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Indirect Social Sanctions from Monetarily Unaffected Strangers in a Public Good Game

Abstract:
Several economists have maintained that social sanctions can enforce cooperation in public good situations. This experimental study investigates whether indirect social sanctions from monetarily unaffected observers can increase contributions to a public good. The experiment has two treatment effects. First, each participant's identity and contribution to the public good is revealed to the monetarily unaffected observers. Second, information affecting participants' beliefs about the degree to which the observers are contributors is introduced. The data suggests that indirect social sanctions from monetarily unaffected observers can increase voluntary contributions to public goods, provided that the subjects have reason to believe that the observers themselves are strong contributors.

Keywords: conditional, cooperation, public good, social approval, social norms

JEL classification: A13, C91, H41, Z13

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1. Introduction

Several economists have maintained that social sanctions can enforce cooperation in public good situations (Arrow 1971, Ullmann-Margalit 1977, Akerlof 1980, North 1981, Andreoni 1990 and Holländer 1990). These sanctions take the form of approval or disapproval. Typically, social approval and disapproval need not be verbal or direct. Simply the suspicion that someone dislikes one's behavior may constitute a significant social cost for somebody disobeying a social norm. Such informal and intangible social approval and disapproval will be referred to as *indirect* social sanctions.

An experimental study by Rege and Telle (2003) suggests that indirect social sanctions can increase private contributions to a public good[1]. They compare a sanction treatment, in which each participant's identity and contribution to the public good are common knowledge, to a no-sanction treatment, in which there is full anonymity with regard to the contribution of each participant. In the former treatment subjects contributed in average about 68% of their initial endowment, whereas in the latter treatment subjects contributed in average about 34%. The authors argue that subjects contribute more in the sanction treatment due to an expected benefit in the form of indirect social approval from the other participants, which is not present in the no-sanction treatment.

In the present experiment we introduce indirect social sanctioning, not from participants in the public good game as in Rege and Telle (2003), but from monetarily unaffected observers who have previously participated in a public good experiment. In real life a person's contribution to a public good may have a very low, if any, impact on the welfare of the individuals actually able to approve or disapprove of this person's behavior. For example, the fact that one single person is contributing to the public good of a cleaner environment by recycling has a very limited effect on the welfare of other people. Nevertheless, this person may feel social approval from people observing him, - especially if he knows that the people observing him recycle themselves. Thus, the main objective of the present paper is to study whether these types of social sanctions can affect behavior. We experimentally investigate whether private contributions to a public good are affected by indirect social sanctions by monetarily unaffected observers. Moreover, we investigate whether the impact of social sanctions from such observers is conditional on whether there is reason to believe that the observers are contributors.

The experiment has two treatment effects. The first treatment effect reveals each person's identity and contribution to the public good to the monetarily unaffected observers. In this treatment all subjects

[1] See Gächter and Fehr (1999), Fehr and Gächter (2000), Masclet et al. (2003), and Dufwenberg and Muren (2003) for experimental investigations of other types of social sanctions.

first decide anonymously how much to contribute to the public good. Thereafter, each subject has to stand up and count the money he has contributed in front of the observers. The observers were hired among subjects that had previously participated in a similar public good game reported in Rege and Telle (2003). The second treatment effect introduces a high and a low "population reference point" by informing the participants of the average contribution level in the public good game in which the observers previously participated. In order to establish the high and the low "population reference point" observers were hired from sessions with very high and very low average contributions respectively.

Interestingly, the data shows that revealing each person's identity and contribution to the monetarily unaffected observers increases voluntary contributions under the high population reference point. However, under the low population reference point, revealing each person's identity and contribution to the observers has no significant effect on voluntary contributions. This suggests that indirect social sanctions from unaffected observers can increase voluntary contributions to public goods, provided that the subjects have reason to believe that the observers themselves are strong contributors.

