COHESION IN THE PUBLIC GOODS GAME

THE EFFECT OF SANCTIONING AND THE SANCTIONING SYSTEM ON COHESION

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Common part

A. M. Jochemsen 4265831
H. Kolner 4301331

Individual part

H. Kolner 4301331

Supervisor Vincent Buskens
Second corrector Joyce Delnoij

ABSTRACT: The aim of this study is to find out what the effects of sanctioning and the sanctioning system in the Public Goods Game are on a player´s feeling of cohesion. By means of experimental data, we compare the effects of receiving punishments and rewards, and we examine whether there is a difference between playing under the condition in which a sanction is implemented by an individual, the majority, or the unanimous decision of the group. A player in the latter two conditions might distribute a sanction that will not be implemented. Our results show that the more punishments a player receives, the stronger this player's feeling of cohesion, while receiving sanctions in general has no effect. Furthermore, the feeling of cohesion is not influenced by playing in a certain decision rule condition, nor by the number of non-implemented sanctions. Lastly, we find that a player's final profit has a positive effect on the feeling of cohesion.

Utrecht University

1. INTRODUCTION

Social cohesion has always been an interesting and relevant discussion topic. Durkheim was one of the first to study social cohesion (van Heerikhuizen, 2008), and it still remains an everlasting theme in the field of sociology. This is not very surprising; social cohesion is considered to be an important feature of a healthy society and is therefore a timeless topic. Although many different definitions are used over time, the most general definition is a feeling of interpersonal connectedness within a group (e.g. Berkman & Kawachi, 2000; Forrest & Kearns, 2001; Putnam, 1995). We consider this feeling of connectedness as having similar norms and values and/or having affinity towards other people.

There are several studies that showed positive effects of cohesion. For example, studies have shown that social cohesion in a neighbourhood is associated with less depression and anxiety amongst its residents (Aneshensel, 1996; Echeverría et al., 2008). When looking at a larger scale, cohesion is believed and often shown to be a large contributing factor to civic engagement (Berkman & Kawachi, 2000; Keefer & Knack, 1997; Putnam, 1995). On top of this, a cohesive society is able to remain stable, even during rapid and intense social changes (Moulaert et al., 2012).

These positive effects of cohesion have not gone unnoticed; many societies strive to achieve it. It is often mentioned in the same breath as participation, which is also desirable for governments (Sectorinstituut Openbare Bibliotheken, 2014). Perhaps not surprisingly, the theories behind this association vary broadly, due to the possible different directions of the relation, not to mention the different definitions of cohesion. Nevertheless, participation is always deemed to be relevant and is often seen as a large contributing factor to achieve social cohesion. Therefore, it is not surprising that much attention has been paid to stimulating participation in order to improve cohesion (e.g. Bloch, 2000; Rijksoverheid, n.d.). This urge is also present on micro levels of society. For example, not only corporations strive for participation of their employees, also informal groups such as friend groups wish to stimulate it. A way of achieving this, is sanctioning others for their antisocial behaviour. On top of that, the (informal) system or rules with regard to sanctioning also play a part in stimulating participation. As discussed, participation is in turn linked to cohesion.

The focus on participation, cohesion, sanctioning, and sanctioning systems is not only present in policy, also many experimental studies on these relations have been conducted. A lot of research has been conducted on the emergence of cohesion within experimental games

such as prisoner's dilemmas and Public Goods Games, which represent social dilemmas. (e.g. Anderson et al., 2004; Horne, 2001; Kuwabara, 2011; Lawler & Yoon, 1996; Roca & Helbing, 2011). Social dilemmas are situations in which an individual can choose to either cooperate (participate) or defect. The optimal outcome would arise when all people involved would cooperate. Paradoxically, many people tend to defect because this leads to highest individual earnings. These dilemmas are very common to everybody in society, perhaps even on a daily basis. An example of such a situation is choosing to intensely contribute to a group project or to free-ride on the labour of others. Also putting effort into cleaning your neighbourhood can be seen as a social dilemma.

Several theorists state that cohesion can be seen as an outcome of cooperative behaviour within the aforementioned social dilemma games. For example, Molm (2010) states that a mutual exchange relation leads to a more committed relationship between the participants and to a decreasing risk of being exploited when such exchange relations are repeated. This reciprocity leads to more cooperative behaviour after more frequent exchanges, and this, in turn, promotes the feeling of group cohesion. Moreover, according to Lawler (2001), a mutual exchange relation promotes more cooperative behaviour to occur, and when this exchange is repeated several times, this helps creating feelings of affection towards the other participants. These positive feelings will promote commitment to the relationship and this will, in turn, lead to more group cohesion. In his study, Kuwabara (2011) proposes an integrated model on these different perspectives of the effects of mutual exchange relations on group cohesion. He states that both perception of cooperation and joint action are key mechanisms to establish group cohesion in such relations. He finds that the emergence of positive emotions within exchange relations that are perceived as cooperative, prevent competition to occur, and promote the emergence of group cohesion (Kuwabara, 2011). However, it must be noted that also on this relation, consensus is yet to be reached. For example, Molm (2010) also finds that it is likely that competition will occur in such mutual exchange relations as well, and this feeling of competition has a negative impact on the emergence of cohesion.

Thus, the focus of previous policy, theories and experimental research on cohesion is mainly on cooperative behaviour itself. However, little attention has been paid to the effects on cohesion of *how* cooperative behaviour is reached. As mentioned before, implementing a sanctioning system is a popular method of stimulating cooperation, also in experimental games. This is applied in order to promote cooperative behaviour, although hardly any attention has been paid to how this could affect the feeling of cohesion. To make this more

explicit; in many experimental games, the opportunity to reward or punish other group members is introduced. Often it is shown that punishing participants in order to achieve more cooperation is an effective method to promote cooperation (e.g. Sefton et al., 2007; Choi & Ahn, 2013). In our theory section, we will elaborate further on this relation. Whereas these studies focus on stimulating cooperation, there is a gap in research on how the sanctioning system and sanctioning itself, directly affects the feeling of cohesion. We expect that there is a relation between social cohesion and how the cooperation in the concerning dilemmas is established.

Moreover, there is no consensus on the direction of the relation between cooperation and cohesion. As discussed before, several studies assume that cooperation leads to cohesion. However, others state that cohesion is the cause of cooperative behaviour. For example, Lawler and Yoon (1996), state that the perception of cohesion leads to cooperative behaviour. They find that positive feelings arise when a certain exchange relation is repeated several times. These positive feelings will produce the perception of relational cohesion. This perception, in turn, will lead to cooperative and contributory behaviour, because a feeling of commitment arises. This is in line with the findings of Kollock (1998), who states that the feeling of being a part of a group, reduces hostile feelings towards the other participants, such as distrust or competition, and promotes cooperative behaviour instead. In this case, being part of a group leads to having similar norms and values -which can be considered as cohesion- stimulates cooperative behaviour during the experiment.

To sum up, there is no consensus yet on the direction of the relation between cooperation and social cohesion. Moreover, little attention has been paid to how sanctioning and the regarding system affects social cohesion. Therefore, the aim of this study is to find out what the effects of sanctioning and the sanctioning system in the Public Goods Game are on social cohesion. This results in the following research question:

How does the sanctioning system and sanctioning itself in the Public Goods Game influence a player's feeling of cohesion towards the other players in the game?

By attempting to answer this question, we hope to contribute to the knowledge about how the feeling of cohesion is influenced. Because social cohesion is considered to be an important feature of a well-functioning society, and also believed to bring positive effects for individuals, we think it is relevant to study it. In many experimental studies, the relation between cooperation and cohesion is already explored. In addition to this knowledge, we will focus on the stimulation of cooperation with regard to sanctioning and the sanctioning system.

2. THEORETICAL FRAMEWORK

2.1 The Public Goods Game

Design of the Public Goods Game

The Public Goods Game (henceforth PGG) is an example of a social dilemma (Van Miltenburg et al., 2014). This experimental game is played by several actors who all get an endowment of a certain amount of points. They have to choose whether they want to contribute some of this endowment to a shared group account, or if they want to save it all for themselves. In other words, players can choose to cooperate or defect. When all the players have decided whether they want to contribute or not, the total amount contributed to the group account is multiplied by a factor smaller than the number of group members, but larger than 1, and will then be divided equally among all players. For this reason, the players find themselves in situations of interdependence. The choice that leads to the highest individual earnings is to defect and not to contribute to the group account: the distributed amount will always be lower than the contributed amount. Therefore, not contributing is the dominant strategy for most players. However, when everybody would contribute their full endowment, all players would be better off than if nobody would contribute, due to the fact that the amount in the group account is multiplied. Because the dominant strategy for individuals is not to cooperate -whereas this would actually lead to the best collective outcome- PGG's are social dilemmas (Van Miltenburg et al., 2014).

