

# The effect of personality traits and emotions on social motives

A Game Theoretic Approach

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## Abstract

This research has aimed to elucidate the role of social motives in game theory. This was done by using two different game theoretical experiments; the Prisoner's Dilemma and Decomposed Games. The main question that has been raised in this area of research, is why do individuals cooperate if they could make themselves better off by not cooperating? The three possible explanations for cooperative behaviour in simple economic games, explored in this research, are empathy, levels of psychopathic personality traits and emotions. Firstly, the results have shown that cooperation is higher among individuals who feel empathy for their opponent than among individuals who feel no empathy for their opponent. Secondly, against expectations, the results have shown that cooperation appears to be higher among individuals with higher levels of psychopathic personality traits than among individuals who with lower levels of psychopathic personality traits. And lastly, this research has found no relationship between mood and the level of cooperation.

*Keywords: Game theory, Prisoner's Dilemma Games, Dictator Games, empathy, psychopathy, emotions*

## 1. Introduction

Game theory is widely used to gain insight into problems of cooperation among different scientific fields, two of which include sociology and economics. An extensively used tool in this area of research is the one-shot Prisoner's Dilemma Game (Aksoy & Weesie, 2013). This is a simple economic game played by two players. Each player has two options; they can either choose to cooperate or to defect. Players make a choice individually, there is no communication allowed between the two players. If we assume selfish players, the option to defect is preferred by each player, because this yields the higher outcome no matter what the other player chooses. This means choosing to defect is the dominant strategy and that each player will expect the other to also choose to defect. The expected outcome is mutual defecting. This is the Nash Equilibrium; both players act in the best way they can, no matter what the other player does (Pindyck & Rubinfeld, 2013). However, if both players choose to cooperate this would yield a higher outcome for each than when both players choose to defect. Therefore, mutually defecting is a Pareto-optimal outcome; both players would be better off if both cooperated but neither has the incentive to do so (Pindyck & Rubinfeld, 2013). This is the social dilemma that the Prisoner's Dilemma represents: the possible conflict between the individual and collective interests (Kallock, 1998). According to Kallock (1998), the study of social dilemmas is the study of the tension between individual and collective rationality.

A second tool that is often used in game theory experiments is the Decomposed Game, often referred to as the Dictator Game. This is also a simple economic game where each player can choose between two options. Each option yields a certain outcome for the player and for his or her opponent(s). It is a one-shot game and the player makes decisions anonymously. The outcome does not depend on decisions of anyone else, only on your own decision. Because the player does not take other players into account and the game only has one round, it is a non-strategic game. This is an important difference with the Prisoner's Dilemma Games, where decisions are strategic because the decision of the other player is taken into account when deciding what to do. When explanations of strategic nature can be eliminated, it becomes possible to test other motives behind choices. Therefore, Decomposed Games may be more suitable to test social motives leading to choices in game theory than the Prisoner's Dilemma Games. Decomposed Games allow for participants to be classified in social orientation categories (Aksoy & Weesie, 2012). An example of such a category is the category of people with a cooperative orientation, a person that maximizes both his or her own outcome and the outcome of others.

Two main disciplines that have been studying social cooperation are sociology and

economics. Both disciplines have given different explanations for social cooperation. Economical explanations have emphasized the rationality and selfishness of individuals. This view assumes that every individual acts in a way that maximizes his or her own outcome. Incentives are used as an explanation for social cooperation. On the other hand, sociological explanations have emphasized the influence of social motivations. This view focusses on the internalization of values. When someone has a certain value, they will most likely live according to the norm following from this value. Much research has been conducted to find out which one of these views is correct, if not both. Why do individuals choose to cooperate if they could be better off themselves by not cooperating? This paper aims to elucidate the role of social motives within game theory. How can social motives be explained? Are social motives related to personality traits? More specifically, this paper aims to answer three questions. The first, is there a relationship between empathy and behaviour in simple economic games? The second, is there a relationship between psychopathic personality traits and behaviour in simple economic games? And third and last, is there a relationship between emotions and behaviour in simple economic games? Empathy and psychopathy are traits a person can have, and the third factor, emotions, addresses a state. Therefore, this research can be seen as a trait versus state debate when explaining decision-making in game theory.

Research into behaviour of participants of simple economic games can help our understanding of nonself-interested behaviour. The results from this research can be applied in many real life settings. Examples of fields where game theory can be applied to better understand and/or predict situations, are consumer response to price changes, attitudes toward different tax schemes and employee response to changes in wages (Charness & Rabin, 2002).

This paper starts off by introducing its theoretical background. Chapter one, the theory section, is divided into several parts. It starts off by discussing different approaches that attempt to explain behaviour in game theory. Then attention is paid to the role social motives play in explaining behaviour in game theory. Next, factors that may have a relationship with social motives are discussed. The first two factors are a part of a person's personality. The first factor is empathy, the second factor is psychopathic traits, and the third factor is emotion. After the hypotheses have been clearly stated, the paper moves on to the method section, chapter three. To test the three hypotheses, two different experiments are used. One dataset contains data collected using Decomposed Games and will be used to test social motives. The other dataset contains data collected using Prisoner's Dilemma Games and will be used to test the relationship between emotions and behavioural choices. Following the method section is the results section in chapter four; presenting all found results. These results are discussed in the conclusion and the paper ends

with a discussion on the relevance of the findings and suggestions for future research, both to be found in chapter five.

## 2. Theory

### 2.1 Sociologists versus economists

In economics it is assumed that individuals act rationally; people maximize their own outcome. When people are strictly rational, defined as being selfish, they act only in self-interest, and it would be expected they do not to show cooperative behaviour in simple economic games<sup>1</sup>. Yet, as mentioned, research has shown that individuals often do cooperate and therefore do not act only on self-interest. This is because people can also act rationally without being fully selfish. Rationality can also take non-selfish preferences into account. This is a view often adopted by sociologists. People want to maximize their own outcome while taking (non)selfish preferences into account. A possible explanation for this behaviour given by science, is found in the influence social motives have on behaviour. Fehr and Gintis (2007) have developed an approach that combines the views of the two explanations of social cooperation. They show that not everyone is either fully rational and selfish, or fully rational and influenced by social motives when they behave cooperatively. Their approach is called the Beliefs, Preferences and Constraints approach. Fehr and Gintis (2007) show with their research that self-regarding and norm-regarding individuals coexist. They show that the available action opportunities determine which of these actor-types dominates the aggregate level of social cooperation.