The experiment presented in this paper is related to experiments by Carpenter and Matthews (2002) and Fehr and Fischbacher (2003), who investigate costly monetary sanctions from observers whose pay-off is independent of the public good. Of special relevance to the present public good experiment is Carpenter and Matthews (2002). The study indicates that costly monetary sanctions by monetarily unaffected observers increase contributions to a public good. In real life, however, monetary sanctions may often be unavailable to the subjects actually able to inflict sanctions. The type of indirect social sanctions investigated in the present experiment is so to say available in every inter-human relation. Simply the suspicion that an observer dislikes one's behavior may constitute a significant social cost for somebody not contributing to a public good.

2. Experimental Design

The experiment is embedded in the following public good game. Each of the 10 participants have an initial endowment of 150 kroner (one Norwegian krone is about 0.15 US$), and the total of 10×150 kroner is placed in a box. Each subject *i* has to decide how much money $g_i \in [0,150]$ to take from this box. Subject *i*'s monetary payoff is given by

$$\pi_i = g_i + 2\frac{1}{10}\sum_j \left(150 - g_j\right),\ j=1,..,..,10$$

The participants receive no payments except from the payments they earn in the one period public good game[2]. This payoff structure does not differ from the ones normally used in experimental research on public goods (Ledyard 1995).

The following main procedure is held in all treatments: One person at a time is asked to come up to the box. He then receives two envelopes, a "group envelope" and a "personal envelope". In addition, he receives 150 kroner from the box. He has to bring the money and the envelopes behind a screen where nobody, including the experimenters, can see him. Behind this screen he has to divide the 150 kroner between the two envelopes, and seal them. To secure absolute discretion, he then has to put both envelopes into one large envelope, which he brings back to his seat.

When all the participants have been through the above procedure, one person at a time steps forward to the box to return the group envelope. The sum of the money in the group envelopes is then calculated. This sum is multiplied by two, and thereafter divided equally between all ten participants. In addition to this money, each participant receives the money he puts in his personal envelope. He has to keep the personal envelope sealed until he has left the lab.

In each treatment there are three monetarily unaffected observers who sit silently in the front of the lab facing the subjects. We inform the subjects that the three people facing them participated in a previous session of the same type of experiment. In the instructions we write: “The persons sitting in front of you will observe this experiment. These observers have previously participated as experimental participants in a similar experiment. (..) In the experiment in which the observers participated as experimental participants, every participant took on average X kroner from the box.” X is a treatment variable. We will refer to (150-X) as the *population reference point*. To establish a high and low population reference point, observers were hired from the approval/non-associative treatment and the no-approval/non-associative treatment in Rege and Telle (2003). The average contributions in the sessions from which the observers where hired yielded X=48 kroner in the high population reference point treatment, and X=98 kroner in the low population reference point treatment.

In addition to the population reference point, a second treatment effect is the introduction of indirect social sanctions. In a *no-sanction* treatment one person at a time returns his *sealed* group envelope to the box. An experimenter mixes the ten group envelopes. Then he randomly draws one envelope at a time from the box, counts the amount of money in the envelope, and writes the sum on the blackboard.

[2] On average each student earned 215 kroner, which covers opportunity costs for the one-hour session.

[3] X = 48 kroner in the high population reference point treatment, and X = 98 kroner in the low population reference point treatment.

This is done in sight of all of the participants and the observers. This procedure ensures full anonymity with regard to the contribution of each participant[4], thus making social sanctioning impossible.

In a *sanction* treatment one person at a time comes up to the box with his sealed group envelope. In front of the three monetarily unaffected observers, but hidden from the other group members and the experimenters, he opens his envelope, counts the amount of money in the envelope, and then puts the money into the box. In order to make it easy for the observers to follow when he counts the money, he has to mark the number of every coin/note on a special form. This procedure ensures revelation of every participant's choice and identity to the observers, thus making indirect social sanctioning possible.