When we would apply such dilemmas to a real life situation, the example from the introduction about working on a group project suffices. When every member of the group would put much effort into their project (cooperate), it would lead to a high grade. However, one can also freeride on others' effort by deciding not to work as much as them (defect). This way, one does not have to put effort into it, but can still benefit from the high grade. Because this consideration is applicable to everybody, there is a risk that all members would choose not to put much effort into the project (defect), whereas this would definitely not lead to a high grade, even though this would be the best collective outcome. As mentioned in the introduction, much attention is paid to stimulating participation (cooperation) in society. When wanting to study this from an experimental point of view, an often used design is the PGG, which is -as discussed previously- a social dilemma.

Behaviour in social dilemma games

In general, the dominant strategy is not to cooperate in social dilemmas. Naturally, there are individual differences in the motives for making the decision whether to cooperate or defect (Balliet et al., 2009). These differences of the participants are based upon their *social value orientations* (Balliet et al., 2009). According to this framework, there are three types of players; cooperators, individualists, and competitors (Van Lange, 1999). Cooperators are focused on both collective and equal outcomes, while individualists and competitors are focused on their individual outcomes. Individualists will only choose to cooperate if this will contribute to a better individual outcome, whereas competitors will choose for the best relative outcome, compared to the other players. According to Au and Kwong (2004), about 46% of the people can be seen as cooperators, 38% as individualists and 12% as competitors. To apply this in a PGG, both individualists and competitors will probably choose to defect.

Behaviour in the repeated Public Goods Game

When a game is played more than once, participants in a PGG find themselves in situations of an even stronger interdependence: because of the reciprocity that is established over time, their actions in the current game may affect others' behaviour in subsequential games. Kurzban and Houser (2001) distinguish players of the repeated PGG not only by the choices they make, but also by their individual characteristics. They state that three types of players are most common: strong freeriders (28%), conditional cooperators (29%), and strong cooperators (25%). According to Van Miltenburg and colleagues (2014) strong cooperators are very rare, and people who initially start with cooperating, only remain cooperative when they assume others will cooperate as well. Freeriders are rational and self-regarding, and they never contribute to the common good (Van Miltenburg et al., 2014).

The presence of these types of players in repeated PGG's, mostly results in a decline in contributions (Fischbacher & Gächter, 2010). This can be explained by the fact that conditional cooperators base their decision to contribute or to defect on the beliefs about the contributions of others. The contributions of others are often not completely in line with their own previous contributions, because other conditional cooperators can differ in the amount they contribute, and freeriders never cooperate. In other words, when the contributions of others decline, the beliefs of others cooperating will simultaneously decline (Fischbacher & Gächter, 2010).

There are, however, people who keep contributing to the common good, even though others defect. According to Andreoni (1995), this prosocial behaviour can be explained by

both confusion and kindness. In his study, about 75% of the players displayed repeated cooperative behaviour. About half of these players were confused and were not fully aware of the decisions they made. The other half, however, chose deliberately to keep contributing for altruistic reasons, such as caring for the outcome of others, being kind to others, or striving for fairness (Andreoni, 1995).

Concluding, although there are participants in repeated PGG's who will contribute unconditionally, in most situations contribution to the group account will decline over time. Because this decline of contribution is not desirable, certain methods can be introduced to stimulate cooperation. An often used method is introducing a sanctioning system, in which participants can choose to either punish or reward the other group members. We will now elaborate on this in the following section.

2.2 Sanctioning in the Public Goods Game

Sanctioning in the Public Goods Game

Sanctioning can be introduced in the repeated PGG (Van Miltenburg et al., 2014). After the players have made their decision on how much to contribute, the players will be able to see whether the other players cooperated or defected, and -in the former case- what amount they contributed. When the opportunity to sanction is added in a PGG, all players can choose whether they want to pay a certain amount from their private account to sanction (an)other player(s). There are two types of sanctioning: players can either reward or punish another player. By doing so, a multiplication (larger than 1) of this paid amount is added to the account of the rewarded player, or is subtracted from the account of the punished player (Van Miltenburg et al., 2014).

The sanctioning in experimental games can take place under several conditions. Van Miltenburg and colleagues (2017) distinguish the following systems; the individual decision rule (henceforth IDR) and the collective decision rule (henceforth CDR). In the IDR condition, players can make the individual decision whether they want to punish or reward other players. In the CDR condition, sanctions will only be implemented when a certain proportion of the players decided to punish or reward this player as well. There are two variants of the CDR: 1) sanctions are implemented when the majority of the group agrees (CDR-M), or 2) sanctions are implemented when every other group member agrees (CDR-U). In both variants, the attempt to sanction will be costless, when the distributed sanction will not be implemented. For this reason, it is not likely that a player will decide not to

sanction when considering the risk of wasting his or her endowments. We can therefore assume that players in settings of both IDR and CDR will not differ in their sanctioning decisions (Van Miltenburg et al., 2014).

Behaviour with sanctioning in the Public Goods Game

Punishments and rewards are used to promote cooperation (Sefton et al., 2007). Assuming that most players in the PGG strive for the highest individual income, it can be expected that punishment will not be used frequently, due to the cost of sanctioning (Van Miltenburg et al., 2014). Empirical evidence, however, shows that players often do use the option to punish another player (e.g. Ertan et al., 2009; Fehr & Gächter, 2000; Sefton et al., 2007). Punishments are frequently executed by high-contributors (Fehr & Gächter, 2000) on low-contributors (Carpenter & Matthews, 2009) and can therefore be seen as a prosocial form of punishment. On the contrary, when a low-contributor decides to punish a high-contributor, this cannot be justified in as prosocial, and is instead seen as 'perverse' punishment (Casari & Luini, 2009; Ertan et al., 2009).

In their experimental study, Fehr and Gächter (2000) find that players of the PGG in one-shot interactions contribute on average four times more to the common good in the punishment condition, than in the condition where punishment was not possible. In the latter condition, full freeriding became the dominant strategy over time, while in the former condition, contributions did not decrease, and contributing was the most frequently used strategy at the end of the game (Fehr & Gächter, 2000).

Sefton and colleagues (2007) find in their experimental study that punishments usually were distributed to players who contributed below average, and that rewards were distributed to players who contributed above average. They find that punishments were more effective in keeping contributions high over the entire game compared to rewards. They explain this by the fact that the threat of being punished does not decrease over time, while the incentive to reward does decrease over time when rewards are not given back (Sefton et al., 2007).

In conclusion, the option to sanction is an efficient method to promote cooperation, especially when players can be punished. As we discussed before, we want to examine whether sanctioning and the sanctioning system has an influence on the feeling of cohesion towards other players.

2.3 Cohesion in the Public Goods Game

Definition of social cohesion

We introduced the concept of social cohesion as having similar norms and values and/or having affinity towards other people. Both elements are often used in previous literature when defining social cohesion. For example, Forrest and Kearns (2000) considered having common norms and values as an important aspect of cohesion. Through having similar objectives, people can facilitate a code of behaviour towards one another, and consequently identify to one another (e.g. Aneshensel & Sucoff, 1996; Cheong et al., 2007; Forrest & Kearns, 2000). This is also often referred to as a feeling of interpersonal connectedness within a group, which can be linked to having affinity towards other group members (e.g. Berkman & Kawachi, 2000; Forrest & Kearns, 2001; Putnam, 1995). Concluding, we consider social cohesion as having the same norms and values as others and having affinity towards others.

The emergence of social cohesion in the Public Goods Game

Although social cohesion is often seen as something that is established over a long period of time and with a large social group, it can also be assessed in experimental games. A theory that is very applicable when looking at the emergence of social cohesion in such games, is the *Social Exchange Theory* (Cook & Whitmeyer, 1992). Briefly put, this theory describes relations between people in terms of the exchange of resources and is often used to explain social structures and the processes involved. When considering this from a micro-level perspective, people always act upon their individual interest and pursue this through exchange relations (Cook & Whitmeyer, 1992).