Many other researchers have come to the same conclusion that social motives should be taken into account when explaining behaviour in simple economic games. For example, Fehr and Fischbacher (2002) argue that when economists disregard social preferences, they fail to fully understand certain economical questions. Examples of important core questions in economics are the question of the mechanism behind competition and the interplay of competition and cooperation in markets and businesses. Fehr and Fischbacher (2002) have shown that to fully understand core economic questions such as these, social preferences must be taken into account.

Their research has shown that without taking social preferences into account, one cannot fully understand the effects of competition on market outcomes, laws governing cooperation and collective action, and the effects and determinants of material incentives. Also, social preferences should be taken into account in order to fully understand which contracts and property rights

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<sup>1</sup> In economics, 'fully rational' is often set equal to 'self-interested'. Most of the time, this is correct and therefore, this paper follows this assumption. However, it must be noted that in certain situations there can be a difference between the two (Van Witteloostuijn, 1988). An example can be found in the work of the founding father of economics, Adam Smith. Another example can be found in the work of Nobel Prize winner Gary Becker.

arrangements are optimal, and important forces shaping social norms and market failures. Their research shows the importance of understanding the role social preferences play in situations of competition, cooperation and incentives. Many of these economical questions can be answered by conducting research using simple economic experiments. In analysing these experiments, both selfish and non-selfish behaviour can be found. Together, rational choice theory and theories on social preferences can help us gain greater insight into the behaviour of individuals. Therefore, it is important to gain more insight into social preferences.

This paper aims to gain more insight into these social preferences and their influence on behaviour in simple economic games. The main goal of this paper is to find out which mechanisms can be found that form social motives. To be more precise, this paper discusses whether there is a relationship between social motives and personality traits, and whether there is a relationship between social motives and emotions. In this theory section, firstly previous research on social motives will be discussed to create a better understanding of the concept of social motives. After this, theory on three possible forces behind social motives will be discussed. The first two of the three are personality traits: the effect of empathy and psychopathic personality traits on behaviour in simple economic games. The last of the three possible forces behind social motives are emotions. More specifically, do emotions a participant experiences whilst playing a game influence his or her behaviour?

## *2.2 Social motives*

Economists often base their reasoning on the self-interest assumption. This assumption states that all individuals are exclusively motivated by their material self-interest (Fehr & Fischbacher, 2002). It is often argued that economists fail to recognize the importance of social preferences in explaining behaviour in simple economic games. When individuals have social preferences, this means that they do not only care about their own outcome but also about the outcome of others. Many researchers are straying from the economic idea that individuals always act in self-interest in economic experiments. Research has shown departures from self-interest in economic experiments and explain these departures by models of social preferences. Models of social preferences are based on the assumption that individuals are not only interested in their own outcome, but also in the outcome of others. Participants in economic experiments frequently choose actions that are not fully selfish. In simple bargaining games, they choose to punish those who have acted in a way that has negatively influenced their outcomes, even though this means giving up part of their own outcome. Also, participants frequently choose to share money with other participants who have no say in allocations. What social preference models can be used as an explanation for these

departures from self-interested behaviour? Charness and Rabin (2002) have dug deeper into the subject of social preferences.

Charness and Rabin (2002) have used simple experimental games to test several social preference theories. Their research has shown results different from results of recent other models. They have shown that participants value increasing social welfare more than reducing differences in outcomes. This means that participants sacrifice a part of their own outcome in order to make all other participants better off. This is especially the case when the other participants would otherwise receive a low outcome. These results are in line with the social-welfare models, which are based on the assumption that people like to increase social surplus. These models state that people care especially about helping those with low outcomes. The results are not in line with the inequality aversion models, which are based on the assumption that players are motivated to make the differences between their own outcomes and the outcomes of others smaller. Charness and Rabin (2002) have found that the social-welfare models have more explanatory power than the inequality aversion models.

A second important finding is that participants are also motivated by reciprocity. This means that whether a participant is willing to sacrifice part of their outcome in order to make the other participant(s) better off, depends on the willingness of the other participants to do the same. So if one participant is willing to sacrifice part of their outcome, it is likely that the other participant(s) will do this also. When participants feel they are being treated unfair, they may turn to punishing the individual who is showing the unfair behaviour. These results are in line with the reciprocity models, which are based on the assumption that how fairly a person is treated influences their willingness to raise or lower the outcome of others. Motivation by reciprocity can be of importance when explaining choices in multiple-shot strategic games, yet not in one-shot games. Therefore, it may be helpful when researching behaviour in Prisoner's Dilemma Games, but not when researching behaviour in Decomposed Games, where behaviour is non-strategic and all games are one-shot games.

Other researchers that have explored social motives are Aksoy and Weesie (2012). They have conducted research on the relationship between an individual's social orientation and his or her beliefs about the social orientations of others. An individual's social orientation describes how a person feels about different ways of dividing outcomes between participants. Social orientations can be categorized into individualists, co-operators and competitors. The goal of individualists is to maximize their own outcomes, whereas the goal of co-operators is to maximize the total sum of outcomes. Competitors have the goal to maximize his or her own outcome and on the other hand, to minimize the outcome of the others.