For each treatment the instructions (see appendix) make all the relevant information given above common knowledge for all participants. The instructions are read aloud. Then, the participants get time to study the instructions individually. Finally, each participant has to answer questions that test the subjects' understanding of the instructions. Those subjects revealing a lack of understanding get special tutoring before the experiment starts. No oral communication between participants is allowed at any stage of the experiment.

Twelve experimental sessions were conducted in March and April 2003. Ten students participated in each session and three sessions were conducted for each treatment. No student participated in more than one session. Altogether 120 students took part in the experiment, 30 in each treatment. Each session lasted approximately one hour. The students were recruited from the Blindern campus of the University of Oslo[5]. As no oral communication was allowed, participants and observers remained unfamiliar with eachother throughout the experiment[6]. When a session was over, the participants had to leave the experimental lab individually. These precautions were taken to reduce the possibility that any sanctioning could be expected after the experiment.

To summarize, the experiment has two treatment effects: Introduction of social sanctions and the high and low population reference point. This yields four different treatments. Figure 1 shows the abbreviation we will use for each treatment.

[4] Of course, this would not be strictly true if, for example, all subjects contributed nothing.

[5] About 25 000 students are registered at the Blindern campus of the University of Oslo.

[6] In a questionnaire filled out after the experiment, none of the participant reported to know the name of any of the observers, and only three participants had seen the face of any of the observers before.

Figure 1: The four treatments

		Social sanctions available	
		Yes	No
Population reference point	High	**HS**	**H**
	Low	**LS**	**L**

3. Predictions

Previous experiments have shown that subjects will contribute from 30 to 70 percent in one-shot public good games or in the early rounds of finitely repeated public good games (see survey by Ledyard 1995). One explanation for these contributions may be that subjects do not understand the game. It is well known that people learn not to be a sucker during the first periods in a repeated public good experiment (Andreoni 1995, Ledyard 1995). A second explanation is that people contribute due to internalized norms. This has been shown in a theoretical analysis by Andreoni (1990)[7], and in experimental analyses by Andreoni (1995) and Palfrey and Prisbrey (1997).

In the experiment presented in this article, misunderstanding of the game and internalized norms are motives to contribute which are present in all four treatments . The following two subsections will discuss treatment dependent motives to contribute: Indirect social sanctions and population reference point.

3.1 Indirect Social Sanctions

Several recent experimental studies suggest that non-monetary social sanctions can affect behavior in public good games (Gachter and Fehr 1999, Masclet et al. 2003, Rege and Telle 2003). These experiments are all in line with well-known theories of social exchange (see Homans 1961 and Blau 1964), which argue that the possibility of exchanging pecuniary rewards for social approval can enforce cooperation in many social dilemmas. Such exchanges take place because people are anxious to receive social approval from others. Moreover, a person receives social approval from another person if his actions imply a pecuniary reward to that person.

In the present experiment, a participant cannot give the observers any pecuniary reward. The observers are monetarily unaffected by the participants' action. Thus, it does not follow from the theories of social exchange that social sanctions by the observers can affect behavior. However, recent

[7] Andreoni (1990) refers to a positive internal sanction as a "warm glow".

experiments by Fehr and Fischbacher (2003) and Carpenter and Matthews (2002) show that monetarily unaffected observers are willing to impose costly sanctions onto non-cooperators, and that the participants anticipate such sanctions. In the present experiment we hypothesize that similar propensities to punish non-cooperators can take the form of indirect social disapproval . A participant who contributes in a sanction treatment may therefore expect a benefit in the form of increased social approval if she believes that the observers approve of contributing behavior. Such a potential benefit does, however, not exist in a no-sanction treatment in which there is full anonymity with regard to the contribution of each participant. Thus,

Prediction 1.1 Introduction of indirect social sanctions from monetarily unaffected observers increases contributions if the subjects believe that the observers approve of such a behavior.

In the next subsection we will describe how information about the population reference point can manipulate subjects' beliefs about the behavior of which the observers approve.