According to Lawler and Yoon (1996) and Kuwabara (2011), cohesion is especially strengthened in bilateral exchange. Due to the high degree of joint actions, individual outcomes are influenced by the actions of others. Applying this to a PGG, when participants repeatedly interact with each other through contribution to, and distribution from a group account, exchange relations in which mutual commitment is important, are established. Consequently, feelings of cohesion can emerge (Kuwabara, 2011; Lawler & Yoon, 1996). Moreover, Molm (2010) suggests that a condition for cohesion to emerge is the opportunity to prove trustworthiness. In a PGG, participants can take risk by contributing to the group account, and thereby expressing their trustworthiness. This in turn would improve cohesion.

2.4 The effect of sanctions on cohesion in the Public Goods Game

The effect of sanctions on feeling of cohesion

As described before, rewards and punishments can be used as tools to promote cooperation in the PGG. Rewards are most often distributed to players who contributed in the former round, in order to encourage this player's prosocial behaviour (Sefton et al., 2007), whereas the threat of receiving a punishment will force intentional freeriders to contribute (Fehr & Gächter, 2000). Especially when a player has received a punishment before, it is likely that this player wants to prevent this from happening again by choosing to cooperate in the following rounds. When a player decides to keep contributing after receiving a reward, or when a player decides to change his freeriding behaviour after receiving a punishment, this consideration of cooperating in the next round is known as the process of *Social Learning* (Chaudhuri et al., 2006) or as the *Learning Hypothesis* (Andreoni, 1988). According to this framework, a player may not immediately know whether he should cooperate or defect. When this player decides to defect and consequently, receives a punishment for this action, it is likely that this player learned from his prior decision and the consequences it may entail (Andreoni, 1988). When a player decides to cooperate and receives a reward for this action, it is likely that this player will continue cooperating in order to receive more rewards. For these reasons, it can be expected that a sanctioned player will choose to cooperate in the following rounds (Chaudhuri et al, 2006).

Punishments are most often executed by high-contributors in order to promote cooperation among freeriders and low-contributors (Carpenter & Matthews, 2009; Fehr & Gächter, 2000). In their view, not contributing is antisocial behaviour. They punish these low-contributors in order to change this deviant behaviour by forcing them to comply with the norm of cooperating. Rewards are most often executed on high-contributors in order to encourage this prosocial behaviour and to reward them for complying with the norm of cooperating (Fehr & Gächter, 2000). According to Horne (2004), this *norm enforcement* occurs when punishing a low-contributor or rewarding a high-contributor entails benefits for the player who distributed this sanction. Examples of such benefits are a decrease of freeriding or higher overall contributions (Posner, 2009).

In settings where people are interdependent, there is a strong urge of controlling others' behaviour (Horne, 2004), and therefore, norm enforcement is very likely to occur (Horne & Cutlip, 2002). In their study, Horne and Cutlip (2002) argue that norm enforcement is most present in more cohesive social groups, compared to less cohesive groups. This can be

explained by higher rates of interdependency, and by the benefits this entails. They also state that norm enforcement and cohesion in groups are reciprocal and reinforce each other. This means that group cohesion leads to more norm enforcement, and simultaneously, that norm enforcement has a positive effect on the emergence and increase of cohesion (Horne & Cutlip, 2002).

For this reason, norm enforcement can be seen as a form of social control. According to Sampson and colleagues (1997), social control refers to: "the capacity of a group to regulate its members according to desired principles, to realize collective, as opposed to forced, goals" (p. 918). They state that when informal institutions, such as peer institutions, use sanctions to encourage prosocial behaviour and restrain deviancy, behaviour is likely to change. This can be explained by the idea that social bonds can emerge in informal institutions, and that these bonds lead to more (emotional) commitment towards others. This commitment is the reason why individuals are more likely to adapt to the norms enforced by informal institutions, compared to the norms enforced by formal institutions (Markovsky & Lawler, 1994).

Thus, receiving a sanction by informal institutions in the PGG, will not solely lead to a potential increase of the benefits, but also to a more committed relationship with the other players (Horne, 2004). According to the *Theory of Relational Cohesion* (Lawler & Yoon, 1996), increasing commitment within exchange relations leads to more affinity to the other players, which is an aspect of cohesion. Therefore, it is likely that receiving a punishment or reward leads to a stronger feeling of cohesion.

To sum up, we expect that receiving sanctions increases the feeling of cohesion, based upon the idea that norm enforcement and cohesion reinforce each other, and that norm enforcement creates the feeling of commitment towards other players, which, in turn, results in the emergence of cohesion. Therefore, our first hypothesis will be:

Hypothesis 1a: *The more sanctions a player receives in the Public Goods Game, the stronger this player's feeling of cohesion.*

The different effects of punishments and rewards on feeling of cohesion

Not only receiving sanctions in general may affect the feeling of cohesion, but we expect that the type of sanction received man influence this relation with cohesion. In the next section, we will argue how rewards and punishments differ from each other in their effect on the relation between received sanctions and cohesion.

In their meta-analysis of the effects of sanctioning and cooperation, Balliet and colleagues (2011) state that psychological processes are important predictors of the decision to cooperate or defect. Emotions, for instance, influence the decision to contribute or to defect in the next session, after a reward is received. Balliet and colleagues (2011) argue that receiving a reward leads to the emergence of positive feelings, such as joy and gratitude. According to the *Theory of Relational Cohesion* (Lawler & Yoon, 1996), these positive emotions, in turn, lead to more affinity towards the other players, which we define as an aspect of cohesion.

In line with the emergence of positive feelings, Rege and Telle (2004) argue that individuals strive for appreciation and acceptance of other group members. In order to obtain this social approval, they adapt to the norms of the group. Gächter and Fehr (1999) argue that receiving a certain incentive confirms approval of the other group members, which decreases the social distance between them. This creates the feeling of a shared identity, which is, according to Ashforth and Mael (1989), associated with social cohesion. In case of the PGG, receiving a reward may lead to the perception of social approval from the other players, reducing the social distance, and creating the feeling of a shared identity. In other words, receiving rewards would lead to a stronger feeling of cohesion.

Receiving punishments, on the other hand, may lead to a reduced feeling of cohesion. Players may, as a consequence of receiving punishments, adapt to the norm and contribute in the following sessions. However, negative feelings, such as frustration, anger and hostility, may emerge (Oliver, 1980). Especially after yet another punishment is received, this will not only intensify these emotions, but may also lead to deviation of cooperating in order to oppose to the punishers. This will increase the perception of competition between the players (Balliet et al., 2011; Oliver, 1980), and will not only generate more feelings of frustration, but will also increase the social distance between the players (Benard, 2012). Therefore, receiving punishments will have a negative impact on the emergence of group cohesion.

The idea that receiving punishments can lead to negative emotions, and may provoke unwanted behaviour is in line with the *General Strain Theory* (Agnew, 1992). According to this theory, strain develops when an individual fails to achieve its goals, when positive stimuli are removed, and when the amount of negative stimuli increases. This strain leads to a negative emotional state, and is expressed in deviant behaviour. In case of the PGG, receiving a punishment can be seen as a negative stimulus, the subtraction of points as a punishment can be seen as the removal of a positive stimulus, and the failure of freeriding as a strategy without consequences can be seen as the failure to achieve goals. Receiving punishments

entails strain, which leads to feelings of frustration and anger. These negative feelings will be expressed in defecting in the following rounds, which is the equivalent of deviant behaviour.

According to Griffith and Vaitkus (1999), strain is an important predictor for the feeling of cohesion. They argue that individual strain leads to disintegration of a group: due to the deviant behaviour of the person who perceives strain, negative relations in this group arise. This disintegration has a negative influence on group cohesion, because it generates feelings of aversion among the members of a group, which weakens their social bonds (Griffith & Vaitkus, 1999).

Taken together, though receiving punishments may lead to cooperative behaviour, it also evokes individual strain and negative emotions. These emotions will be expressed in not contributing and will entail perceived competition, as well as the disintegration of a group. And, since both competition and disintegration have a negative effect on group cohesion, it is likely that receiving punishments has a negative effect on the relation between receiving sanctions and cohesion.

