rejected and I conclude that leading-by-example, by a democratically elected leader, is effective in increasing cooperation in the Claim Game (H_2).

Consistent with my findings in the literature review I conclude that the most probable reason for this finding is that preventing free-riding is an integral part of leadership. Also a lot of people are 'conditional cooperators', a person setting a good example (i.e. leading-by-example) could therefore result in their cooperation. I refer to the literature review on leadership for a more extensive examination on the reasons for the effectiveness of leadership.

Q5 - Is leading-by-example more effective in eliciting cooperation in the CG compared to communication?

Using the Mann-Whitney U test I find that the null hypothesis of equal distribution of contributions between the leading-by-example treatment (*M*=€15.00; *Mdn*=€20.00) and the communication treatment (*M*=€12.60; *Mdn*=€20.00), cannot be rejected, *U*=361.5 *p*=.984. *This suggests that the solutions of communication and leading-by-example do not significantly differ in their effectiveness in increasing contribution rates in the Claim Game.* Notice that the average contributions in the leading-by-example treatment were (slightly) higher compared to the communication treatment, but apparently this difference is by no means statistically significant. To my best knowledge this is the first study to compare the effectiveness of communication and leadership. From the results of this study no clear conclusions can be drawn. I expected that the degree to which either of the solutions is effective, and which one is more effective, depends to a large extend on the dynamics, circumstances and complexity of the specific dilemma.

Q6 - Do individuals cooperate more when they are a leader compared to when they are a follower?

I will first test for the difference between leader and follower contributions using the combined data of treatment 3 and 4. A Related-Samples Wilcoxon Signed Rank Test showed that the null hypotheses of no differences between the follower contributions and the leader contributions should be rejected, *Z*=-2.351, *p*<.019. The rank figures indicate that on average people contributed more after being elected leader. *I therefore conclude that individuals cooperate more as a leader compared to when they are a follower*. Observation of the data confirms this finding, note that there were even some participants that claimed €20 when a follower, and contributed €20 when a leader. Note that leaders (*M*=€16.72, *Mdn*=€20.00) also contribute significantly more compared to the baseline treatment (*M*=€6.28, *Mdn*=€10.00), Independent-Samples Mann-Whitney U Test, *U*=236, *p*=.002.

Interestingly when testing for the differences between leader and follower contribution within the treatment groups, we do the following interesting finding. In the leading-by-example only treatment group (T3), there was no significant difference between the contributions of leaders and followers (Related-Samples Wilcoxon Signed Rank Test, *Z*=-1.476, *p*<.07). However, in the combined treatment group (T4), participants did contribute more when they acted as leader compared to when they were a follower (Related-Samples Wilcoxon Signed Rank Test, *Z*=-1.873, *p*<.03).

These findings are consistent with the findings of other scholars as we have seen in our literature review; followers do follow leaders but on average contribute less. This is because the allocation decision of the leader is used as an upper benchmark for their contributions. The interesting finding in our study is that this effect was only weakly and not significantly present, in the treatment with only leading-by-example. When people were able to communicate the effect became much stronger and significant. *This suggests that the possibility of communication increases the likelihood that an individual will increase his contribution when (s)he is a leader compared to when (s)he is a follower.* In other words when leaders know that communication is possible they are more inclined to contribute. This could be because communication provides group members with the ability to confront the leader on his actions. Fear of this confrontation could make the leader more inclined to contribute. Also initial communication might be able to strengthen a sense of group identity, which could result in the leader acting in a way that is more beneficial to the group, as opposed to acting in a way that is more beneficial to his self-interest. However because this finding was done within-subjects and carryover effects are very likely to occur, one should be careful making generalizations as a result of these findings. Further research is needed to examine this effect.

Q7 - Is there a difference in cooperation rates between individuals that voted for a different leader?

Although there is no statistically significant difference in cooperation between followers voting for a different leader (Independent-Samples Kruskal-Wallis Test, $\chi 2$=3.634, p=.163), there is a significant difference in leader cooperation as a result of voting for a specific leader (Independent-Samples Kruskal-Wallis Test, $\chi 2$=6.031, p=.049). For individuals voting for either group member 1 (*M*=€16.11; *Mdn*=€20.00; *SD*=€5.02) or 3 (*M*=€16.33; *Mdn*=€20.00; *SD*=€5.16) the average contribution was around €16 points, individuals voting for the second group member (*M*=€19.29; *Mdn*=€20.00; *SD*=€2.39) contributed on average over €19. Interestingly this message was the one considered most forceful, written all in capital letters, implicating a more authoritarian leader. *I therefore conclude that an unexpected finding of this study is that there is a difference in cooperation rate as a result of the leader that an individual elected.* This is in line with earlier research, for instance that of De Cremer (2002) who find that charismatic leaders are more able in eliciting higher cooperation rates.

COMBINATION OF SOLUTIONS

Q8 - Do individuals in the CG cooperate more in the - communication and leading-by-example treatment - compared to the control treatment?

A Mann-Whitney U test indicates that contributions in the treatment using a combination of solutions (*M*=€12.20; *Mdn*=€20.00) are significantly higher compared to those in the baseline treatment (*M*=€6.28, *Mdn*=€10.00), *U*=249 *p*=.035. In line with what I expected this suggests that the combination of leading-by-example and communication is effective in increasing cooperation rates in the CG.

Therefore the third hypothesis cannot be rejected and I conclude that the combination of face-to-face communication and leading-by-example, by a democratically elected leader, is effective in increasing cooperation in the Claim Game (H_3).

An extensive reasoning for the expected reasons for the effectiveness of this combination of solutions can be found in the literature review.

Q9 – Is the combination of face-to-face communication and leading-by-example more effective in eliciting cooperation in the CG compared to the solutions on their own?

To correctly answer this question contributions in the combined treatment need to be separately compared to those in the communication and the leading-by-example treatment.

Q9.1 - Do individuals in the CG cooperate more in the - communication and leading-by-example treatment - compared to the communication treatment?

I start by examining whether the combination of communication and leadership (*M*=€12.20; *Mdn*=€20.00) is more effective in increasing cooperation compared to communication (*M*=€12.60; *Mdn*=€20.00) on its own. A Mann-Whitney U test shows that the null hypothesis of equal distribution of contributions between the two groups cannot be rejected, *U*=303.5 *p*=.836. The data for these two treatments also appears to be very much the same. *This suggests that the combination of communication and leading-by-example is not more effective than the stand-alone effect of communication in increasing contribution rates in the Claim Game*.

Q9.2 - Do individuals in the CG cooperate more in the - communication and leading-by-example treatment - compared to the leading-by-example treatment?