3.2 Population Reference Point

It is well recognized in sociological theory that social norms are conditional, meaning that a norm is enforced by social sanction from those adhering to the norm (see e.g. Coleman 1990). A person adhering to a social norm will feel approval from other people adhering to the same norm. He will, however, not feel approval from people disobeying this norm. From these people he may even feel disapproval.

A participant in the present experiment does not know to which degree the observers adhere to a norm of cooperation. The population reference point does, however, give the participants some information about the degree to which the observers are cooperators. On this background we hypothesize that participants believe that observers in a treatment with the high population reference point to a larger degree are cooperators than observers in a treatment with the low population reference point. Then, sociological theories of conditional social norms imply the following hypothesis:

Prediction 1.2 Subjects believe that observers in a treatment with the high population reference point will approve of contributing behavior, and that observers in a treatment with the low population reference point will not approve (and maybe even disapprove) of contributing behavior.

Predictions 1.1 and 1.2 suggest that a person who contributes in the HS treatment (with social sanctions and the high population reference point) will receive a benefit in the form of increased social approval. Such a benefit does not, however, exist in any of the other three treatments in which there is

either full anonymity with regard to the contribution of each participant, and/or subjects do not believe that observers approve of contributing behavior. Thus,

Hypothesis 1 Introduction of indirect social sanctions from monetarily unaffected observers increases contributions under the high population reference point, whereas it does not increase contributions under the low population reference point.

In addition to manipulating subjects' beliefs about the behavior of which the observers approve, there are (at least) three other ways in which the population reference point can affect behavior. Firstly, several experiments show that many people are conditional cooperators, meaning that they are willing to cooperate if they believe that others are also cooperating (e.g. Croson 2002, Fischbacher et al. 2001, and Falk and Fischbacher 2002). This suggests that the population reference point can affect behavior by influencing conditional cooperators' beliefs about the contribution level of the other participants. Secondly, the population reference point can affect behavior by influencing the enforcement of internalized norms. Internalized norms are enforced by internal sanctions such as feelings of self-respect or guilt (Lindbeck 1997). A high population reference point can increase the amount of guilt subjects feel when contributing low amounts.

Finally, the population reference point can affect behavior by manipulating social learning. It may be that subjects are uncertain about what to do when deciding how much to contribute. A subject in such a situation may simply adopt the behavior of the observers. This phenomenon is known as herding behavior, and has been elegantly captured in several economic models (Banarjee 1992 and Bikhchandani et al. 1992), and detected in several experimental studies (see survey in Anderson and Holt 1997).

If the population reference point affects conditional cooperators' beliefs about the contribution level of the other participants, the enforcement of internalized norms, or social learning, then introduction of the high population reference point should increase contributions. Thus,

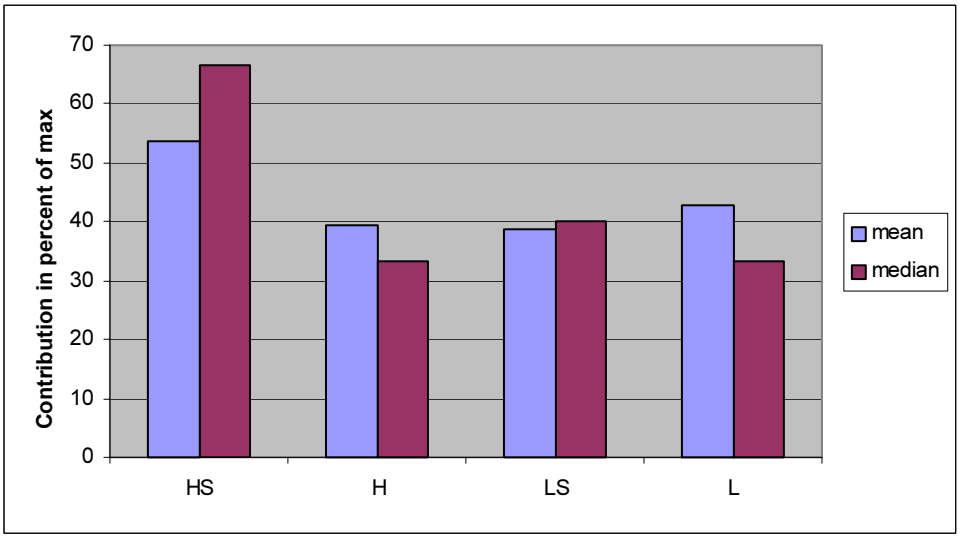
Hypothesis 2 Introduction of the high population reference point increases contributions both under the sanction treatment and the no-sanction treatment.