The more punishments one has received, the smaller the share of rewards in the total number of received sanctions. As discussed before, receiving rewards increases the feeling of cohesion, whereas receiving punishments decreases this feeling. Taking everything into account, this leads to our next hypothesis:

Hypothesis 1b: *The more punishments a player receives in the Public Goods Game, the weaker the positive effect of received sanctions on this player's feeling of cohesion.*

2.5 The effect of the sanctioning system on cohesion

The effect of the presence of a collective decision rule on cohesion

As discussed before, Lawler and Yoon (1996) found that when a player's outcome is influenced by others' decisions in a game, the feeling of cohesion can emerge. A similar mechanism can be applied to the implementation of a sanctioning system. When there is task-interdependence within a game, this promotes collective responsibility among the players. In order to achieve goals, joint action must be undertaken. Therefore, people will perceive the relation with other players as salient (Lawler & Yoon, 1996).

When implementing a CDR in a PGG, this task-interdependence is even stronger. Not only one's individual outcome is influenced by others' actions, also the implementation of a sanction is directly dependent on the decision of other players. This strengthens the realisation

that decisions are not made independently, but strongly cohere with the action of other players. After all, when all or a majority of the players (depending on which CDR condition) does not choose to sanction the concerning player, the sanction is not implemented at all. In the IDR condition, on the contrary, decisions to sanction another player are made independently from one another.

To sum up, when playing in a CDR condition in a PGG, the members of a group are to an even larger extent exposed to task-interdependence compared to when playing in an IDR condition. Everyone's decision is directly linked to one another's when it comes to sanctioning other players. Hence, players find their relation to others more salient. Also due to the collective responsibility of sanctioning, which can only be achieved by means of joint action, one will feel more connected with the other players. As mentioned before, connectedness within a group is associated with both aspects of cohesion. Hence, our hypothesis will be the following:

Hypothesis 2a: *Participating in the Public Goods Game with a collective decision rule leads to a stronger feeling of cohesion of a player, compared to participating in a game with an individual decision rule.*

The effect of the implementation of a sanction under a collective decision rule on cohesion

Previously, we discussed the *General Strain Theory*, developed by Agnew (1992). Not only receiving a punishment can be seen as the presence of a negative stimulus, and thereby a strain, also the CDR could entail a strain in the case of failing to achieve one's goal. In a PGG with a CDR, when a player distributes a sanction to another player, but the sanction is not implemented, the goal of sanctioning is not achieved. Applying the *General Strain Theory*, this may lead to negative feelings such as frustration, which results in the increase of one's social distance to a group. This, in turn, renders a decreased feeling of cohesion (Bernard, 2012).

Simultaneously, the more sanctions are implemented, the stronger a player's feeling of cohesion may be. We can explain this by means of the findings of Kuwabara (2011). Because of the large debate whether bilateral exchange would facilitate or weaken feelings of cohesion, Kuwabara (2011) tested an integrated model that took into account multiple aspects of the nature and the context of the relations between players. The outcomes of his study showed that bilateral exchange can facilitate a strong feeling of cohesion under certain conditions. He argued that when a relation is perceived as cooperative, this enhances the

feeling of cohesion. When being in an exchange relation with someone who cooperates, this can be seen as an indication of mutual interests and commitment, and leads to positive feelings towards the other person (Kuwabara, 2011). As discussed before, Lawler and Yoon (1996) argue that such positive feelings lead to the emergence of social cohesion. When a player in a PGG with a CDR would like to sanction someone, he must have the support of others in order to get this sanction implemented. When the sanction is indeed implemented, this affirms cooperative behaviour of the other player(s). This leads to the perception of commitment and mutual interests and positive feelings towards the others, and thus, cohesion.

To conclude, the non-implementation of a distributed sanction, being a strain, can reduce the feeling of cohesion, whereas the feeling of mutual commitment and the perception of cooperation can lead to an increase in the feeling of cohesion. The last hypothesis will thereby be:

Hypothesis 2b: *The more a player's distributed sanctions are implemented in the Public Goods Game, the stronger this player's feeling of cohesion.*

3. METHODS

3.1 Experimental design

Procedures

The players were participating in PGG's in experimental groups of 12, 16 or 20 players, in which they were interacting in randomly matched groups of 4. Due to the rematching after every round, all players interacted with every other player in the lab multiple times. All players started with an endowment of 20 points, and after every round the total amount contributed by all players together was multiplied by 1.6, and divided equally amongst all the players. At the end of the experiment, the players received 1 euro for every 60 points they had earned during the game.

The experiment consisted of four phases. In the first phase, the players decided what amount they would contribute in a game with three other players in an unconditional setting, regardless of what the other players would contribute. This was done in order to measure their contribution without them interacting with others. Subsequently, they filled in a conditional contribution scheme, deciding how much they would contribute to the group account, given every possible contribution of the other three group members.

In the second phase, the game was played for ten rounds. In every round, the players were randomly rematched with three other players, and were not aware of the decisions of their group members that were made in previous rounds. After every round, the players were updated about their own payoff and the contributions of the other three group members.

In the third and fourth phase of the experiment the players still interacted with three randomly matched others. In these phases the option to sanction was added to the game. In each phase, the players played another ten rounds, one phase in which they could only punish other players, and one phase in which they could only reward others. The order of these two sanctioning options differed between the session groups, and both of the orders occurred in each decision rule; IDR, CDR-M, and CDR-U. After the players decided what amount they wanted to contribute, they were informed about the contributions of the other three group members, and could decide for each separate group member whether they wanted to sanction them. If this sanction was implemented, a reward added six points to the rewarded player, and a punishment subtracted six points from the punished player, at a cost of two points from the player who distributed the sanction.

In the IDR condition, all distributed sanctions were implemented. Receiving sanctions from multiple group members, subtracted or added six points multiplied by the number of group members that distributed the sanction. The costs of sanctioning remained two points for each player. This was also the case for the CDR conditions, but a sanction was only implemented if at least two group members agreed upon sanctioning in the CDR-M condition, and all three group members agreed upon sanctioning in the CDR-U condition. After each round, the players were updated about the implemented sanctions in their group, but could not trace them back to the players who distributed them. Players were also not informed about sanctions that were distributed but not implemented in the CDR conditions.

A flowchart of the procedure of the game can be found in Appendix I.

Subjects

The data used for this study was conducted in the ELSE laboratory of Utrecht University. Participants were recruited by using the online recruiting system ORSEE. In total, 184 students participated in the experiment.

There were twelve sessions: every decision rule condition (IDR, CDR-M, and CDR-U) took place four times. Within each of these three conditions, two sessions started with the option to punish, and two started with the option to reward. All participants within the same session received the same instructions, which explained the procedure of the game. These

instructions also consisted of control questions to make sure the participants understood the game. In the game, punishing was called 'subtracting points', and rewarding was called 'adding points', in order to reserve neutrality. When the game was finished, the participants had to fill in a questionnaire, which included questions about their feelings of cohesion towards the other group members.

The IDR condition consisted of 56 participants, and both the CDR-M condition and the CDR-U condition consisted of 64 participants. The average number of received sanctions was 6.51, with a minimum of 0 and a maximum of 27 received sanctions, and the average final profit was €12.40, varying from €8.48 to €14.73.

3.2 Operationalisation of the variables

Dependent variable

We consider the concept of cohesion as consisting of two main aspects: having affinity towards one another and having the same norms and/or values as others. It may be difficult to determine whether you have affinity towards others and have the same norms and values as others, after only having had brief interactions during a PGG. Therefore, for our operationalisation, we simplified these dimensions to a general feeling of liking each other, and respectively, feeling alike.

Because these two aspects together capture the feeling of cohesion, we constructed a scale from the following seven questions that were asked after the game was played: 1) '*I would have preferred to have interacted with other people than the ones in this room*', 2) '*The people in this room went along well'*, 3) '*I enjoyed interacting with the others in this room*', 4) '*I did not like most of the others in this room*', 5)'*The (general) behaviour of the others in this room reflects who I am*', 6)'*I see myself as quite different from the others in this room*', and 7) '*I see myself as quite similar to the others in this room*'.

All the items were measured on a seven-point scale, ranging from 1 'strongly disagree' to 7 'strongly agree'. Question 1, 4 and 6 were coded in the opposite direction, to make sure that a high score on the scale for cohesion would represent a strong feeling of cohesion.

When testing the reliability of the scale with Cronbach's Alpha, an alpha of .842 was found for the seven items. As a general rule of thumb for a reliable scale, the alpha ought to be higher than .7, meaning our scale shows good reliability.

Independent variables

We measured the *received sanctions* by adding up the number of punishments and rewards a player has received in the third and fourth stage of the experiment. *Received punishments* is measured by adding up the absolute number of punishments a player has received during these stages.