Again a Mann-Whitney U test was used, this time to compare the effectiveness of the combination of communication and leadership (*M*=€12.20; *Mdn*=€20.00) in increasing contributions in the CG to leadership on its own (*M*=€15.00; *Mdn*=€20.00). Once more the null hypothesis of equal distribution of contributions between the two groups cannot be rejected, *U*=347, *p*=.756. Even more so the mean for the leading-by-example only treatment, is higher than the mean of the combination treatment. *This suggests that the combination of communication and leading-by-example is not more effective than the stand-alone effect of leading-by-example in increasing contribution rates in the Claim Game.* If anything the combination of solutions is less effective, but not on a statistically significant level for this data.

Another interesting finding is that the average contribution rate for the communication only treatment (T2) is about €12, for the leading-by-example only treatment the average contribution rate was €15. Interestingly for the combined treatment the average contribution rate went back down to €12 again. However, as earlier shown, leader contribution rates did increases slightly in the combination treatment, but not significant at a 5% significance level.

At this point I have shown that the combination of solutions is not more effective in increasing cooperation in the CG, compared to both communication and leading-by-example on their own.

Therefore I reject the fourth hypothesis and conclude that the combination of face-to-face communication and leading-by-example, by a democratically elected leader, is not more effective in increasing cooperation in the Claim Game, compared to the isolated effects (H_4).

This finding is not in line with my expectations, however it is in line with earlier research that finds ambiguous results on the effectiveness of a combination of solutions in a social dilemma. A reason for this finding could be that either one of the solutions is so effective on its own, that adding another solution does not further increase cooperation. Or as stated earlier, it could be that communication triggers a debate about the procedural fairness of a leader. Resulting in some individuals (fully) defecting, and others (fully) cooperating. The reason could also have something to do with the way the leader election process was simulated in our study. During this process subjects had to write a platform (i.e. motivating message), and were shown the platforms of the other group members, after which they had to vote for the best platform. It can be argued that a form of communication is already included in this treatment. Adding a communication manipulation to this treatment may consequently not have resulted in the expected increase in cooperation.

Q10 - Do elected leaders in the CG cooperate more in the - leading-by-example and communication treatment - compared to the leading-by-example treatment ?

In other words; do leaders contribute more when communication is possible? The average contribution rates for leaders in the combination treatment were slightly higher (*M*=€18.20; *Mdn*=€20.00; *SD*=€3.79) compared to the treatment with only leading-by-example (*M*=€16.72; *Mdn*=€20.00; *SD*=€4.87). However a Mann-Whitney U test showed that this difference was not statistically significant, *U*=308, *p*=.228. Note that leader contribution levels were very high for both treatment groups (Table A2), and in both groups none of the leaders defected. The mean for all leader contributions in our study is €17.41, which is over 87% of the total endowment.

QUALITATIVE DATA ANALYSIS

In the experiment, subjects provided qualitative data by answering what they would communicate and by writing a leader election platform. This data will be analysed in this section.

ANALYSIS OF COMMUNICATION MESSAGES

Analyzing the messages written by participant in response to the communication simulation (by categorization), it can be observed that most messages are concerned with asking the other group members to fully cooperate. These are messages in the context of "If all four of us contribute 20, we all receive 40". The vast majority (≈52%) are these kind of messages. The second most common type of message concerns the general importance of cooperation, acting in a socially acceptable way or urging people to think about their actions (≈26%). An example of this is "Together we achieve more". Then some of the messages are about telling how difficult the experiment is, and/or asking other people for advice (≈14%). Surprisingly a few of the messages written by participants stated that they were fine with other group members making a claim, or suggested that everyone should defect (≈8%).

Also interesting is that individuals in the combined treatment seemingly wrote far more extensive messages (longer sentences and written in better phrases) compared to participants in the communication only treatment. It could be that the anticipation of the possibility of being elected leader, results in individuals trying to present themselves in a better way. To test this I categorised the messages by the number of words used. A Shapiro-Wilk test showed that this data is not normally distributed, therefore the non-parametric Independent-Samples Mann-Whitney U Test was used to test for differences. This test showed however that the number of words used in the combination treatment (*M*=9.24; *Mdn*=7; *SD*=7.891) was not statistically significantly larger than the number of words used in the communication treatment (*M*=6.96; *Mdn*=6; *SD*=5.488), *U*=259.5, *p*=.302. There was also no significant difference in the distribution of the type of messages between the two treatment groups (T2 and T4), which was tested executing a Chi-Square test, $\chi 2$=3.220, *p*=.359.

Now that the messages are categorised we can run an analysis to examine its relationship to the contribution decisions of individuals. *Interestingly it seems that people 'do what they say', even though this is not necessarily economically rational in the Claim Game.* People that ask others to fully cooperate, *contribute* €19.81 on average themselves (*M*=€19.81; *Mdn*=€20.00; *SD*=€0.981), those stating that a claim is acceptable *claim* on average €11.25 (*M*=-€11.25; *Mdn*=-€12.50; *SD*=€10.31). Individuals that emphasize the importance of social behaviour contribute on average €13.08 (*M*=€13.08; *Mdn*=€20; *SD*=€11.28). Performing a Kruskal-Wallis H Test, showed that these differences are statistically significant, $\chi 2$=30.157, *p*<.001.

ANALYSIS OF LEADERSHIP ELECTION PLATFORMS

Performing a categorization analysis on the platforms written by participants for the purpose of leadership election, it can be observed that a large part of the written platforms was about the participant stating (s)he is willing to be the leader or why (s)he should be the leader (≈43%). In contrast only a few individuals stated that they had not interest in being the leader (≈6%). Another large part of participants stated the importance of achieving a result in which all group members contributed their full endowment (≈26%). The remaining participants stated something concerning the importance of working together, behaving in a socially responsible way or trusting each other (≈24%). Only a couple of participants platforms were about how difficult the experiment is, and/or asking other people for advice (≈2%).

Although too vague and insignificant to categorise it is clear that in the combined treatment, in which individuals could also communicate, platforms were more focused towards coming to an agreement or making promises on the amount of contribution. These were messages such as "Let's all come to the agreement and promise to contribute the full amount". Executing a Chi-Square Tests however shows that the distribution of the type of platform written is not equal between the combined treatment and the leading-by-example only treatment, $\chi 2$=10.522, p=.032. In the combined treatment a relatively large proportion of the platforms are about the general importance of working together and trust, while in the leading-by-example only treatment a relatively large proportion of the platforms are about the strategic benefits of full cooperation. *This suggests that the possibility of face-to-face communication alters the way in which individuals try to influence or convince one another.*

Note that there were no statistically significant differences in the cooperation rates between the different platform categories (Kruskal-Wallis H Test, $\chi 2$=6.794, p=.147). However analysing the means one can see that there is one category that clearly differs, individuals that state not eager to be the leader, on average *claim* €1.67 (M=-€1.67; Mdn=-€5.00; SD=€20.21) compared to an average *contribution* of €13.70 (M=€13.70; Mdn=€20.00; SD=€11.54) among all analysed individuals.