Note that also Hypothesis 1 implies that introduction of the high population reference point increases contributions under the sanction treatment. However, the hypothesis does not imply any effect of the high population reference point under the no-sanction treatment.

4. Results

In the following, a person's contribution is denoted in percent of his maximum possible contribution. Figure 2 presents the mean and median contributions in all four treatments. As expected, even in the absence of social sanctions and when the population reference point is low, subjects contribute considerable amounts. When the population reference point is low, subjects contribute on average 39 and 43 percent in the sanction and the no-sanction treatment respectively. In the no-sanction treatment with high population reference point subjects contribute on average 40 percent. Contributions are highest in the sanction treatment with high population reference point, in which subjects contribute on average 54 percent.

Figure 2: Mean and median contributions in the four different treatments



The data is consistent with Hypothesis 1: Introduction of social sanctions increases contributions under the high population reference point, whereas it does not increase contributions under the low population reference point. The hypothesis that contributions are not higher in the HS-treatment than in the H-treatment may be rejected (Wilcoxon-Mann-Whitney, one-sided exact test, $p=0.084$), whereas the hypothesis that contributions are not higher in the LS-treatment than in the L-treatment is not rejected (same test, $p=0.70$). Moreover, the hypothesis that the contributions in the HS-treatment are not higher than the contributions in the H-, L- and LS-treatment may be rejected (same test, $p=0.053$). These results suggest that indirect social sanctions from unaffected observers can increase voluntary contributions to public goods, given that the subjects have reason to believe that the observers themselves are strong contributors.

The data does not support Hypothesis 2: Introduction of the high population reference point increases contributions both under the sanction treatment and the no-sanction treatment. Introduction of the high population reference point increases contributions under the sanction treatment: The contributions are higher in the HS-treatment (54 percent) than in the LS-treatment (39 percent). However, introduction of the high population reference point does *not* raise contributions under the no-sanction treatment: Contributions are lower in the H-treatment (40 percent) than in the L-treatment (43 percent). Hence, a hypothesis that contributions are *not* higher in the H- than in the L-treatment is not rejected (same test, p=0.68). Moreover, the hypothesis that contributions are *not* higher in the H- and HS-treatment than in the L- and LS-treatment is not rejected (same test, p=0.22). These results suggest that the population reference point does not affect conditional cooperators' beliefs about the contribution level of the other participants, the enforcement of internalized norms, or social learning.

5. Concluding discussion

Several economists have maintained that social sanctions can enforce cooperation in public good situations (Arrow 1971, Ullmann-Margalit 1977, North 1981, Andreoni 1990 and Holländer 1990). In real life, a person's contribution to a public good may have a very low, if any, impact on the welfare of the individuals actually able to approve or disapprove of this person's behavior. The main objective of this paper is to study whether private contributions to a public good are affected by indirect social sanctions by observers whose payoff does not depend on the public good. The data indicates that indirect social sanctions from monetarily unaffected observers can increase voluntary contributions to public goods, provided that the subjects have reason to believe that the observers themselves are strong contributors.