The decision rule conditions (*IDR*, *CDR-M*, and *CDR-U*) are constructed as dummy variables, for which the value 1 means that a player participated under that condition. We included the two CDR conditions in our analysis as two separate dummy variables.

We measured the *non-implemented sanctions* by subtracting a player's total number of implemented sanctions from this player's total number of distributed sanctions.

Control variables

In our theory section, we elaborated on how the feeling of cohesion leads to a committed relationship. This would increase the chance of people sanctioning one another. However, this relation is also reciprocal: the more people sanction others, the more cohesion they may feel. To control for this aforementioned reversed causality, we included the number of *distributed sanctions* to other players. We measured by constructing a variable that counts the total number of sanctions that a player has given to the other players. When having played in a system with a CDR-M or CDR-U, the number of sanctions that the player distributed were added up, regardless of whether these sanctions were actually implemented or not.

In the experiment, some of the participants started the third phase with the option to punish, followed by the option to reward, while others started with the option to reward, followed by the option to punish. All participants filled in the questionnaire after the game, and, in order to control for this difference in sanctioning order, we included the control variable *sanctioning order*. We measured this by constructing a dummy variable, in which the value 1 stands for having started with the option to reward, followed by the option to punish.

The final profit of the participants varied from €8.48 to €14.73. To control for the differences in profits and the feelings this may entail, we included the variable *final profit*. The value of this variable equals the money the participants received after the experiment.

Lastly, the cooperation during the game could affect the outcome of the feeling of cohesion. The more cooperation a player experienced in the game, the stronger this player's feeling of cohesion may be. In order to rule out the effect of cooperation on cohesion, we constructed the variable *total contribution*, consisting of the sum of the contributions within a group of four after each round for every player.

3.3 Analysis

For testing our hypotheses, we performed a multiple linear regression analysis with two models. Using a regression enabled us to predict the influence of sanctioning and the sanctioning system on the feeling of cohesion.

In the first model, we included the independent variables for hypotheses 1a and 2a in order to control for each other's effects on cohesion. Thus, *received sanctions* and the dummy variables of *CDR-M* and *CDR-U* are used as our independent variables. The reference category for the latter two variables is thereby *IDR*. The variables *sanctioning order*, *distributed sanctions*, *final profit*, and *total contribution* were used as control variables. To test hypotheses 1b and 2b, we added *received punishments* and *non-implemented sanctions*. The seven-point scale for *feeling of cohesion* was used as the dependent variable in our analysis.

3.4 Descriptive statistics

Table 1 shows the descriptive statistics of the variables we have used for our analysis. The average of our dependent variable, *feeling of cohesion*, is 3.96, with a minimum of 1 and a maximum of 6.57. The minimum of *received sanctions* is 0, the maximum is 27, and the mean is 6.51. The number of *received punishments* varies between 0 and 21, with an average of 4.05. The average of the *non-implemented sanctions* is 6.21, with a minimum of 0, and a maximum of 44. For *CDR-M*, the average of this variable is 5.53, and 12.33 for *CDR-U*.

Table 1. *Descriptive statistics*

	N	Minimum	Maximum	Mean	SD
Feeling of cohesion	184	1.00	6.57	3.96	1.09
Received sanctions	184	0.00	27.00	6.51	5.21
Received punishments	184	0.00	21.00	4.05	4.07
IDR	184	0.00	1.00	0.30	
CDR-M	184	0.00	1.00	0.35	
CDR-U	184	0.00	1.00	0.35	
Non-implemented sanctions	184	0.00	44.00	6.21	8.68
For IDR	56	0.00	0.00	0.00	0.00
For CDR-M	64	0.00	28.00	5.53	5.84
For CDR-U	64	0.00	44.00	12.33	10.48
Distributed sanctions	184	0.00	53.00	12.72	9.76
Sanctioning order	184	0.00	1.00	0.46	
Final profit	184	8.48	14.73	12.40	1.11
Total contribution	184	381.00	1352.00	854.57	208.38

4. RESULTS

4.1 Results of the analysis

The results of the regression analysis are shown in Table 2. Model 1 appeared to be significant ($F(7, 176)=5.56$, $p<.001$), with an R^2 of .18. In this model, final profit has a significant positive effect on feeling of cohesion ($b=.42$, $t(7, 176)=5.50$, $p<.001$), which means that feeling of cohesion increases with .42 by each euro earned for final profit. No other significant results were found, meaning that hypothesis 1a and hypothesis 2a are rejected.

Adding received punishments and non-implemented sanctions to the second model, the F change was not significant ($F(9, 174)=2.06$, $p=.131$), with an R^2 of .20. Final profit maintains its significant positive effect, only smaller ($b=.40$, $t(9, 174)=5.08$, $p<.001$). Moreover, a positive significant effect of received punishments is found ($b=.07$, $t(5, 178)=1.98$, $p=.049$). Since we hypothesised that receiving punishments would have a negative effect on the positive relation between receiving sanctions and feeling of cohesion, hypothesis 1b is rejected. Furthermore, there seems to be no significant effect of non-implemented sanctions on feeling of cohesion, meaning that hypothesis 2b is rejected as well.

Table 2. *Multiple linear regression analyses of feeling of cohesion on individual level*

	Model 1		Model 2	
	b	s.e.	b	s.e.
(Constant)	-.54	1.04	-.62	1.06
Received sanctions	-.00	.02	-.05	.03
CDR-M	-.16	.19	-.24	.21
CDR-U	-.39	.23	-.43	.27
Sanctioning order	-.11	.17	-.10	.17
Distributed sanctions	.01	.01	.01	.02
Final profit	.42***	.08	.40***	.08
Total contribution	-.00	.00	.00	.00
Received punishments			.07*	.03
Non-implemented sanctions			.00	.02
R^2	.18		.20	
R^2 change	.18		.02	
F change	5.65***		2.06	

*p<.05, **p<.01, ***p<.001

4.2 Factor analysis

An additional sensitivity analysis was performed in order to determine whether the results on the dependent variable would be different with another operationalisation of the dependent variable. In our first regression analysis, the scale for feeling of cohesion was used. The definition comprised of having affinity and having similar norms/values, and when looking back to our theoretical framework, some mechanisms were primarily focussed on either one of these aspects. Therefore, we examined whether the results would be similar when making the distinction between similarity and affinity.

Because we assumed two underlying dimension of the latent construct cohesion, a factor analysis is performed. We used promax as an extraction method, due to the possibility of correlation between the two common factors. We found reasons to assume the existence of two underlying dimensions of cohesion: two factors with an eigenvalue larger than 1 (3.649 and 1.106) were found. Additional tables can be found in Appendix II.

Table 3. *Factor loadings based on principal axis factoring with promax rotation*

	Factor 1: Similarity	Factor 2: Affinity
I am similar	.995	
I am different	-.794	
Others' behaviour reflected who I am	.590	
People went along		.791
Did not like others		-.730
Enjoyed interacting		.632
Rather interacted with other people		-.538
Correlation	.597	

*Factor loadings <.3 are suppressed

Subsequently, two different scales for cohesion were constructed. The scale for similarity consists of the first three items in Table 3. The included items represent feeling alike (item 1 and 2) or perceiving the reflection of others' behaviour on oneself. Therefore, these three items are included in the scale for similarity. When performing Cronbach's alpha as the reliability check, an alpha of .849 is found for the three items.

The second scale ought to represent a feeling of affinity. Therefore, the items about liking the others, enjoying to interact with them, and how the other group members liked each other, were included. For the scale for affinity, an alpha of .779 was found for these four items.

Consequently, the same regression analysis as before was performed in order to establish the robustness of the results (Table 4 and Table 5).

Table 4. *Multiple linear regression analyses of the similarity scale on individual level*

	Model 1		Model 2	
	b	s.e.	b	s.e.
(Constant)	-.73	1.22	-.97	1.25
Received sanctions	-.02	.02	-.05	.03
CDR-M	-.45*	.23	-.43	.25
CDR-U	-.47	.27	-.38	.32
Sanctioning order	.02	.20	.04	.20
Distributed sanctions	.01	.01	.02	.02
Final profit	.41***	.09	.41***	.09
Total contribution	.00	.00	.00	.00
Received punishments			.04	.04
Non-implemented sanctions			-.02	.02
R^2	.13		.14	
R^2 change	.13		.01	
F change	3.87***		.63	

*p<.05, **p<.01, ***p<.001

The results of the regression on similarity

When performing a regression analysis with a scale for similarity as dependent variable, a few changes in results were found (Table 4). In the first model, the CDR-M condition appeared to have a significant negative effect on the feeling of similarity (b=-.45, t(7, 176)=-1.990, p=.048), while we hypothesised a positive effect. In the second model, however, the significance of CDR-M disappeared. Received punishments too, did not have a significant effect on the feeling of similarity. Furthermore, the (non-)significance of the other results are similar to the first analysis.