SUB-GROUP ANALYSIS

Alongside the main findings described above, I also analysed for differences in cooperation rates between different sub-groups. The sub-groups were identified by the answers subjects provided on the background questions.

GENDER

There is no statistically significant difference in cooperation rates between man and woman in my study (Independent-Samples Mann-Whitney U Test, U=1303.5, p=.516). The mean contribution for woman is €11.74 (M=€11.74; Mdn=€15.00; SD=€11.17) and €11.26 for man (M=€11.26; Mdn=€20.00; SD=€13.76). Also analysis of other descriptive data on the cooperation between man and woman suggests that they are very much alike. This finding contradicts findings from earlier research, in which it is commonly found that woman (initially) contribute significantly more than males (Cadsby & Maynes, 1998; Nowell & Tinkler, 1994). However as Vyrastekova, Sent, & Staveren (2015) argues, these gender differences are not found systematically in the social dilemma literature.

AGE

Not to our surprise, a statistically significant difference in cooperation rates between the different age groups in our study is found (Independent-Samples Kruskal-Wallis Test, $\chi 2$=12.706, p=.013). Examining the data it can be seen that relatively high contribution rates can be found for the age groups between 35 – 45 years and 45 – 55 years old, and relatively low

contribution rates for the age group over 55 and younger than 25 years old (the age group 25 to 35 years old is in-between). As explained in the social demographics section, age categories are not distributed equally across the different treatment groups. Therefore I attribute this finding to the unequal age distribution among the treatment groups.

FIELD OF STUDY

There is no statistically significant difference in cooperation rates between people with a different field of study in our study (Independent-Samples Kruskal-Wallis Test, $\chi 2$=5.907, p=.823). Note that the interesting finding here is that subjects with a background in economics did not seem to act in a more 'homo economics', profit optimizing, economically rational way. If anything they contributed more than people with another field of study (but not statistically significant). This is not consistent with findings from other scholars, Frank, Gilovich, & Regan (1993) for instance found that studying economics inhibited cooperation. This could be because most subjects in our study were not students anymore, therefore practical thinking may have replaced the theoretical 'homo economics' way of thinking.

OTHER SUB-GROUPS

Further, performing multiple Independent-Samples Kruskal-Wallis Tests, no statistically significant difference in contributions was found between the subgroups of civil state ($\chi 2$=2.628, p=.453), working situation ($\chi 2$=8.100, p=.151), gross household income ($\chi 2$=2.781, p=.595) or level of education ($\chi 2$=3.980, p=.552). Note however the latter finding is not useful, because I specifically targeted highly educated individuals in order to receive valid survey responses.

CONCLUSION

The present study contributes to the existing literature by demonstrating that the much studied solutions face-to-face communication and leading-by-example are also effective in increasing cooperation in the Claim Game. Both solutions do not differ in their effectiveness; and although a combination of these solutions is also effective in enhancing cooperation, it is not more effective compared to the individual solutions. Combining solutions in an effort to achieve a social optimal outcome is therefore not as straight forward as one might think. Maybe a single solution is so effective, that cooperation is unaffected by the addition of another solution. Or there might be certain interaction effects between the solutions that prevent an increase in cooperation. That is not to say that allowing for communication, in addition to leading-by-example, has no beneficial effects whatsoever. In the presence of the possibility of communication individuals are more inclined to cooperate when they are elected to lead-by-example, compared to when no communication is possible. Possibly out of fear of confrontation when setting a bad example.

Further I found that communication alters the way in which individuals try to influence or convince one another, and a shift is observed from a strategically oriented to a socially orientated argument. Also, contrary to what is economically rational, individuals in the Claim Game keep their word, and for the participants in my experiment communication was not just 'cheap talk'. Those asking others to cooperate, choose to cooperate themselves as well. Likewise individuals stating a claim is acceptable, claim (on average) more than half the endowment amount themselves. Lastly, in line with previous research I found that people voting for a different leader, differ in their level of cooperation. Interestingly individuals that vote for a more forceful authoritarian leader, cooperate more.

FUTURE RESEARCH

In this thesis I did not go into detail on the mechanisms behind these observations, I suggest that this is worth future attention. It is also up to future research to carry out the actual experiment described in this thesis, that I was not able to execute. In the described experiment behaviour in multiple periods is studied, instead of the one-shot behaviour that was examined in our survey. Will communication and leadership also be effective in countering the trend of declining contributions over time in the Claim Game? Further because of the ambiguous findings in regards to the effectiveness of combinations of solutions in social dilemmas, future research is also needed in this regard. Under which circumstances are combinations of solutions beneficial? And can they be incorporated in such a way that the resulting cooperativeness is an accumulation of the cooperation induced by the individual solutions? In addition I came across an abundance of research on a variety of solutions that have been studied, and shown to be effective in traditional give-some and take-some games. It will be of interest to examine whether those solutions are also effective in the Claim Game.

To this point research regarding leadership in social dilemmas has revolved around leading-by-example. That is leaders are first movers, but have no formal authority; the only thing they can do is set a good example (Van der Heijden & Moxnes, 2013), hoping that their good actions will inspire followers to take similar actions. In real-world scenarios leaders tend to have more formal powers, future research will benefit from putting more effort into studying this type of leadership. The present study did also not test for the differences between leader selection methods. Future research is needed to test for the differences in effectiveness of various leader selection methods in the Claim Game, and the influence of communication on these outcomes. For example, what is the difference in the level of cooperation as a result of an elected or an appointed leader in the Claim Game, and does communication strengthen or weaken this difference?

Lastly because of time and focus concerns I decided not to go into detail concerning the underlying motives for cooperation in social dilemmas. The development of a comprehensive model in which the underlying reasons for cooperation are incorporated, would benefit future research in its quest for cooperation. Therefore an extensive literature review on the motives for cooperation and defection would be necessary, and any gaps in the literature should be filled by experimental research.

LIMITATIONS

Off course a major limitation of the present study is that the actual laboratory experiment was not conducted, and a survey was carried out in an attempt to approximate what would be found in a laboratory experiment. Consequently no real monetary incentives were used, only intentions were measured instead of actual behaviour. Note that in addition to a limitation, this is also a strength of this study. After all I demonstrated that merely thinking about communication is enough to encouraging cooperation. Accordingly this provides future research with a 'quick and dirty way' of conducting (preliminary) research into the phenomenon of communication. Moreover this offers insight into the human mind; apparently the thought of communication triggers certain mechanisms that are similar to those triggered in real communication.