The research of Aksoy and Weesie (2012) tested three main hypotheses on the relationship between an individual's social orientation and their beliefs of the social orientation of others. The first hypothesis is the triangle hypothesis. This hypothesis focusses on competitors and co-operators only. It states that competitors expect others to be competitors too, whereas co-operators expect others to be either competitors or co-operators. This hypothesis can be tested by conducting Prisoner's Dilemma games. The second hypothesis is based on structural assumed similarity bias. This hypothesis states that an individual in one of the social orientation categories expects others to belong to the same category. To test this hypothesis, most researchers use Decomposed Games instead of Prisoner's Dilemma games. In a Decomposed Game, a participant can only choose between two choices, each of which showing the outcome for the participant and for the anonymous other player(s). The third hypothesis is based on the Cone model. This hypothesis states that, in line with structural assumed similarity bias, individuals are likely to expect others to belong to the same category of social orientation as themselves. Only, this hypothesis adds that this likelihood is highest among individualists.

The results of this research show that there is a positive relationship between an individual's social orientation and his or her beliefs about the mean of the other's social orientation, in line with all three hypotheses. Additionally, the results show that the likelihood of expecting someone to belong to the same category as themselves is highest among individualists. All in all, the findings are in line with the Cone model.

Another example in this line of research is that of Liebrand (1984). He has conducted research on the effect of social motivation on the behaviour in simple economic games. He divided social motives into four categories: altruistic motives, cooperative motives, individualistic motives and competitive motives. His results have shown that in games where participants could divide resources, there were differences between the participants with different social motives in how much of the outcome they took for themselves. Competitive subjects took the most, while individualistic participants took less than the competitive participants but more than the average. The participants with cooperative and altruistic social motives took the smallest amount of the outcome for themselves.

Just as Aksoy and Weesie (2012), Liebrand (1984) also gained insight into the question of the effect of an individual's social motives on the expectation of the social motives of others. He found that competitive participants expected the others to take a smaller outcome than they took themselves, so they expected others to have different social motives than themselves. The altruistic participants expected the opposite, they expected the others to take more than they took themselves. So both the competitors and the altruists expected others to have different social



motives than themselves. Another interesting question Liebrand (1984) raised was whether the presence or absence of the possibility of communication influences the decisions of the participants. The results have shown that when there is the possibility of communication, participants tend to take fewer resources for themselves.

As may be clear by now, social motives certainly play a big role in explaining behaviour in simple economic games. Yet, the question as to what mechanisms lie behind these social motives has not very often been addressed. This will be done now, and the rest of this paper will focus on three possible forces that lie behind social motives, and therefore can explain behaviour in simple economic games. These forces will be discussed in the following sections.

### *2.3 Personality*

The first two forces that may explain social motives are personality traits. The two personality traits that this paper will focus on are levels of empathy and levels of psychopathy. Before elaborating on each and before forming hypotheses, previous research on the impact of personality on behaviour in economic games will be discussed to understand that personality might indeed influence behaviour.

Boone, De Brabander and Van Witteloostuijn (1999) have investigated the effect of personality on behaviour in economic games. They divided the behaviour in competitive and cooperative behaviour in several Prisoner's Dilemma games. The research focussed on four personality traits or attributes: locus of control, self-monitoring, type-A behaviour and sensation seeking. Locus of control means that people believe either in external control, or in internal control. Externals see themselves as relatively passive agents, whereas internals see themselves as relatively active agents, they can control the events in their lives. So internals feel they have more control over their lives than externals do. Self-monitoring refers to the extent to which an individual has the ability and motivation to regulate their expressive self-presentations. In other words, self-monitoring is the level to which a person is able to observe, adapt and control his or her own behaviour. Type-A behaviour refers to "individuals who are characterized by time urgency, interpersonal hostility, aggression, irritability, impatience and a high level of competitiveness" (Boone, De Brabander & Van Witteloostuijn, 1999, p. 350). Individuals with lower scores on these personality traits belong to the group of type-B behaviour. The last personality trait, sensation seeking, is self-explaining; individuals differ in the level of sensation they seek.

Their research has shown that internal locus of control, high self-monitoring and high sensation seeking are personality traits that lead to cooperative behaviour. The research has clearly



found evidence that personality traits influence behaviour in simple economic experiments. Now this paper turns to whether two specific personality traits, empathy and psychopathy, influence behaviour.

#### *2.4 Empathy*

The first factor this paper focusses on as a possible explanation for cooperative behaviour in simple economic games is a personality trait, namely empathy. Is empathy related to altruistic behaviour in simple economic games? This question is widely debated among different sciences. To begin, there is the question of whether pure altruistic behaviour exists. The crucial difference between altruistic and non-altruistic behaviour lies in whose welfare is aimed to be maximized. In non-altruistic behaviour, one aims to maximize his or her own welfare and in altruistic behaviour, one aims to maximize the welfare of the other. Do we ever act in a way that is in no way beneficial to ourselves at that moment or any moment in the future? Batson (1991) formed the empathy-altruism hypothesis, which states that when people feel empathy for others, this leads to motivation to behave in a truly selfless way to help those others. Batson conducted laboratory experiments during which empathy was induced, and then observed helping behaviour. This revealed that participants were willing to help others who they felt empathy for, no matter what their own outcome would be. Supporting his hypothesis, Batson's research has shown that empathy-helping is motivated by the welfare of others, and not by self-interest.

There are also researchers that do not find support for the existence of truly selfless behaviour in order to help someone else. Neuberg, Cialdini, Brown, Luce, Sagarin and Lewis (1997) have also tested Batson's empathy-altruism hypothesis, because they believed Batson's research did not meet criteria necessary to properly be able to test whether empathy-associated helping is altruistic. The first criterion is that possible non-altruistic explanations need to be considered, and second, these non-altruistic alternatives need to be valid and reliable. The third and last criterion states that it needs to be tested whether the empathy-altruism relationship still exists after removing all non-altruistic factors. After conducting analyses on new data and reanalyses on existing data, while meeting these three criteria, Neuberg et al. rejected the empathy-altruism hypothesis. Using similar laboratorial experiments to Batson's experiments, their research has shown that there is a non-altruistic motivator that explains the relationship between empathy and helping others at the cost of themselves. Their results suggested that empathy only increases superficial and minimal-cost helping.