Summing up, the differences that were found in comparison to the first analysis on feeling of cohesion, are the negative effects of CDR-M in the first model, and no significant effect of received punishment in the second model. In line with the first analysis, our hypotheses are rejected.

The results of the regression on affinity

In Table 5, the results of the regression analysis of the affinity scale are shown. Hardly any changes are found in comparison to the analysis of feeling of cohesion. However, contrary to the first analysis of cohesion, the F-change for the second model appeared to be significant (F-change=3.32, p=.038). Once more, all hypotheses are rejected.

Table 5. *Multiple linear regression analyses of the affinity scale on individual level*

	Model 1		Model 2	
	b	s.e.	b	s.e.
(Constant)	-.39	1.19	-.36	1.20
Received sanctions	.01	.02	-.05	.03
CDR-M	.06	.22	-.10	.24
CDR-U	-.32	.27	-.47	.30
Sanctioning order	-.20	.20	-.21	.20
Distributed sanctions	.01	.01	.00	.02
Final profit	.44***	.09	.39***	.09
Total contribution	-.00	.00	.00	.00
Received punishments			.09*	.04
Non-implemented sanctions			.01	.02
R^2	.17		.17	
R^2 change	.20		.03	
F change	5.21***		3.32*	

*p<.05, **p<.01, ***p<.001

5. CONCLUSION AND DISCUSSION

5.1 Conclusions

The aim of this study was to find how sanctioning and the sanctioning system in Public Goods Games influence a player's feeling of cohesion. To answer our research question, we used experimental data of PGG's with the option to sanction other players in different sanctioning systems. We compared the effects of receiving punishments and rewards, and the effects of playing in the individual decision rule condition and two collective decision rule conditions on a player's feeling of cohesion.

We expected that the more sanctions a player had received in the game, the stronger this player's feeling of cohesion would be (Hypothesis 1a). According to Horne (2004) this can be explained by the enforcement of others to adapt to the norm of cooperating. It can be expected that receiving a punishment increases a player's future contributions, and that receiving a reward encourages a player to keep contributing. Furthermore, several theorists (e.g. Lawler & Yoon, 1996; Markovsky & Lawler, 1994) argued that having the same norms leads to more commitment, which, in turn, leads to cohesion. However, we found no relation between receiving sanctions and feeling of cohesion. Furthermore, we expected that the more punishments a player had received, the weaker the positive effect of received sanction on this player's feeling of cohesion (Hypothesis 1b). We theorized that receiving punishments would

lead to the emergence of negative feelings towards the other players (Oliver, 1980), and would produce individual strain (Agnew, 1992). We rejected this hypothesis because, contrary to our expectation, we found a positive effect of receiving punishments on the relation between receiving sanctions and cohesion.

When a decision rule is implemented in a PGG, we expected that playing in a CDR condition would lead to an increase of a player's feeling of cohesion, compared to the IDR condition (Hypothesis 2a). Players in a CDR condition are to a larger extend exposed to task-interdependence, which has a positive effect on cohesion (Lawler & Yoon, 1996). We, however, found no evidence for the relation between playing in a CDR and a player's feeling of cohesion. Furthermore, according to Kuwabara (2011), the feeling of mutual commitment, and the perception of cooperation occurs when other players also decide to sanction a certain player, and that this leads to the perception of having similar norms and values, which is an aspect of cohesion. Therefore, we predicted that the more a player's given sanctions were implemented, the stronger a player's feeling of cohesion (Hypothesis 2b). Contrary to our expectations, no evidence was found to support this relation.

In addition to our main analysis, we performed a factor analysis to validate the construction of our dependent variable. In line with previous literature, we found evidence for two underlying dimensions of cohesion; similarity and affinity. We conducted two more regression analyses with these dimensions. We found no notable differences compared to the prior analysis, except for the insignificance of receiving punishments on feeling of similarity.

Furthermore, a noteworthy, yet unexpected result of our analysis was the significant relation between final profit and a player's feeling of cohesion. This significance implies that the amount of money the participants earned at the end of the game has a positive effect on this player's feeling of cohesion.

To conclude, we found that receiving sanctions in general had no effect on a player's feeling of cohesion, while solely receiving punishments had a small positive effect. Furthermore, we found no differences between the sanctioning systems on cohesion, and no relation was found between non-implemented sanctions and cohesion. Taken our results together, we can presume that sanctioning and the sanctioning system in PGG's have little effect on a player's feeling of cohesion towards the other players.

5.2 Discussion

Reflection on the findings

There are several points of discussion regarding our theoretical arguments and our findings. Firstly, we found, in contrast to our expectation, a positive effect on the relation between receiving punishments and cohesion. We theorized that due to strain, this would have a negative effect. As described by Agnew (1992), it was expected that receiving punishments generates feelings of strain, whereas we found no evidence for this effect. Moreover, it was found that it intensifies the feelings of commitment. A possible explanation for this relation is found in the study of Sefton and colleagues (2007). They find that punishments are more effective in keeping contributions high, compared to rewards. The incentive to reward declines over time, and, thereby, less rewards are distributed compared to punishments. This may explain the reason we found that solely receiving punishments creates a stronger feeling of cohesion, compared to receiving sanctions in general.

A second point of discussion is that we found no relation between playing in a CDR condition and feeling of cohesion. In line with the study of Lawler and Yoon (1996), we argued that interacting in a setting with strong task-interdependence leads to commitment and cohesion. We, however, found no relation between these variables. In the study of the aforementioned authors, the players interacted with the same players for several rounds, creating committed relations. In contrast to this design, the participants of our study interacted in randomly rematched subgroups of four, meaning that the players interacted with different group members in every round, without knowing whom they were interacting with. An explanation for the different findings may be a weaker feeling of task-interdependence when one does not know with whom they are interacting.

Thirdly, in contrast to what we expected, receiving sanctions seemed to have to no effect on a player's feeling of cohesion, meaning that norms were not enforced by means of sanctioning. As described by Horne and Cutlip (2002), even though norm enforcement and cohesion reinforce each other, norm enforcement is most present in more cohesive groups. It can be expected that the experimental groups were not cohesive at the begin of the experiment, since the participants were recruited separately from each other. Sanctioning may have led to cooperative behaviour, but may have not created a feeling of having similar norms and, thereby, a feeling of cohesion.

A fourth point worth discussing, is the positive significance of one's final profit on feeling of cohesion. This unexpected relation implies that the higher a player's earnings, the

stronger this player's feeling of cohesion towards the other players. Since we controlled for total contributions and, thereby, cooperation, the possibility that cooperation influenced one's final profit and feeling of cohesion was excluded. It can be argued that a higher profit generates positive feelings in general. According to Diener and Biswas-Diener (2001) receiving and earning money, indeed, leads to (short term) happiness and positive feelings. As described before, these positive feelings are associated with the emergence of cohesion (Lawler & Yoon, 1996).

Limitations and implications for future research

As with any study, there are several limitations to our study. Firstly, after completing the game, the participants filled in the questionnaire. This implies that their feeling of cohesion towards the other players was measured after they played the game in both the reward and punishment condition. For this reason, it is hard to draw conclusions about the different impact of received punishments and received rewards on the participants' feeling of cohesion. To determine whether there is indeed a difference in the effects of receiving punishments and rewards, future research is needed. An implication for this future research is to construct an experimental design in which participants interact in either a punishment, a reward, or a mixed sanctioning condition, followed by handing them a questionnaire including questions about their feeling of cohesion. Contrary to the design used in this study, a disadvantage of this implication is that the conditions will consist of different participants. A strength of the design used in this study, after all, is that all participants played in every sanctioning condition, giving a clear insight into the differences between punishing and rewarding.

A second limitation to our study is in line with the former limitation. As mentioned before, the participants filled in the questionnaire after finishing the game, meaning that there was only one occasion where the participant's feeling of cohesion was measured. Therefore, we were unable to get an insight into the process of the emergence of cohesion, and to determine whether there is a causal relation. Hence, a suggestion for future research is to include multiple questionnaires during the experiment, measuring the process of the emergence of a participant's feeling of cohesion. A disadvantage, however, may be that measuring multiple times, may lead to biased results in the forthcoming parts of the experiment.