One should be careful when generalizing the results of this study. Only highly educated individuals were targeted, and all respondents resided in the Netherlands. Especially because concepts such as cooperation and response to leadership are very culturally dependent, the findings from this study may only be applicable to western culture. Also the leader in our leading-by-example simulation set a good example by contributing his full endowment. Findings regarding leading-by-example in the present study are therefore limited to 'good leadership'. The way the leader election process was simulated in this study, causes further limitations. During this process subjects had to write, and vote for, a platform. To a certain degree communication is therefore already included in this treatment, this could influence results, hence caution is advised when generalizing my findings on the combination of solutions. Lastly, the present study only studied the actions of people in a one-shot game, cooperation rates might be considerably different over an extended periods of time.

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A. APPENDIX – TABLES

ABBREVIATIONS

- **T1**: Treatment 1 – Claim Game
- **T2**: Treatment 2 – Claim Game + Communication
- **T3**: Treatment 3 – Claim Game + Leading-by-example
- **T4**: Treatment 4 – Claim Game + Communication + Leading-by-example

A1 - DIFFERENCES IN CONSEQUENCES OF COOPERATION/DEFECTION BETWEEN THE PGG AND THE CG.

	Public Good Game [0, 20]		**Claim Game [-20, 20]**	
	Cooperator payoff	*Defector payoff*	*Cooperator payoff*	*Defector payoff*
4 cooperators, 0 defectors	40	-	40	-
3 cooperators, 1 defector	30	50	20	60
2 cooperators, 2 defectors	20	40	0	40

A2 - OVERVIEW OF AVERAGE CONTRIBUTIONS IN THE DIFFERENT TREATMENT GROUPS.

	AVG CONT.	**SD CONT.**	**MDN CONT.**	**AVG CONT. (L)**	**SD CONT. (L)**	**MDN CONT. (L)**
T1	€6.28	€13.92	€10.00	-		
T2	€12.60	€12.59	€20.00	-		
T3	€15.00	€7.79	€20.00	€16.72	€4.87	€20.00
T4	€12.20	€14.80	€20.00	€18.20	€3.79	€20.00

- **AVG CONT.** = Average contribution (mean)
- **SD CONT.** = Standard deviation of mean contribution
- **MDN CONT.** = Median contribution
- **AVG CONT. (L)** = Average leader contribution (mean)
- **SD CONT. (L)** = Standard deviation of mean leader contribution
- **MDN CONT. (L)** = Median leader contribution

A3 - OVERVIEW OF THE PERCENTAGE OF SUBJECTS THAT COOPERATED OR CLAIMED.

	T1	**T2**	**T3**	**T4**
Zero contributor	10.3%	4.0%	0.0%	0.0%
Cooperator	62.1%	80.0%	93.1%	84.0%
Defector	27.6%	16.0%	6.9%	16.0%

A4 - OVERVIEW OF THE PERCENTAGE OF SUBJECTS THAT, FULLY OR PARTIALLY, COOPERATED OR CLAIMED.

	T1	**T2**	**T3**	**T4**
Full cooperator	34.5%	64.0%	58.6%	68.0%
Partial cooperator	27.6%	16.0%	34.5%	16.0%
Full defector	10.3%	8.0%	0.0%	16.0%
Partial defector	17.2%	8.0%	6.9%	0.0%
Zero contributor	10.3%	4.0%	0.0%	0.0%

B. APPENDIX – SURVEY (ENGLISH)

Welcome to this survey on economic decision-making. Completing this survey will only take a couple of minutes, results will remain anonymous.

INSTRUCTIONS

Plead read the following instructions carefully. After you have read the instructions there will be a test question that must be answered correctly in order to continue the survey.

EXPERIMENT EXPLANATION

You will be matched with 3 other randomly chosen individuals to form a group that participates in an economic experiment.

Every group member will receive €20, with which can be done either of two things:

- You can contribute between €0 and €20 to the group project.
- You can claim between €0 and €20 from the group project (and keep the €20).

All four group members will have to decide simultaneous how much to claim from or contribute to the group project.

Amounts that are claimed from the group project will be subtracted from the contributions in the group project (and transferred to the group members who have claimed the amount). The amount remaining in the group project is multiplied by two (doubled) and divided equally among all four group members.

Every group member will therefore receive the following amount from the group project = ((Contributions - Claims) × 2) ÷ 4

EXAMPLE

An example to clarify the experiment and the earnings.

Simple examples: When all group member contribute €20, each group member will receive €40. If no one contributes, each group member will keep his €20. Below is an example of how the earnings in an experiment could be:

EARNINGS EXAMPLE

Suppose that:

- group member 1: contributes €20
- group member 2: contributes €10
- group member 3: contributes nothing (€0)
- group member 4: claims €10

>> What are the earnings of each group member at the end of the experiment? <<

Total contributions = 20 + 10 = €30

Total claims = €10

The total investment in the group project is therefore €20, with total contributions (€30) minus total claims (€10). This €20 is doubled (€40), and divided among the four group members (€40 ÷ 4) allowing each group member to receive €10 from the group project.

What are the earnings of each group member at the end of the experiment:

- group member 1 receives €10 | Kept €0 + €10 from the group project.
- group member 2 receives €20 | Kept €10 + €10 from the group project.
- group member 3 receives €30 | Kept €20 + €10 from the group project.
- group member 4 receives €40 | Kept €20 + claimed €10 + €10 from the group project.

TEST QUESTION

NOTE: The test questions must be answered correctly in order to proceed with the survey!

We ask to answer the following questions, to make sure you understand the experiment. Tip: You may use a calculator.

Reminder:

- At the start of the experiment every group member receives €20.
- Amount that is invested in the group project (total contributions - total claims), is doubled and then divided equally among all four members.
- When you make a claim, you contribute nothing. You therefore keep the €20.

SUPPOSE I CLAIM €5 FROM THE GROUP PROJECT, AND THAT THE THREE OTHER GORUP MEMBERS CONTRIBUTES €15 EACH TO THE GROUP PROJECT.

Therefore: total contributions are equal to €45, total claims are equal to €5.

1a. The amount I keep equals €_____ (20)

Tip: How much did I not contribute?

1b. The amount I receive because of my claim equals €_____ (5)

Tip: How much did I claim?

1c. The amount I receive from the group project equals €_____ (20)

Tip: ((Total contributions minus Total claims) × 2) ÷ 4

1d. The total amount I receive in this experiment is thus €_____ (45)

Tip: Sum of three answers above.

TREATMENT 1 – CLAIM GAME

EXPERIMENT

Suppose you are participating in the experiment just described. Communication with the other group members is not possible. At the beginning of the experiment you receive €20. What choice would you make?

How much do you want to contribute to the group project or claim from the group project?

I want to contribute or claim €... *(-20 to 0 are claims, 0 to 20 are contributions)*

Making your choice

To make your decision you can only choose one number. To claim an amount from the group project you enter a number between -20 and 0, to contribute an amount to the group project you enter a number between 0 and 20.