The experimental results in this paper may be taken to suggest that social norms are conditional, meaning that the social approval a person receives from adhering to a norm is felt more strongly, the larger the degree of other people's adherence to this norm. Several papers analyzing economic impacts of social norms assume that social norms are conditional, and show how this can give rise to a group interaction effect : One person's decision to adhere to a social norm affects his neighbors' decision to adhere to the same norm. This group interaction effect is important because it amplifies the effect of policy changes or economic shocks on aggregate norm adherence. A large and growing literature suggests an important role for group interaction effects in many behavioral outcomes including criminal activity, drug use, divorce, out-of-wedlock fertility and educational attainment. In addition to be consistent with a story of conditional social norms, these group interaction effects are, however, also consistent with several other behavioral stories, as for example herding behavior. By using the experimental lab to control for other potential explanations for group interaction effects, thus isolating

the effect of conditional social norms, this paper provides some preliminary support for the conditional nature of social norms.

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Instructions (translated from Norwegian)

The experiment is to proceed in silence. Talking is prohibited.

In this experiment there are 10 experimental participants. The persons sitting in front of you will observe this experiment. These observers have previously participated as experimental participants in a similar experiment. In the present experiment, these observers shall sit in silence and watch what happens.

You and the 9 other experimental participants in the room have 1500 kroner in this box.

You can either take money out of the box or you can leave the money in the box. If you decide to take money from the box, you may decide for yourself how much money to take, but the amount may not exceed 150 kroner. After all participants have had the opportunity to take or not to take money out of the box, the amount of money remaining in the box will be counted. This amount will be doubled and then divided between *all* ten participants.

This means that your total earnings from this experiment are dependent upon the choices that you and the other participants make, under the following rule:

Your total earnings: = The money you take from the box
+ One tenth of twice the sum of money remaining in the box

Note that regardless of what the other participants choose to do, you will receive the largest amount of money if you take all 150 kroner out of the box. However, as a group, all of the participants will receive the largest amount of money if no one takes any money out of the box.

In the experiment where the observers participated as experimental participants, every participant took on average X[*] kroner from the box.

[No-sanction treatment: No one will know whether you take money out of the box or not.]

[Sanction treatment: All the observers will know how much money you take from the box.]

One person at a time will be asked to come forward. After coming forward you will receive two envelopes, one marked "back in the box" and one marked "mine". You will also receive 150 kroner from the box (2 fifty kroner notes, 1 20 kroner coin, 2 ten kroner coins, 1 five kroner coin and 5 one kroner coins). You will bring both the money and the envelopes with you behind a screen. While no one can see, you will divide the money between the two envelopes as you see fit: If you don't want to take any money out of the box, put all 150 kroner in the envelope marked "back in the box" and put nothing into the envelope marked "mine." If you want to take all 150 kroner out of the box, put all 150 kroner into the envelope marked "mine" and put nothing into the envelope marked "back in the box." If you want to take some money then put some money into the envelope marked "mine" and put the rest into the envelope marked "back in the box."

After you have done this, seal both envelopes and put them both into a big, brown envelope which you will then take with you back to your seat. You may take the envelope marked "mine" home with you when the experiment is finished, but you will put the contents of the envelope marked "back in the box" back into the box at a later point in the experiment.

Once everyone has divided the money between the two envelopes, one person at a time will be asked to come forward with the envelope marked "back in the box".
[No-sanction treatment: When you come forward you will put the sealed envelope into the box. You will then return to your seat.]

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[*]X=48 kroner in the high population reference point treatment, and X=98 kroner in the low population reference point treatment.

[Sanction treatment: When you come forward, you will walk behind this screen where only the observers can see what you do. Here you open the envelope and count the money in front of the observers. To make it easy for the observers to follow when you count the money, you mark the number of every coin/note on this form. You will then put the money back into the envelope, seal it and return it to the box. Before you return to your seat, you wrap the form and throw it into the bin.]