In later research, Maner, Luce, Neuberg, Cialdini, Brown and Sagarin (2002) have again investigated the true existence of altruism as an explanation of helping others, and found no

support for this. Although they found a significant zero-order relationship between empathic concern and helping, this relationship disappeared when controlling for non-altruistic motivators. They found that helping was not mediated by altruistic motivators, but only by non-altruistic motivators.

A possible explanation for the varying results is that selfish and selfless motivations for helping others can be hard to tell apart from each other. Behaviour that may seem truly selfless in order to help others, may actually be selfish because the person showing this behaviour expects something in return in the future to also benefit him or herself. An example can be found in a multiple-shot Prisoner's Dilemma. If a participant knows he will be playing the same game with the same opponent more than once, he or she may cooperate because of the expectation that the opponent to do the same in the future, and therefore create the highest possible outcome for him or herself without being concerned with the outcome of the opponent. To be able to rule out such strategic behaviour, Decomposed Games are often used in research. These games are non-strategic and, therefore, it is easier to separate selfish from selfless motivations in Decomposed Games.

Behaviour in game theory is central in this paper, more specifically, what factors may lead to cooperative behaviour in simple economic games. Can empathy explain why people choose to cooperate in a simple economic game, even though acting in a non-cooperative way would yield a higher outcome for themselves? In other words, can altruism motivate a person to cooperate in a simple economic game? Batson and Moran (1999) have investigated whether empathy-induced altruism motivates a person to cooperate in a one-shot Prisoner's Dilemma. They found that in all their cases, cooperation was higher among those who were led to feel empathy for the other than among those who were not led to feel empathy. To test whether empathy can explain cooperative behaviour in simple economic games, the following question is asked: To what extent does feeling empathy influence the likelihood of cooperation in simple economic experiments? Using Decomposed Games, which, as mentioned, are suitable for testing this question, the following hypothesis is tested:

**H1: Cooperation in simple economic experiments is higher among individuals who feel empathy for their opponent than among individuals who feel no empathy for their opponent.**

### *2.5 Psychopathy*

The second factor this paper focusses on as a possible explanation for cooperative behaviour in simple economic games is also a personality trait, namely psychopathy traits. Is having psychopathy personality traits related to behaviour in simple economic games? First of all, it is important to explain what psychopathy is. Psychopathic people are often diagnosed with a

personality disorder. Yet, it must be noted that psychopathy is not officially recognized as a personality disorder in the Diagnostic and Statistical Manual of Mental Disorders, a manual created to form internationally accepted diagnoses and statistics of health problems ([www.dsm.com](http://www.dsm.com)). Therefore, one must be careful when describing what psychopathy entails. The most widely used instrument to measure psychopathy is the Hare Psychopathy Checklist-Revised (Hare & Neuman, 2007). This checklist makes a distinction between primary psychopathy and secondary psychopathy. For each category, several items were created to measure psychopathy. The items for primary psychopathy measure selfish, uncaring and manipulative behaviour towards others (Levenson, Kiehl & Fitzpatrick, 1995). Secondary psychopathy measures impulsiveness and self-destruction, it is all about control; can a person control or repress his or her impulses? When a person has primary psychopathy traits but no secondary psychopathy traits, they may be deceitful and pretend to want to cooperate (or not) because they are able to control and repress their impulses. However, when a person has primary as well as secondary psychopathy traits, he or she will most likely act in a way true to his or her nature because he or she is unable to repress impulses. For this reason, to be able to assess levels of psychopathy, both categories should be measured.

Psychopaths show antisocial behaviour. Psychopaths miss certain affective capabilities, such as a lack of empathy. Though psychopathy must not be mistaken to be the opposite of empathy. Psychopathic personality traits entail more than only a lack of empathy. Psychopaths are characterized by reckless attitudes to manipulate and exploit others, egocentric, selfish urges and deceitful, superficial conduct.

Mokros, Menner, Eisenbarth, Alpers, Lange and Osterheider (2008) have noted that previous research has shown psychopaths to act uncooperatively in many social situations. The question this paper would like to answer is whether individuals with psychopathic personality traits are also likely to act uncooperatively in simple economic experiments or not. Mokros et al. (2008) have conducted research to gain more insight into this matter. The data were collected on a group of criminal psychopaths from high-security psychiatric hospitals. Their research has shown that psychopaths are more likely than healthy controls to show non-cooperative behaviour in simple economic experiments, in their case the Prisoner's Dilemma. This result can be explained by two psychopathic personality traits. The first is the fact that psychopaths are prepared to act in a way that others may find inappropriate. The second is the fact that psychopaths are willing to do anything in order to make themselves better off, even if this implies that they make someone else worse off.

Not all research is in line with the assumption that psychopaths are less likely to cooperate

in simple experimental games than non-psychopaths. Contrary to the findings of Mokros et al. (2008), Widom (1976) found no difference in behaviour between psychopaths and non-psychopaths while playing the Prisoner's Dilemma game. His data show that psychopaths may well be able to cooperate.

Curry, Chesters and Viding (2011) have assessed psychopathic personality traits in the general population, using Psychopathic Personality Inventory scores. Their question was whether there is an association between normal variation in psychopathic personality traits and levels of cooperative behaviour in experimental games. They believe this is important because there are people in the general population that have lower levels of psychopathic personality traits. The results showed that cooperative behaviour was associated with different aspects of self-reported psychopathic personality. They concluded that future research should identify how different psychopathic personality traits have an effect on different types of social interaction.