TREATMENT 2 - CLAIM GAME WITH COMMUNICATION

EXPERIMENT

Suppose you are participating in the experiment just described. You are seated around a table with the other three members and you may communicate with each other throughout the entire experiment (before, during and after).

COMMUNICATION PERIOD

At the beginning of the experiment you receive €20. Before you decide how much to claim from or contribute to the group project you are given the opportunity to discuss the issue with the other group members.

An example of what one of the group members says, is the following:

"If we all contribute the full amount to the group project, at the end of the day it will be better for all of us, but it will only work if we all do it."

What do you want to communicate to the other group members?

In one short sentence enter the main message that you want to get across to the other group members.

After the short communication period all group members have to decide simultaneously how much to contribute to or claim from the group project. After every member has made his or her decision it is again possible to communicate with one another.

How much do you want to contribute to the group project or claim from the group project?

I want to contribute or claim €... *(-20 to 0 are claims, 0 to 20 are contributions)*

Making your choice

To make your decision you can only choose one number. To claim an amount from the group project you enter a number between -20 and 0, to contribute an amount to the group project you enter a number between 0 and 20.

TREATMENT 3 - CLAIM GAME WITH LEADING-BY-EXAMPLE

EXPERIMENT

Suppose you are participating in the experiment just described. Before the start of the experiment a leader must be elected. The leader will take the lead by being the first to decide how much to contribute to or claim from the group project. His/her decision will be visible for all the group members. Then, the three remaining group members must decide simultaneously how much to contribute or claim.

LEADER ELECTION 1

To decide who will become the leader of the group, all group members are asked to write a (short) motivating message directed to the other group members. When each group member has written his or her message, group members get to see the messages written by the other three group members. Then each group member has to vote for the message of another group member. The person who wrote the message with the most votes is elected leader.

Enter the message that you would send to the other group members.

Fill in one brief motivational sentence.

LEADER ELECTION 2

After you sent a message to the other group members, you can vote for one message from another group member. After all members have voted for a message, the group member with the winning message will continue as the leader in the experiment.

Vote for the message of your preference:

Group member that receives most votes will be elected leader in the experiment.

- Group member 1 - *"Contribute at least a little to the group project; we would all be better off with a mutual contribution to the group project."*
- Group member 2 - *"PUT EVERYTHING IN THE GROUP PROJECT, THEN WE ALL GET MORE MONEY!"*
- Groep member 3 - *"Do not be greedy. If we all put a bit more in, we will all get more."*

Suppose another group member has been elected leader (group member 1). This leader must now take the lead in the experiment by deciding first how much to contribute to or claim from the group project. His/her choice will be visible for all the group members. Then you and the other group members must simultaneously how much to claim or contribute.

THE LEADER OF YOUR GROUP HAS MADE HIS DECISION, AND DECIDED TO CONTRIBUTE €20 TO THE GROUP PROJECT.

You and the other group members now have to decide simultaneously how much to contribute to or claim from the group project.

How much do you want to contribute to the group project or claim from the group project?

I want to contribute or claim €... *(-20 to 0 are claims, 0 to 20 are contributions)*

Making your choice

To make your decision you can only choose one number. To claim an amount from the group project you enter a number between -20 and 0, to contribute an amount to the group project you enter a number between 0 and 20.

YOU ARE ELECTED LEADER OF THE GROUP.

Suppose you are elected as leader in the experiment. This means that you decide how much to contribute to or claim from the group project before the other group members make their decision. Your decision will be visible for the other three group members. The other group members have to make their decision simultaneously after you have made your decision.

How much do you (as the leader) want to contribute to the group project or claim from the group project?

I want to contribute or claim €... *(-20 to 0 are claims, 0 to 20 are contributions)*

Making your choice

To make your decision you can only choose one number. To claim an amount from the group project you enter a number between -20 and 0, to contribute an amount to the group project you enter a number between 0 and 20.

TREATMENT 4 - CLAIM GAME WITH COMMUNICATION AND LEADING-BY-EXAMPLE

EXPERIMENT

Suppose you are participating in the experiment just described. You are seated around a table with the other three members and you may communicate with each other throughout the entire experiment (before, during and after). Also, before the start of the experiment a leader must be elected. The leader will take the lead by being the first to decide how much to contribute to or claim from the group project. His/her decision will be visible for all the group members. Then, the three remaining group members must decide simultaneously how much to contribute or claim.

COMMUNICATION PERIOD

At the beginning of the experiment you receive €20. Before you decide how much to claim from or contribute to the group project you are given the opportunity to discuss the issue with the other group members.

An example of what one of the group members says, is the following:

"If we all contribute the full amount to the group project, at the end of the day it will be better for all of us, but it will only work if we all do it."

What do you want to communicate to the other group members?

In one short sentence enter the main message that you want to get across to the other group members.

LEADER ELECTION 1

After the short communication period a leader must be elected. To decide who will become the leader of the group, all group members are asked to write a (short) motivating message directed to the other group members. When each group member has written his or her message, group members get to see the messages written by the other three group members. Then each group member has to vote for the message of another group member. The person who wrote the message with the most votes is elected leader.

Enter the message that you would send to the other group members.

Fill in one brief motivational sentence.

LEADER ELECTION 2

After you sent a message to the other group members, you can vote for one message from another group member. After all members have voted for a message, the group member with the winning message will continue as the leader in the experiment.

Vote for the message of your preference:

Group member that receives most votes will be elected leader in the experiment.

- Group member 1 - *"Contribute at least a little to the group project; we would all be better off with a mutual contribution to the group project."*
- Group member 2 - *"PUT EVERYTHING IN THE GROUP PROJECT, THEN WE ALL GET MORE MONEY!"*
- Groep member 3 - *"Do not be greedy. If we all put a bit more in, we will all get more."*

Suppose another group member has been elected leader (group member 1). This leader must now take the lead in the experiment by deciding first how much to contribute to or claim from the group project. His/her choice will be visible for all the group members. Then you and the other group members must simultaneously how much to claim or contribute.

THE LEADER OF YOUR GROUP HAS MADE HIS DECISION, AND DECIDED TO CONTRIBUTE €20 TO THE GROUP PROJECT.

You and the other group members now have to decide simultaneously how much to contribute to or claim from the group project. You can communicate with the other group members during the entire experiment.

How much do you want to contribute to the group project or claim from the group project?

I want to contribute or claim €... *(-20 to 0 are claims, 0 to 20 are contributions)*

Making your choice

To make your decision you can only choose one number. To claim an amount from the group project you enter a number between -20 and 0, to contribute an amount to the group project you enter a number between 0 and 20.

YOU ARE ELECTED LEADER OF THE GROUP.