Thirdly, there were several sample and data-related restraints. For example, the sample solely consisted of students, which makes it hard to generalize our findings to a broader population. Furthermore, the dataset was incomplete, due to missing data. Several variables of

one session were not included, among which the variable that consisted of the number of people a participant knew of the experimental group. This variable could have been of value to our study, because it can be expected that knowing someone influences one's behaviour, and feeling of cohesion. We, however, decided to leave this variable out of our analysis, and chose to include this particular session. If we would have left this session out, we would not have an equal number of sessions with the same sanctioning system, leading to an underrepresentation of one condition. Including this variable, however, would have given insights into the differences in behaviour and feeling of cohesion between acquaintances and strangers.

Besides limitations, also new empirical insights were found. As described before, we found a positive effect of receiving punishments on feeling of cohesion. Moreover, a positive relation between final profit and feeling of cohesion was found. There, however, seems to be no prior research on this topic. Hence, future research is needed to examine this relation and the possible mechanism generating this relation.

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APPENDIX I – FLOWCHART PUBLIC GOODS GAME

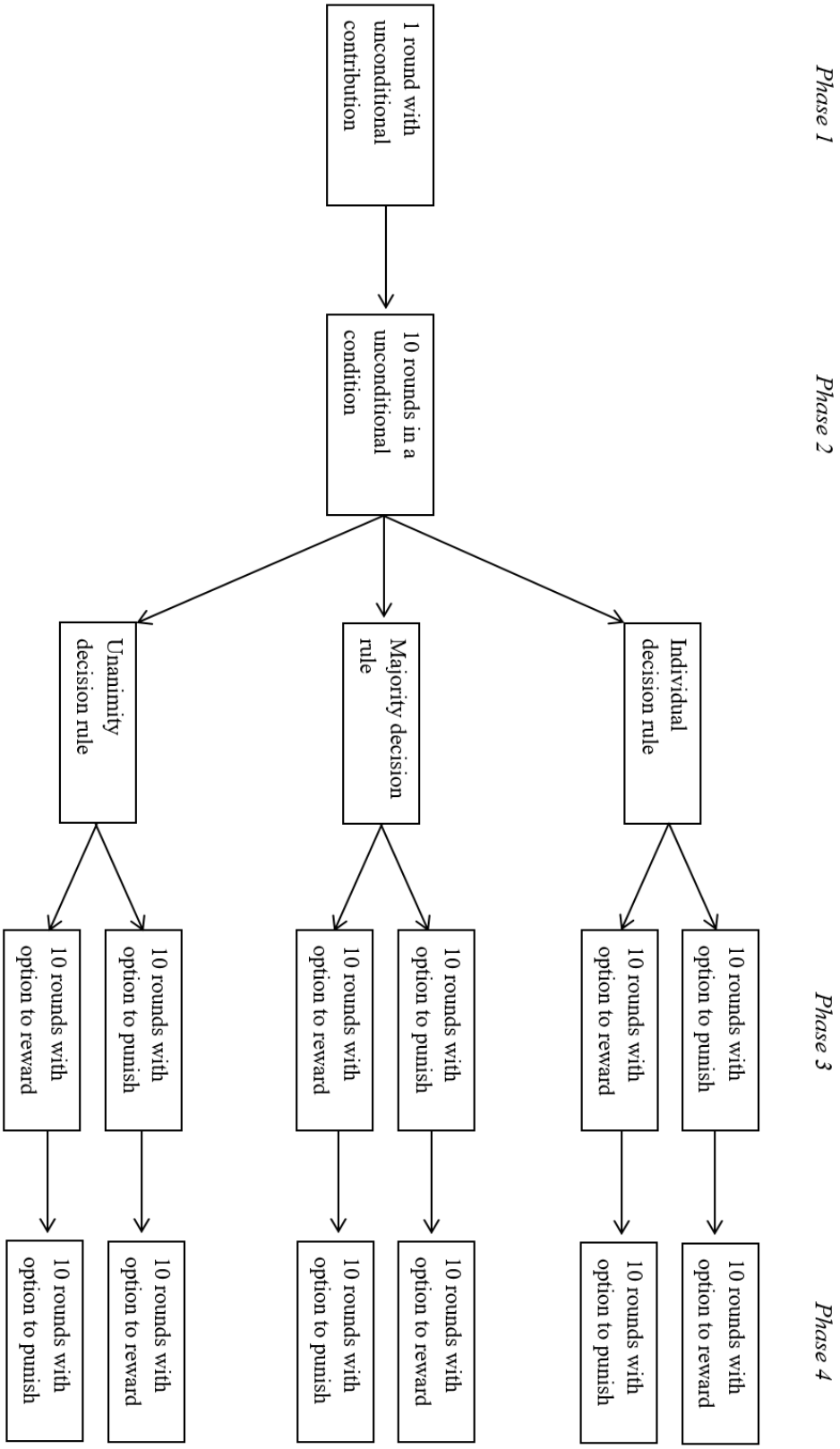

Figure 1. *Flowchart of the procedure of the Public Goods Game*

APPENDIX II – ADDITIONAL TABLES FACTOR ANALYSIS

Table 6. *KMO and Barlett's test for the factor analysis*

Kaiser-Meyer-Olkin measure	.796
Bartlett's test	
Approx. Chi-Square	553.57***
df	21

*p<.05, **p<.01, ***p<.001

Table 7. *Communalities of the items with Principal Axis Factoring as extraction method*

	Initial	Extraction
I am similar	.689	.898
I am different	.680	.713
Others' behaviour reflected who I am	.432	.434
People went along	.470	.610
Did not like others	.394	.505
Enjoyed interacting	.428	.474
Rather interacted with other people	.346	.353