There has been little more research done in the field of psychopathic personality traits among the general public and the association with behaviour in game theory experiments. Therefore, this paper aims to gain more insight into this matter. The goal is to find out whether people with different levels of psychopathic personality traits differ in their level of cooperative behaviour. To test whether psychopathic personality traits can explain cooperative behaviour in simple economic games, the following question is asked: To what extent do psychopathic personality traits influence the likelihood of cooperation in simple economic experiments? If psychopathy leads to the absence of social behaviour, then individuals with higher levels of psychopathic personality traits should be less likely to show cooperative behaviour in simple economic games. This adds up to the following baseline hypothesis:

**H2: Cooperation in simple economic experiments is higher among individuals with lower levels of psychopathic personality traits than among individuals who with higher levels of psychopathic personality traits.**

## *2.6 Emotions*

Behaviour is influenced by emotions. When a person is feeling extremely angry, the person is less likely to give a compliment to a friend than when the person is feeling extremely happy. And when a person is extremely anxious, the person is less likely to be able to give a presentation with confidence than when the person is feeling extremely proud of themselves. These are logical examples. But do emotions also influence behaviour in simple economic games? This matter is researched in this paper.

A lot of research has been conducted on the question what influence a mood has on

behaviour. Wood, Saltzberg and Goldsamt (1990) investigated what causes people to become self-focused and therefore act in a self-focused way. They proposed that affect itself may induce self-focus. When self-focused attention is high, this means a person is focused on him or herself rather than on others and the environment around him or her. A person then directs attentional resources towards his or her own thoughts, feelings and experiences. The main reasoning behind their assumption is that affect causes people to draw their attention inward. Their results suggested that affect does indeed induce self-focus, and negative affect is more likely to do so than positive affect.

Green, Sedikides, Saltzberg, Wood and Forzano (2003) also looked into the question of what induces self-focused behaviour. Their research tested whether mood was of influence; they addressed the question whether mood influences self-focused attention. The research compared the influence on self-focused attention of a sad and happy mood to the influence of a neutral mood. The results of the study showed that a happy mood decreased self-focused attention, when compared to a neutral mood. So in other words, when a person is happy, they focus their attention more to the outside world and to others, than to their inner self. Green et al. (2003) name several possible explanations for this phenomenon, provided by previous research. One explanation is that happiness leads to stimulation seeking. Also, happiness makes people more socially oriented. And last, happiness positively affects the motivation for reaching important goals. All this leads to a person being more oriented to the external world around him or her.

More research has been conducted to investigate the influences of positive affect on people. Rowe, Hirsch and Anderson (2007) have shown that when people are in a positive state, this results in the breadth of attentional allocation to both external visual and internal conceptual space. This means that when a person experiences positive affect, this may affect their perception and cognition. The reason for this is that positive states let people loosen mechanisms of control that would normally not let people broaden their attentional allocation.

This theory can be applied to game theory. To test whether emotions can explain cooperative behaviour in simple economic games, the following question is asked: To what extent does mood influence the likelihood of cooperation in simple economic experiments? If a happy mood decreases self-focused attention and broadens attention, and therefore increases attention to the external environment, it can be expected that people in a happy mood are more likely to cooperate in simple economic experiments compared to people in a sad mood. When people are in a sad mood, caused by negative affect, this may cause the opposite effect; tunnel vision. Putting all this together, the following hypothesis is formed:

**H3: Cooperation in simple economic experiments is higher among individuals in a happy mood than among individuals in a sad mood.**

### 3. Method

Two different experiments were used to test the three hypotheses. An experiment conducted at Utrecht University was used to test the role of empathy and psychopathy in explaining the behaviour in simple economic games. This experiment contains personal information of each participant as well as the choices they made in Decomposed Games. This experiment was used to test the first two hypotheses on the role of traits, and is discussed in part A. Second, an experiment conducted at Tilburg University was used to test the role of emotions, a state, in explaining behaviour in simple economic games. This experiment also contains personal information of each participant, but differs from the other experiment because it contains data collected by conducting Prisoner's Dilemma Games. This experiment was used to test the third hypothesis and is discussed in part B.

#### 3.1 Part A

*H1: Cooperation in simple economic experiments is higher among individuals who feel empathy for their opponent than among individuals who feel no empathy for their opponent.*

*H2: Cooperation in simple economic experiments is higher among individuals with lower levels of psychopathic personality traits than among individuals who with higher levels of psychopathic personality traits.*

#### 3.1a Data

The experiment used to test hypothesis number one and two was collected at Utrecht University in the ELSE laboratory. The ELSE laboratory is an experimental laboratory of the department of sociology and economics of Utrecht University. During experiments at the ELSE laboratory, a maximum of thirty students can sit behind a computer and take part in an experiment. Participants are asked to make decisions on anonymous interaction with others. Also, participants fill in questions about themselves. The students are paid at the end of the experiments, the amount depending on the decisions they made in the experiment. Students earn around eight to ten euros per hour ([www.elseutrecht.nl](http://www.elseutrecht.nl)). This can be a motivation for students to take part in the experiments. Other motivations may be the desire to help research in the field of sociological and economic science.

The experimental data used for this paper were collected by conducting Decomposed Games. The dataset contained 148 participants, of which 136 were used for this research due to missing values. Kahneman, Knetch and Thaler (1986) stated that Decomposed Games were

formed as an expansion to already existing game theory. Their aim was to gain more insight into the preferences that people have for fairness. How do people value being treated fairly and treating others fairly? In the Decomposed Games conducted in the ELSE laboratory, participants were asked to divide money. The participant could choose between two different options on how to divide the money. The instruction sheet that each participant received can be found in appendix A. During the experiments, students were not allowed to communicate with one another. Each round, the participant was randomly matched with three other participants and was asked to make a decision on the division of the money. An example of two possible options, the way they were presented to the students, can be found in appendix A. The two options differed from each other each round in the relative differences of the divisions so that each round, the participant had to think about the decision to make.

Because the participant could make a choice anonymously and the game was a one-shot game, he or she did not take the behaviour of others into account when making their own decision. Therefore, the game played was a non-strategic game. Because of this, strategic motivations as the reasoning behind the choices of participants were ruled out. Eliminating this possible explanation behind the behaviour in these simple economic experimental games, leaves the social motivations as one possible explanation. It should be noted that another possible explanation could be that people make mistakes. Yet, the economic games that were used for this research are so simple, that it is highly unlikely that participants made mistakes because they didn't understand the games. This is why social motivations are left as a possible explanation for behaviour.