Suppose you are elected as leader in the experiment. This means that you decide how much to contribute to or claim from the group project before the other group members make their decision. Your decision will be visible for the other three group members. The other group members have to make their decision simultaneously after you have made your decision.

All group members (including you) can communicate during the entire time of the experiment.

How much do you (as the leader) want to contribute to the group project or claim from the group project?

I want to contribute or claim €... *(-20 to 0 are claims, 0 to 20 are contributions)*

Making your choice

To make your decision you can only choose one number. To claim an amount from the group project you enter a number between -20 and 0, to contribute an amount to the group project you enter a number between 0 and 20.

PERSONAL QUESTIONS

For statistical analysis we need the following information. Of course, your data will remain anonymous.

Sex

- Male
- Female

Age

- under 25 years
- 25 to 35 years
- 35 to 45 years
- 45 to 55 years
- over 55 years

Marital status

- Single
- Married
- Living together
- Divorced/Widow/widower

Working situation

- Fulltime employment
- Part-time employment
- Entrepreneur / Freelance
- Retirement
- Student / Pupil

- Unemployed

Gross household income

Gross household income in €

- Up to 15.000
- 15.000 - 30.000
- 30.000 - 60.000
- 60.000 - 120.000
- Over 120.000

Level of education

Highest level of education (completed).

- No schooling / Primary education
- VMBO (MAVO, LBO)
- HAVO
- VWO
- MBO (MTS, MEAO)
- HBO (HTS, HEAO)
- WO

Field of study

In which area of study is your education?

- Economics & Management
- Law & Governance
- Media & Communication
- Language & Culture
- Exact & technology and ICT
- Education
- Social, behavior and society
- Security
- Health, sport and exercise
- Nature, environment and agriculture
- Arts, culture and design

Thank you for your participation! Your answers have been saved.

C. APPENDIX – SURVEY (DUTCH)

Welkom bij deze web-enquête over economische besluitvorming. Het invullen van deze enquête duurt slechts enkele minuten, resultaten zullen anoniem blijven.

INSTRUCTIES

Lees de volgende instructies aandachtig door! Na de instructies volgt een controlevraag die correct beantwoord moet worden om de enquête voort te zetten.

UITLEG EXPERIMENT

Samen met 3 andere willekeurig gekozen personen, vormt u een groep die deelneemt aan een economisch experiment.

Ieder groepslid krijgt €20, en kan daarmee het volgende doen:

- Een bedrag tussen €0 en €20 bijdragen aan het groepsproject.
- Een bedrag tussen €0 en €20 claimen van het groepsproject (en de €20 houden).

Alle 4 de groepsleden kiezen gelijktijdig hoeveel ze willen bijdragen of claimen van het groepsproject.

Bedragen die zijn geclaimd van het groepsproject worden afgetrokken van de inleg in het groepsproject (en overgemaakt aan de groepsleden die een bedrag geclaimd hebben). Het bedrag dat in het groepsproject overblijft wordt vermenigvuldigd met 2 (verdubbeld) en evenredig verdeeld onder alle 4 de groepsleden.

Ieder groepslid ontvangt dus uit het groepsproject = ((Bijdragen - Claims) × 2) ÷ 4

VOORBEELD

Een voorbeeld om het experiment en verdiensten duidelijk te maken.

Simpele voorbeelden: Wanneer alle groepsleden €20 bijdragen, ontvangt ieder groepslid €40. Draagt niemand iets bij, dan houdt ieder groepslid zijn €20. Hieronder een voorbeeld zoals de verdiensten in een experiment zouden kunnen zijn:

VOORBEELD VERDIENSTEN

Veronderstel dat:

- groepslid 1: €20 bijdraagt
- groepslid 2: €10 bijdraagt
- groepslid 3: niets (€0) bijdraagt
- groepslid 4: €10 claimt

>> Wat ontvangt ieder groepslid dan aan het einde van het experiment? <<

Totale bijdragen = 20 + 10 = €30

Totale claims = €10

In het groepsproject is dus €20 geïnvesteerd, namelijk totale bijdragen (€30) minus totale claims (€10). Deze €20 wordt verdubbeld (€40), en over de 4 groepsleden verdeeld (€40 ÷ 4) waardoor ieder groepslid €10 uit het groepsproject ontvangt.

Hoeveel heeft ieder groepslid aan het einde van het experiment:

- groepslid 1 ontvangt €10 | Heeft €0 gehouden + €10 uit groepsproject.
- groepslid 2 ontvangt €20 | Heeft €10 gehouden + €10 uit groepsproject.
- groepslid 3 ontvangt €30 | Heeft €20 gehouden + €10 uit groepsproject.
- groepslid 4 ontvangt €40 | Heeft €20 gehouden + €10 geclaimd + €10 uit groepsproject.

CONTROLEVRAAG

LET OP: Controlevragen moeten juist ingevuld worden om door te gaan met de enquête!

We vragen u de volgende vragen in te vullen, om er zeker van te zijn dat u het experiment begrepen heeft. Tip: U kunt uiteraard gebruik maken van een rekenmachine.

Geheugensteuntje:

- Begin van het experiment krijgt ieder groepslid €20.
- Bedrag dat in het groepsproject geïnvesteerd wordt (totale bijdragen – totale claims), wordt verdubbeld en daarna gelijk verdeeld over de 4 groepsleden.
- Wanneer u een claim maakt, legt u niets in. U mag de volledige €20 dan dus houden.

VERONDERSTEL DAT IK €5 CLAIM VAN HET GROEPSPROJECT, EN DE ANDERE 3 GROEPSLEDEN DRAGEN IEDER €15 BIJ AAN HET GROEPSPROJECT.

Dus: totale bijdragen zijn €45, totale claims zijn €5.

1a. Het bedrag dat ik houd is gelijk aan €_____ (20)

Tip: Hoeveel heb ik niet ingelegd?

1b. Het bedrag dat ik ontvang naar aanleiding van mijn claim is gelijk aan €_____ (5)

Tip: Hoeveel heb ik geclaimd?

1c. Het bedrag dat ik ontvang uit het groepsproject is gelijk aan €_____ (20)

Tip: ((Totale bijdragen minus Totale claims) × 2) ÷ 4

1d. Het totale bedrag dat ik ontvang in dit experiment is dus €_____ (45)

Tip: Som van drie bovenstaande antwoorden.

TREATMENT 1 – CLAIM GAME

EXPERIMENT

Stelt u zich voor dat u deelneemt aan het zojuist beschreven experiment. Communicatie met de andere groepsleden is niet mogelijk. U ontvangt een bedrag van €20. Welke keuze zou u maken?

Hoeveel wilt u bijdragen aan het groepsproject of claimen van het groepsproject?