APPENDIX III – SYNTAX

********** Recoding variables **********

```
FREQUENCIES session.

RECODE session
('110331_1107' = 1)
('110331_1338' = 2)
('110404_1053' = 3)
('110404_1346' = 4)
('110405_1114' = 5)
('110405_1419' = 6)
('110407_1047' = 7)
('110412_1056' = 8)
('110418_1048' = 9)
('110419_1049' = 10)
('110420_1050' = 11)
('110616_1303' = 12)
(ELSE = SYSMIS)
INTO session_id .

FREQUENCIES session_id.

FREQUENCIES subject.
COMPUTE subject_id = 100*session_id + subject .
FREQUENCIES subject_id.

FREQUENCIES group period round .
RECODE period (2 THRU 11 = 2) (12 THRU 21 = 3) (22 THRU 31 = 4) (ELSE = 999)
INTO phase.
SELECT IF phase NE 999.
FREQUENCIES phase.

COMPUTE phase_id = 10*subject_id + phase.
FREQUENCIES phase_id.

COMPUTE round_id = 100*phase_id + round.

FREQUENCIES round_id.

FREQUENCIES condition .
RECODE condition (1 4 = 1) (2 5 = 2) (3 6 = 3) INTO condition_r.
```

```
CROSSTABS
  /TABLES=session_id BY condition_r.

************************* Dependent variable: cohesion *************************
*Recoding all the items into the right direction.

FREQUENCIES coh1 coh2 coh3 coh4 coh5 coh6 coh7.
RECODE coh1 (6=1) (5=2) (4=3) (3=4) (2=5) (1=6) (0=7) INTO coh1_r.
RECODE coh4 (6=1) (5=2) (4=3) (3=4) (2=5) (1=6) (0=7) INTO coh4_r.
RECODE coh6 (6=1) (5=2) (4=3) (3=4) (2=5) (1=6) (0=7) INTO coh6_r.
RECODE coh2 (0=1) (1=2) (2=3) (3=4) (4=5) (5=6) (6=7) INTO coh2_r.
RECODE coh3 (0=1) (1=2) (2=3) (3=4) (4=5) (5=6) (6=7) INTO coh3_r.
RECODE coh5 (0=1) (1=2) (2=3) (3=4) (4=5) (5=6) (6=7) INTO coh5_r.
RECODE coh7 (0=1) (1=2) (2=3) (3=4) (4=5) (5=6) (6=7) INTO coh7_r.
FREQUENCIES coh1_r coh2_r coh3_r coh4_r coh5_r coh6_r coh7_r.

*Reliability check: cronbach's alpha.

COMPUTE round31 = (period = 31).
FILTER BY round31.

RELIABILITY
  /VARIABLES = coh1_r coh2_r coh3_r coh4_r coh5_r coh6_r coh7_r
  /SCALE ('all') = ALL
  /MODEL = ALPHA
  /STATISTICS = DESCRIPTIVES SCALE
  /SUMMARY = TOTAL COV.

*Alpha = .842, which is good.

COMPUTE totalcohesion = mean.7(coh1_r, coh2_r, coh3_r, coh4_r, coh5_r, coh6_r, coh7_r).

FREQUENCIES totalcohesion.
DESCRIPTIVES totalcohesion.

FILTER OFF.

************************* Independent variables *************************
*Calculating the total amount of received rewards and punishments for each player.

FREQUENCIES totreward totpunish.

AGGREGATE
/BREAK = subject_id
```

```
/receivedpunish = SUM(totpunish).

AGGREGATE
/BREAK = subject_id
/receivedreward = SUM(totreward).

FREQUENCIES receivedpunish receivedreward.

COMPUTE receivedsanction = (receivedpunish + receivedreward).
FREQUENCIES receivedsanction.

*Creating dummy variables for each system.

RECODE condition (1 4 = 1) (2 3 5 6 = 0) INTO idr.
RECODE condition (2 5 = 1) (1 3 4 6 = 0) INTO cdr_m.
RECODE condition (3 6 = 1) (1 2 4 5 = 0) INTO cdr_u.
RECODE condition (2 3 5 6 = 1) (1 4 = 0) INTO cdr.
FREQUENCIES condition idr cdr_m cdr_u cdr.

*Computing implemented sanctions.

FREQUENCIES actpunish2 actpunish3 actpunish4 actreward2 actreward3 actreward4.

COMPUTE actreward = actreward2 + actreward3 + actreward4.
FREQUENCIES actreward.

AGGREGATE
/BREAK = subject_id
/implreward = SUM(actreward).

COMPUTE actpunish = (actpunish2 + actpunish3 + actpunish4).
FREQUENCIES actpunish.

AGGREGATE
/BREAK = subject_id
/implpunish = SUM(actpunish).

FREQUENCIES implpunish implreward.

COMPUTE implsanction = (implpunish + implreward).
FREQUENCIES implsanction.

*Computing distributed and non-implemented (abssanction) sanctions.
```

```
FREQUENCIES punish2 punish3 punish4 reward2 reward3 reward4.

COMPUTE distributedpunish = (punish2 + punish3 + punish4).
FREQUENCIES distributedpunish.

COMPUTE distributedreward = (reward2 + reward3 + reward4).
FREQUENCIES distributedreward.

AGGREGATE
/BREAK = subject_id
/distrpunish = SUM(distributedpunish).

AGGREGATE
/BREAK = subject_id
/distrreward = SUM(distributedreward).

FREQUENCIES distrpunish distrreward.

COMPUTE distrsanction = (distrpunish + distrreward).
FREQUENCIES distrsanction.

COMPUTE abssanction = (distrsanction - implsanction).

FREQUENCIES abssanction.
DESCRIPTIVES abssanction.

CROSSTABS
  /TABLES=condition_r BY abssanction.

FILTER OFF.

********** Control variables **********

*Punishment as last condition.

RECODE condition (4 5 6= 1) (ELSE = 0) INTO punishlast.
FREQUENCIES punishlast.

*Number of distributed sanctions.

FREQUENCIES distrsanction.

*Final profit.
```

```
FREQUENCIES finalprofit.
DESCRIPTIVES finalprofit.

*Computing total contribution.

AGGREGATE
/BREAK = subject_id
/totcontr = sum(totalcontr).

FREQUENCIES totcontr.

************************* Analyses: hypotheses 1 and 2 ************************
*We will filter by a single round, so that every subject will only appear once in our analyses.

FILTER BY round31.

REGRESSION
  /STATISTICS COEFF OUTS R CHANGE ANOVA COLLIN TOL
  /DEPENDENT totalcohesion
  /METHOD=ENTER receivedsanction cdr_m cdr_u punishlast distrsanction finalprofit
totcontr
  /METHOD=ENTER receivedpunish abssanction
  /SCATTERPLOT=(*ZRESID ,*ZPRED)
  /RESIDUALS NORMPROB(ZRESID).

*When checking for multicollinearity, every variable scored below 10, which is good.

REGRESSION
  /STATISTICS COEFF OUTS R CHANGE ANOVA COLLIN TOL
  /DEPENDENT totalcohesion
  /METHOD=ENTER receivedsanction cdr_m cdr_u punishlast distrsanction finalprofit
totcontr
  /METHOD=ENTER receivedreward abssanction
  /SCATTERPLOT=(*ZRESID ,*ZPRED)
  /RESIDUALS NORMPROB(ZRESID).

FILTER OFF.

************************* Factor analysis ************************
*Factor analysis: two dimensions expected. We include the original variable, without the
recoded directions.

FILTER BY round31.
```

```
DEFINE !varlist1()
coh1 coh2 coh3 coh4 coh5 coh6 coh7
!ENDDEFINE.

FACTOR
   /VARIABLES = !varlist1
   /PRINT = EXTRACTION ROTATION
   /PLOT = EIGEN
   /CRITERIA = FACTORS(2) ITERATE(25)
   /FORMAT = SORT BLANK(.3)
   /EXTRACTION = PAF
   /ROTATION = PROMAX(4)
   /PRINT = ALL.
```

*We found support for two factors (eigenvalues of 3.649 and 1.106). The items of similarity explained most.

```
RELIABILITY
   /VARIABLES = coh1_r coh2_r coh3_r coh4_r
   /SCALE ('affinity') = ALL
   /MODEL = ALPHA
   /STATISTICS = DESCRIPTIVES SCALE
   /SUMMARY = TOTAL COV.

RELIABILITY
   /VARIABLES = coh5_r coh6_r coh7_r
   /SCALE ('similarity') = ALL
   /MODEL = ALPHA
   /STATISTICS = DESCRIPTIVES SCALE
   /SUMMARY = TOTAL COV.
```

*Affinity: alpha=.779. Similarity: alpha=.849. Both alpha's are sufficient.

```
COMPUTE similarity = mean.3(coh5_r, coh6_r, coh7_r).
COMPUTE affinity = mean.4(coh1_r, coh2_r, coh3_r, coh4_r).

FREQUENCIES similarity affinity.
CORRELATIONS similarity affinity.
```

********** Additional analyses: hypotheses 1 and 2 **********
*Now, we want to examine whether there is a difference between the two aspects of cohesion.

```
FILTER BY round31.
```

```
REGRESSION
  /STATISTICS COEFF OUTS R CHANGE ANOVA COLLIN TOL
  /DEPENDENT similarity
  /METHOD=ENTER receivedsanction cdr_m cdr_u punishlast distrsanction finalprofit
totcontr
  /METHOD=ENTER receivedpunish abssanction
  /SCATTERPLOT=(*ZRESID ,*ZPRED)
  /RESIDUALS NORMPROB(ZRESID).
```

*When checking for multicollinearity, every variable scored below 10, which is good.

```
REGRESSION
  /STATISTICS COEFF OUTS R CHANGE ANOVA COLLIN TOL
  /DEPENDENT affinity
  /METHOD=ENTER receivedsanction cdr_m cdr_u punishlast distrsanction finalprofit
totcontr
  /METHOD=ENTER receivedpunish abssanction
  /SCATTERPLOT=(*ZRESID ,*ZPRED)
  /RESIDUALS NORMPROB(ZRESID).
```

*Checking whether the same results appear for received rewards instead of punishments.

```
REGRESSION
  /STATISTICS COEFF OUTS R CHANGE ANOVA COLLIN TOL
  /DEPENDENT similarity
  /METHOD=ENTER receivedsanction cdr_m cdr_u punishlast distrsanction finalprofit
totcontr
  /METHOD=ENTER receivedreward abssanction
  /SCATTERPLOT=(*ZRESID ,*ZPRED)
  /RESIDUALS NORMPROB(ZRESID).

REGRESSION
  /STATISTICS COEFF OUTS R CHANGE ANOVA COLLIN TOL
  /DEPENDENT affinity
  /METHOD=ENTER receivedsanction cdr_m cdr_u punishlast distrsanction finalprofit
totcontr
  /METHOD=ENTER receivedreward abssanction
  /SCATTERPLOT=(*ZRESID ,*ZPRED)
  /RESIDUALS NORMPROB(ZRESID).

FILTER OFF.
```