### *3.1b Measurements*

To test the first hypothesis, the dependent variable used was the choice made by the participant. Each round, the participant could choose between two options. Each option represented a certain division of money. The choice a participant makes can be seen as the choice between two utility functions. The question is, how important does the participant value the amount the opponents receive compared to the amount the participant receives for him or herself? A similar approach was used in the parametric approach used by Aksoy and Weesie (2012). They estimated the social orientation parameters of the participants. This was done in the dataset used for this research, too. The weights a participant added to the outcome of the others was measured by the parameter  $\theta$  (theta). The utility function can be seen as a function of the weight one adds to one's own outcome plus the weight of the outcome of the other;  $U(x) = X_i + \theta \cdot X_j$ , where  $X_i$  is your own outcome and  $X_j$  is the outcome of the other. In this case, the participant had to divide the money between him or herself and three others. The weight of the outcome of the three others was divided by three to



create the average weight added to the outcome of others. The assumption was made that the weight added to one's own outcome equals one and that the variable of the weight of the outcome of the other participants shows a normal distribution.

Utility increasing from the outcome of the other participants, corresponds with a theta greater than zero. This means the participant is welfare oriented. In this case, the participant is called a co-operator (Aksoy & Weesie, 2012). On the other hand, if the participant's utility decreased from the outcome of the other participants, this corresponds with a theta smaller than zero. This means the participant is competitive. If the participant was indifferent, the theta was equal to zero. This means the person is an individualist and only cares about his or her own outcome, no matter what the other receives. Each participant played between twenty and thirty Decomposed Games. The theta corresponds to the average level of weight added to the outcome of the opponents. In other words, it represents the average level of cooperation the person showed during these games. This new variable was used to measure the level of cooperation. The variable was divided into two categories: co-operative ( $\theta > 0$ ) and competitive orientations ( $\theta \leq 0$ ). The level of measurement of this binary variable is ordinal ( $N=148$ ,  $M=.131$ ,  $SD=.495$ ).

The level of empathy was the independent variable used for the first hypothesis. Each participant was asked to fill in questions about their personality. According to John and Srivastava (1999), the 'Big Five' personality dimensions are a general accepted taxonomy of personality traits, which is often used in psychology. The five personality dimensions are extraversion, agreeableness, conscientiousness, neuroticism and openness. Two of these dimensions have been measured in the questionnaire: agreeableness and neuroticism. The agreeableness trait reflects to what extent a person is concerned with general harmony, in other words, with social welfare. The questionnaire contained four questions measuring agreeableness. These four questions measured whether a person felt empathy for others or not and could thus be used in this analysis. The questions consisted of statements with which the participant could agree or disagree on a scale of zero (fully disagree) to six (fully agree). The four statements indicating feeling empathy are shown below in table 1. The statements were taken from the original International Personality Item Pool, the Five Factor Model developed by Goldberg (1999). The model has been validated by many studies and is therefore it is a valid measure to use.

Table 1

*Original variables on empathy*

Variable name in	Statement	When fully agreed, indicating
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dataset		high or low level of feeling empathy
Pers1	I sympathize with others' feelings	High
Pers3	I am not interested in other people's feelings	Low
Pers5	I feel others' emotions	High
Pers7	I am not really interested in others	Low

Agreeing with the first and the third statements indicates feeling sympathy, and agreeing with the second and fourth statements indicates no (or less) feelings of empathy. To create one variable measuring the level of empathy, the variables belonging to the second and fourth statements were recoded. Now, for each of the four variables, a higher value indicates feeling more empathy whereas a lower value indicates feeling less empathy. This scale is fairly reliable, as it has a Cronbach's  $\alpha$  value of .749. The higher the Cronbach's  $\alpha$ , the better. A value of .800 is considered a sign of pretty good internal consistency. This shows that the correlation between the present scale and all other possible four-item scales measuring empathy, is good.

The new variable measuring empathy adds the results from the four statements together and has a domain from zero to twenty-four ( $N=148$ ,  $M=17.378$ ,  $SD=3.630$ ). The level of measurement is ordinal. The higher the value of this new variable, the higher the level of empathy a person feels. Confirmatory factor analysis of the empathy scale produces one factor with an eigenvalue with a value larger than one (1.77), with factor loadings ranging from a minimum of .54 to a maximum of .76. Hence, a confirmatory factor analysis confirms the single dimensional nature of the empathy scale.

The level of psychopathic personality traits was the independent variable for the second hypothesis. In the questionnaire about personality, there were sixteen statements with which the participants could either agree or disagree, on a scale of zero (fully disagree) to six (fully agree), indicating psychopathic personality traits. These questions can be found in table 2 on the next page. The source of these statements is the Hare Psychopathy Checklist-Revised (Hare & Neuman, 2008). These items present in the ELSE dataset measure primary psychopathy and were used to measure the level of psychopathic personality traits. The questionnaire did not contain any items on secondary psychopathy, which measure impulsiveness and self-destruction.

As can be seen, answering 'yes' indicates a high level of psychopathy in most cases. The variables for which this is not the case, were recorded. Now, for each of the four variables, the

value one indicates to a psychopathic personality trait whereas the value zero does not. This sixteen-item scale is reliable as it has a Cronbach's  $\alpha$  value of .877.

Exploratory factor analysis reveals that the primary psychopathy scale has two factors with eigenvalue larger than one. However, the eigenvalue of 5.34 is much larger than the second factor's eigenvalue of 1.31. Moreover, only three items out of sixteen have a factor loading that is marginally higher for factor two than for factor one. Hence, the exploratory factor analysis produces an outcome that is very close to the predicted single dimensional solution. If we conduct a confirmative factor analysis by imposing the condition of single dimensionality, the confirmative factor analysis produces a single factor with eigenvalue 5.39 and with factor loadings ranging from .36 to .82. Two items are marginally below the rule of thumb threshold of .4 with factor loadings of .36 and .39.