Ik wil bijdragen of claimen €... (-20 tot 0 zijn claims, 0 tot 20 zijn bijdragen)

Keuze maken

Om uw keuze te maken kunt u slechts één getal invullen. Om een bedrag te claimen van het groepsproject vult u een getal tussen -20 en 0 in, om een bijdrage te leveren aan het groepsproject vult u een getal tussen de 0 en 20 in.

TREATMENT 2 - CLAIM GAME MET COMMUNICATIE

EXPERIMENT

Stelt u zich voor dat u deelneemt aan het zojuist beschreven experiment. U zit samen met de andere 3 groepsleden aan één tafel en u mag gedurende het hele experiment (zowel voor, tijdens als na) met elkaar communiceren.

COMMUNICATIEPERIODE

U ontvangt een bedrag van €20. Voordat u beslist hoeveel u van dit bedrag wilt bijdragen aan het groepsproject of wilt claimen van het groepsproject krijgt u eerst de mogelijkheid om het vraagstuk met de andere groepsleden te bespreken.

Een voorbeeld van wat één van de groepsleden zegt tijdens deze communicatieperiode is het volgende:

"Als we allemaal het volledige bedrag dat we gekregen hebben bijdragen aan het project, is het op het einde van de rit beter voor ons allemaal, maar dat werkt alleen als we allemaal meewerken."

Wat zou u willen communiceren richting de andere groepsleden?

Vul in één korte zin de belangrijkste boodschap in die u zou mee willen geven aan de leden van de groep.

Nadat de korte communicatieperiode verstreken is, moeten alle groepsleden tegelijkertijd beslissen hoeveel ze willen bijdragen aan of claimen van het groepsproject. Na het maken van deze beslissing is het weer mogelijk om te communiceren met de andere leden van de groep.

Hoeveel wilt u bijdragen aan het groepsproject of claimen van het groepsproject?

Ik wil bijdragen of claimen €... (-20 tot 0 zijn claims, 0 tot 20 zijn bijdragen)

Keuze maken

Om uw keuze te maken kunt u slechts één getal invullen. Om een bedrag te claimen van het groepsproject vult u een getal tussen -20 en 0 in, om een bijdrage te leveren aan het groepsproject vult u een getal tussen de 0 en 20 in.

TREATMENT 3 - CLAIM GAME MET LEADING-BY-EXAMPLE

EXPERIMENT

Stelt u zich voor dat u deelneemt aan het zojuist beschreven experiment. Voordat het experiment begint moet er een leider verkozen worden. Deze leider zal de leiding nemen in het experiment door als eerste te beslissen hoeveel hij of zij zal bijdragen aan of claimen van het groepsproject. Deze keuze zal voor alle groepsleden zichtbaar zijn. Vervolgens moeten de drie overige groepsleden gelijktijdig beslissen hoeveel zij willen bijdragen of claimen.

LEIDER VERKIEZING 1

Om te beslissen wie de leider van de groep wordt, worden alle groepsleden gevraagd een (kort) motiverend bericht te schrijven gericht aan de andere groepsleden. Wanneer iedere deelnemer een bericht heeft geschreven krijgen alle groepsleden de berichten van de 3 andere groepsleden te zien, en moet iedere deelnemer een stem uitbrengen op het bericht van een andere deelnemer. Degene die het bericht heeft geschreven met de meeste stemmen wordt verkozen als leider.

Vul hieronder het bericht in dat u zou sturen naar de andere groepsleden.

Vul één korte motiverende zin in.

LEIDER VERKIEZING 2

Nadat u een bericht heeft gestuurd naar de andere groepsleden, kunt u stemmen voor het bericht van een andere groepslid. Nadat de stemmen van alle groepsleden binnen zijn, zal het groepslid met het winnende bericht verder gaan als leider in het experiment.

Breng hieronder uw stem uit voor het bericht van uw voorkeur:

Groepslid dat de meeste stemmen krijgt wordt de leider in het experiment.

- Groepslid 1 - *"Draag op zijn minst een beetje bij aan het groepsproject; we zouden allemaal beter af zijn met een wederzijdse contributie aan het groepsproject"*
- Groepslid 2 - *"STOP ALLES IN HET GROEPSPROJECT, DAN KRIJGEN WE ALLEMAAL MEER GELD!"*
- Groepslid 3 - *"Niet hebberig zijn. Als we er allemaal wat meer in stoppen, krijgen we ook meer."*

Stel dat een ander groepslid is verkozen als leider (groepslid 1). Deze leider moet nu de leiding nemen in het experiment door als eerste te beslissen hoeveel hij of zij zal bijdragen aan of claimen van het groepsproject. Deze keuze is voor alle groepsleden zichtbaar. Vervolgens moeten u en de overige groepsleden gelijktijdig beslissen hoeveel bij te dragen of te claimen.

DE LEIDER VAN JOUW GROEP HEEFT ZIJN BESLISSING GEMAAKT, EN HEEFT BESLOTEN €20 BIJ TE DRAGEN AAN HET GROEPSPROJECT.

U en de andere groepsleden moeten nu gelijktijdig beslissen hoeveel bij te dragen aan of te claimen van het groepsproject.

Hoeveel wilt u bijdragen aan het groepsproject of claimen van het groepsproject?

Ik wil bijdragen of claimen €... (-20 tot 0 zijn claims, 0 tot 20 zijn bijdragen)

Keuze maken

Om uw keuze te maken kunt u slechts één getal invullen. Om een bedrag te claimen van het groepsproject vult u een getal tussen -20 en 0 in, om een bijdrage te leveren aan het groepsproject vult u een getal tussen de 0 en 20 in.

U BENT VERKOZEN TOT LEIDER VAN DE GROEP.

Stel dat u nu verkozen bent als leider in het experiment. Dit betekent dat u beslist hoeveel u bijdraagt aan of claimt van het groepsproject, voordat de andere groepsleden hun beslissing maken. De andere groepsleden zien uw beslissing en vervolgens moeten de andere 3 groepsleden gelijktijdig beslissen hoeveel zij willen bijdragen of claimen.

Hoeveel wilt u (als leider) bijdragen aan het groepsproject of claimen van het groepsproject?

Ik wil bijdragen of claimen €... (-20 tot 0 zijn claims, 0 tot 20 zijn bijdragen)

Keuze maken

Om uw keuze te maken kunt u slechts één getal invullen. Om een bedrag te claimen van het groepsproject vult u een getal tussen -20 en 0 in, om een bijdrage te leveren aan het groepsproject vult u een getal tussen de 0 en 20 in.