Once everyone has placed this envelope back into the box, the envelopes will be mixed. We will then randomly draw one envelope at a time, count the money, write the amount on the blackboard, and put the money back into the box.

[No-sanction treatment: Thus no one will know whether or not you take money from the box.]

[Sanction treatment: Thus only the observers will know whether you take money from the box or not]

The amount of money now present in the box is doubled, and this new sum is divided equally between *all* ten experimental participants.

At the end of the experiment each person will leave the lab separately.

Examples:

- If no one takes anything from the box, 1500 kroner will remain in it. Double this sum (=3000) is then divided equally between all participants such that each participant will receive 300 kroner.
- If everyone takes 150 kroner from the box, no money will remain in it, thus leaving no money to be divided equally. Each participant will then only receive the 150 kroner that he took.
- If none of the other participants take anything, but you take 150 kroner, then (1500-150=) 1350 kroner will remain in the box. Double this sum (=2700) is then divided equally between all participants (=270 for each). You will then receive the 150 kroner you have taken and the additional share from the box; making a total of (150 + 270=) 420 kroner. Each of the other participants will then receive 270 kroner.
- If all of the other participants take 150 kroner, but you take nothing, then 150 kroner will remain in the box (the money you did not take). Double this sum (=300) is then divided equally between all participants. You will then receive only the share from the box, i.e. 30 kroner. Each of the others will receive (150 + 30=) 180 kroner.
- In the experiment where the observers participated as experimental participants, every participant took on average X kroner from the box, hence (1500 –X=) [1500-X] kroner remained in it. Double this sum (=[2*(1500-X)]), was divided equally between all experimental participants. An experimetnal participant who took X kroner received the X kroner he took and in addition his share from the box; altogether (X + [2*(1500-X)/10]=) [X + 2*(1500-X)/10] kroner.
- Suppose half of the experimental participants (5 persons) take 150 kroner, 4 take nothing and you:

1. take nothing.
- The box then contains 750 kroner (1500 - 5x150).
- Double this sum (=1500) is then divided equally (150 for each).
- **You receive 150 kroner**.
- The 4 who did not take anything receive 150 kroner each (the same as you).
- The 5 who took 150 kroner receive 300 kroner each (150 + 150).
- **In total all experimental participants receive 2250 kroner** (150 + 4x150 + 5x300).

2. take as much as possible (150 kroner).
- The box then contains 600 kroner (1500 - 6x150).
- Double this sum (=1200) is then divided equally (120 for each).
- **You receive 270 kroner** (150 +120).
- The 4 who did not take anything receive 120 kroner each.
- The 5 who took 150 kroner from the box receive 270 kroner (the same as you).
- **In total all experimental participants receive 2100 kroner** (270 + 4x120 + 5x270).

Note the following:

- In total, the group receives more money the more participants who choose not to take money from the box. In the example above we see that the total payment to all of the participants declines from 2250 to 2100 when you take 150 kroner from the box as compared to when you take nothing.
- Regardless of what the others choose to do, the more you take from the box the greater your payment. In the example above we see that your payment increases from 150 to 270 when you take 150 kroner as compared to when you take nothing.

The Data

		Social sanctions	
		Yes	No
Population reference point	High	0	0
		0	0
		0	0
		0	0
		0	0
		0	0
		0	0
		12	0
		40	7
		50	20
		50	30
		50	36
		60	50
		90	50
		100	50
		100	50
		100	50
		100	50
		100	50
		105	65
		108	80
		150	90
		150	100
		150	100
		150	150
		150	150
		150	150
		150	150
		150	150
		150	150
	Low	0	0
		0	0
		0	0
		0	0
		0	0
		0	5
		0	10
		0	10
		20	25
		25	30
		29	30
		30	50
		36	50
		40	50
		50	50
		50	50
		50	75
		50	75
		50	75
		70	75
		100	80
		100	90
		100	90
		100	130
		100	130
		150	150
		150	150
		150	150
		150	150
		150	150

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