Table 2

*Original variables on primary psychopathy*

Variable name in dataset	Statement	When fully agreed, indicating high or low level of psychopathy
Psy1	Success is based on survival of the fittest; I am not concerned about the losers.	High
Psy2	For me, what's right is whatever I can get away with.	High
Psy3	In today's world, I feel justified in doing anything I can get away with to succeed.	High
Psy4	My main purpose in life is getting as many goodies as I can.	High
Psy5	Making a lot of money is my most important goal.	High
Psy6	I let others worry about higher values; my main concern is with the bottom line.	High
Psy7	People who are stupid enough to get ripped off usually deserve it.	High
Psy8	Looking out for myself is my top priority.	High
Psy9	I tell other people what they want to hear so that they will do what I want them to do.	High
Psy10	I would be upset if my success came at someone else's expense.	Low
Psy11	I often admire a really clever scam.	High
Psy12	I make a point of trying not to hurt others in pursuit of my goals.	Low
Psy13	I enjoy manipulating other people's feelings.	High
Psy14	I feel bad if my words or actions cause someone else to feel emotional pain.	Low
Psy15	Even if I were trying very hard to sell something, I wouldn't lie about it.	Low

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Psy16	Cheating is not justified because it is unfair to others.	Low
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Both items were retained in the analyses.

The new variable measuring psychopathy is the sum of all results from the sixteen items and has a domain from zero to ninety-six ( $N=148$ ,  $M=31.541$ ,  $SD=14.183$ ). The level of measurement is ordinal, and is treated as such. The higher the value, the higher the level of psychopathic personality traits a person has.

The fact that the questionnaire only contains questions on primary and not on secondary psychopathy, may cause problems when interpreting the results. For this reason, the analysis in this research contained a variable measuring secondary psychopathy traits to be used as a control variable. Impulsiveness may lead to acting in a way that others, who think about the consequences and are less impulsive, would not. Impulsiveness can thus be associated with risk. People with secondary psychopathic personality traits would be likely show risk seeking behaviour. The dataset contains information about risk preferences, and these were used to measure secondary psychopathic personality traits. There were seven statements with which the participants could either agree or disagree, on a scale of zero (fully disagree) to six (fully agree), indicating risk preferences. The statements belonging to risk preferences can be found in table 3 on the next page.

The variables were recoded so that for each of the seven variables, the value six indicates to risk seeking behaviour whereas the value zero does not. The new variable measuring risk seeking is the sum of all results from the seven items and has a domain from zero to forty-two ( $N=148$ ,  $M=23.960$ ,  $SD=6.015$ ). This seven-item scale is reliable as it has a Cronbach's  $\alpha$  value of .787. The level of measurement of the new variable is ordinal. The higher the value, the higher the level of risk seeking behaviour. As risk seeking behaviour is associated with secondary psychopathy, this variable was interpreted as follows. The higher the value, the higher the level of secondary psychopathy traits a person has.

Confirmatory factor analysis of the risk seeking scale produces one factor with an eigenvalue with a value larger than one (2.46), with factor loadings ranging from a minimum of .49 to a maximum of .73. Hence, a confirmatory factor analysis confirms the single dimensional nature of the risk seeking scale.

It is important to stress that both psychopathy variables measure levels of psychopathy personality traits, not baldly whether one is a psychopath or not. The participants were students from Utrecht University. They formed a good group to test levels of psychopathic personality traits because they were a random selection of students, and, therefore, the chance that psychopaths are overrepresented in this group was highly unlikely.

To test each hypothesis, regression analysis were conducted to explore the relation between the dependent and independent variables. Gender ( $N=148$ ), age ( $N=148$ ,  $M=23.412$ ,  $SD=4.969$ ) and

Table 3

*Original variables on risk preferences*

Variable name in dataset	Statement	When fully agreed, indicating high or low level of risk seeking behaviour
Risk1	I am not willing to take risks when choosing a job or company to work for.	Low
Risk2	I prefer a low risk/high security job with a steady salary over a job that offers high risks and high rewards.	Low
Risk3	I prefer to remain on a job that has problems I know about rather than take a risk of working at a new job that has unknown problems even if the risk offers greater rewards.	Low
Risk4	I view risk on a job as a situation to be avoided at all costs.	Low
Risk5	I enjoy the excitement of uncertainty and risk.	High
Risk6	I am willing to take a significant risk if this is necessary to obtain my fair share.	High
Risk7	I am willing to take a significant risk if the possible rewards are high enough.	High

field of study ( $N=136$ ) used as control variables for both hypotheses, and risk seeking was used as an extra control variable for testing the second hypotheses. Field of study shows whether a participant has a background in economic studies or not. These control variables were added to the model to see whether the relationship between the dependent and independent variable changed when another possible independent variable was added. For each hypothesis, two models were conducted. The dependent variable of the first model for the first hypothesis, was the level of cooperation, and the independent variables were the level of empathic personality traits and gender, age, and field of study. In the first model for the second hypothesis, the independent variables were the level of psychopathic personality traits, gender, age, field of study, and risk



seeking. The second models included moderation terms to test for moderation effects. Before performing the analyses, all the independent variables, apart from the binary variables, were centred to reduce multicollinearity. In other words, centring the variables reduced the correlations among the independent variables.

The models were performed using STATA. Both models were performed using a logistic regression. This model was chosen because it is suitable to estimate relationships between a binary dependent variable and a set of independent variables.