TREATMENT 4 - CLAIM GAME MET COMMUNICATIE EN LEADING-BY-EXAMPLE

EXPERIMENT

Stelt u zich voor dat u deelneemt aan het zojuist beschreven experiment. U zit samen met de andere 3 groepsleden aan één tafel en u mag gedurende het hele experiment (zowel voor, tijdens als na) met elkaar communiceren. Tevens moet er een leider verkozen worden voordat het experiment begint. Deze leider zal de leiding nemen in het experiment door als eerste te beslissen hoeveel hij of zij zal bijdragen aan of claimen van het groepsproject. Deze keuze zal voor alle groepsleden zichtbaar zijn. Vervolgens moeten de drie overige groepsleden gelijktijdig beslissen hoeveel zij willen bijdragen of claimen.

COMMUNICATIEPERIODE

Het experiment begint met een korte communicatieperiode, waarin groepsleden de mogelijkheid hebben om het vraagstukken met de andere groepsleden te bespreken.

Een voorbeeld van wat één van de groepsleden zegt tijdens deze communicatieperiode is het volgende:

“Als we allemaal het volledige bedrag dat we gekregen hebben bijdragen aan het project, is het op het einde van de rit beter voor ons allemaal, maar dat werkt alleen als we allemaal meewerken.”

Wat zou u willen communiceren richting de andere groepsleden?

Vul in één korte zin de belangrijkste boodschap in die u zou mee willen geven aan de leden van de groep.

LEIDER VERKIEZING 1

Na de korte communicatieperiode moet er een leider verkozen worden. Daarom worden alle groepsleden gevraagd een (kort) motiverend bericht te schrijven gericht aan de andere groepsleden. Wanneer iedere deelnemer een bericht heeft geschreven krijgen alle groepsleden de berichten van de 3 andere groepsleden te zien, en moet iedere deelnemer een stem uitbrengen op het bericht van een andere deelnemer. Degene die het bericht heeft geschreven met de meeste stemmen wordt verkozen als leider.

Vul hieronder het bericht in dat u zou sturen naar de andere groepsleden.

Vul één korte motiverende zin in.

LEIDER VERKIEZING 2

Nadat u een bericht heeft gestuurd naar de andere groepsleden, kunt u stemmen voor het bericht van een andere groepslid. Nadat de stemmen van alle groepsleden binnen zijn, zal het groepslid met het winnende bericht verder gaan als leider in het experiment.

Breng hieronder uw stem uit voor het bericht van uw voorkeur:

Groepslid dat de meeste stemmen krijgt wordt de leider in het experiment.

- Groepslid 1 - *"Draag op zijn minst een beetje bij aan het groepsproject; we zouden allemaal beter af zijn met een wederzijdse contributie aan het groepsproject"*
- Groepslid 2 - *"STOP ALLES IN HET GROEPSPROJECT, DAN KRIJGEN WE ALLEMAAL MEER GELD!"*
- Groepslid 3 - *"Niet hebberig zijn. Als we er allemaal wat meer in stoppen, krijgen we ook meer."*

Stel dat een ander groepslid is verkozen als leider (groepslid 1). Deze leider moet nu de leiding nemen in het experiment door als eerste te beslissen hoeveel hij of zij zal bijdragen aan of claimen van het groepsproject. Deze keuze is voor alle groepsleden zichtbaar. Vervolgens moeten u en de overige groepsleden gelijktijdig beslissen hoeveel bij te dragen of te claimen.

DE LEIDER VAN JOUW GROEP HEEFT ZIJN BESLISSING GEMAAKT, EN HEEFT BESLOTEN €20 BIJ TE DRAGEN AAN HET GROEPSPROJECT.

U en de andere groepsleden moeten nu gelijktijdig beslissen hoeveel bij te dragen aan of te claimen van het groepsproject. Het is gedurende de gehele tijd van het experiment mogelijk om met elkaar te communiceren.

Hoeveel wilt u bijdragen aan het groepsproject of claimen van het groepsproject?

Ik wil bijdragen of claimen €... (-20 tot 0 zijn claims, 0 tot 20 zijn bijdragen)

Keuze maken

Om uw keuze te maken kunt u slechts één getal invullen. Om een bedrag te claimen van het groepsproject vult u een getal tussen -20 en 0 in, om een bijdrage te leveren aan het groepsproject vult u een getal tussen de 0 en 20 in.

U BENT VERKOZEN TOT LEIDER VAN DE GROEP.

Stel dat u nu verkozen bent als leider in het experiment. Dit betekent dat u beslist hoeveel u bijdraagt aan of claimt van het groepsproject, voordat de andere groepsleden hun beslissing maken. De andere groepsleden zien uw beslissing en vervolgens moeten de andere 3 groepsleden gelijktijdig beslissen hoeveel zij willen bijdragen of claimen.

Alle groepsleden (u dus ook) kunnen gedurende de hele tijd van het experiment met elkaar communiceren.

Hoeveel wilt u (als leider) bijdragen aan het groepsproject of claimen van het groepsproject?

Ik wil bijdragen of claimen €... (-20 tot 0 zijn claims, 0 tot 20 zijn bijdragen)

Keuze maken

Om uw keuze te maken kunt u slechts één getal invullen. Om een bedrag te claimen van het groepsproject vult u een getal tussen -20 en 0 in, om een bijdrage te leveren aan het groepsproject vult u een getal tussen de 0 en 20 in.

PERSOONLIJKE VRAGEN

Voor statistische verwerking hebben we de volgende gegevens nodig. Uiteraard blijven uw gegevens anoniem.

Geslacht

- Man
- Vrouw

Leeftijd

- jonger dan 25 jaar
- 25 tot 35 jaar
- 35 tot 45 jaar
- 45 tot 55 jaar
- ouder dan 55 jaar

Burgerlijke staat

- Alleenstaand
- Getrouwd
- Samenwonend
- Gescheiden/Weduwe/weduwnaar

Werksituatie

- Loondienst fulltime

- Loondienst parttime
- Ondernemer / ZZP / Freelance
- Pensioen
- Student / Scholier
- Uitkering / Niet werkzaam

Bruto-gezinsinkomen

Bruto-gezinsinkomen in €

- Tot 15.000
- 15.000 - 30.000
- 30.000 - 60.000
- 60.000 - 120.000
- Meer dan 120.000

Opleidingsniveau

Hoogst genoten opleiding (afgerond).

- Geen / lager- of basisonderwijs
- VMBO (MAVO, LBO)
- HAVO
- VWO
- MBO (MTS, MEAO)
- HBO (HTS, HEAO)
- WO

Studiegebied

In welke studiegebied valt uw opleiding?

- Economie & management
- Recht & bestuur
- Media & communicatie
- Taal & cultuur
- Exact & techniek en ICT
- Onderwijs & ontwikkeling
- Sociaal, gedrag en maatschappij
- Veiligheid
- Gezondheid, sport en bewegen
- Natuur, milieu en landbouw
- Kunst, cultuur en vormgeving

Bedankt voor uw deelname! Uw antwoorden zijn opgeslagen.