### 3.2 Part B

*H3: Cooperation in simple economic experiments is higher among individuals in a happy mood than among individuals in a sad mood.*

#### 3.3a Data

The experiment used to test the third hypothesis was collected by Tilburg University. The data were collected as part of an experimental study of decision-making. The participants were all first year business economics students. The dataset contains information of 573 participants, of which 404 were used for the analyses due to missing values. The experiments took place in a classroom setting, during the students' tutorials. Each tutorial group consisted of approximately thirty students. The students could win an amount up to 125 euros and they answered all questions anonymously. This motivated the students to participate and take the experiments seriously. The research consisted of four parts, collected over a period of three months. Each student participated in all four parts, unless they were absent from one of the tutorials during which the experiments were conducted. The four parts of the research were collected during four different tutorials. The first part was a questionnaire every student filled out about their personality. After this, three different decision-making experimental games were played. The decisions and outcomes of the three experiments were independent of one another.

The first game played was a one-shot Prisoners Dilemma Game. The data collected from this experiment was used for the analysis of this paper and therefore only this experiment will be discussed. The students first read general instructions. Then music was switched on for the participants to listen to for a few minutes before the experiment started. The instructions read the following concerning the music: *'We expect that playing music during the session reduces temptations to violate these guidelines. To focus on the experiment and leave behind different thoughts, we will play a piece of music to you for several minutes before the actual experiments starts. The music will also be played softly during the remainder of the session.'* In reality, the music was played in order to influence the mood of the participants. After having listened to the

music for several minutes, the participants were asked to answer questions on their experiences while listening to the music. These questions also included questions on the current mood of the participants.

After this, the Prisoners Dilemma Game started. There were two parts, only part I-a was used for the analysis of this research so only this part is discussed. The instructions that all participants received for this part of the experiment can be found in appendix B. Before beginning the experiment, participants were asked to judge their current mood. Then, each participant was paired with a randomly selected other participant. The possible outcomes of the one-shot Prisoners Dilemma Game are shown in table 4. The participants were asked which of the two pricing strategies they would choose for four periods of a year (January-March, April-June, July-September and October-December), when the decision was made simultaneously with the other firm and if both did not know what the other did. The choices made were strategic choices because the participant's outcome depended on the decision of the opponent<sup>2</sup>.

Table 4

*Prisoners Dilemma*

		Profits in thousand Euro (TEuro)	
		FIRM B	
FIRM A	Low price	Low price (A: -200, B: -200)	High price (A: +600, B: -600)
	High price	(A: -600, B: +600)	(A: +200, B: +200)

**Note:** In the cells, profits and losses are reported in parentheses: (A: firm A's loss or profit, B: firm B's loss or profit).

### 3.3b Measurements

To test the third hypothesis, the dependent variable used was the level of cooperation. This was measured by the choice made by the participant when confronted with the Prisoners Dilemma. The participant made four choices; the participant could choose between setting a high or a low price in four periods. As the choice is a strategic choice, cooperation can be measured by looking at the total outcome of both players. The option to choose the low price strategy is preferred by each player, only when the other player chooses a high price strategy. And if both firms chose to set a

<sup>2</sup> This is an important distinction from the ELSE dataset, in which strategic strategies did not play a role. This difference between the two datasets makes the ELSE dataset more appropriate to test for social motives, and the Tilburg University dataset more appropriate to test for emotions. Strategic strategies can influence social motives yet they do not influence emotions.

high price, this leads to an outcome where no one can be made better off without making the other worse off. This outcome is therefore the outcome of mutual cooperation. This is called a Pareto-optimal outcome, as explained in the introduction of this paper. So setting a high price indicates cooperation. For each of the four variables, the value one indicates to cooperation whereas the value zero does not. The new variable to measure the level of cooperation is the sum of all results from the four decisions and has a domain from zero to four ( $N=467$ ,  $M=1.152$ ,  $SD=1.224$ ). The level of measurement is ordinal. The higher the value, the higher the level of cooperation. The level of cooperation was measured in two ways. The second variable was a binary variable, simply measuring whether someone had cooperated or not ( $N=467$ ).

The independent variable used to test the third and last hypothesis is the mood of the contestant during the game. Before the experiment started, he or she was asked the following question: *'How do you rate your current mood? Please choose the appropriate response for each item on a scale ranging from 1 to 9 by circling the corresponding number (1 = extremely pleasant, 9 = extremely unpleasant).'* The new variable has a domain from one to nine and the level of measurement is ordinal. The variable was recoded, so that the higher the value, the more *pleasant* the current mood of the participant ( $N=467$ ,  $M=4.713$ ,  $SD=1.759$ ). In other words, it was assumed that the higher the value, the happier the participant.

Two models were tested. In both, gender ( $N=478$ ) and age ( $N=478$ ,  $M=18.883$ ,  $SD=1.204$ ) were used as control variables. Unlike in the earlier regression analyses, the field of study was not used as a control variable, as all participants were business economics students. The dependent variable of the first model was the level of cooperation and the independent variables were the current mood, gender and age. In the second model, moderation terms were included to test for moderation effects.

Again, the models were performed using STATA after all independent variables, apart from the binary variables, had been centred to reduce multicollinearity. Both models were performed using an ordered logit regression as well as a logistic regression, as the level of cooperation was measured in two different ways. These models were chosen because the first is suitable to estimate relationships between an ordinal dependent variable and a set of independent variables, and the second is suitable to estimate the relationship between a binary dependent variable and a set of independent variables.

## 4. Results

### 4.1 Part A

*H1: Cooperation in simple economic experiments is higher among individuals who feel empathy*

*for their opponent than among individuals who feel no empathy for their opponent.*

The first hypothesis was tested using logistic regression. The results can be found in table 5 on the next page. Model 1 shows the results from the logistic regression using cooperation as the dependent variable, the level of empathy as the independent variable, and gender, age and field of study as control variables. Model 2I up to and including model 2IV have included the product terms. The five models produce the robust finding that empathy has a positively significant effect on cooperation. Note that, in models including interaction terms, none of the product terms is significant, although model 2I, 2III and 2IV reveal a higher model fit, shown by the increased  $\chi^2$ . Moreover, although the included product terms are non-significant, the  $R^2$  (explained variance) of models 2III and 2IV is significantly higher at values of 0.12 and 0.13, respectively, which is about twice as high as of models 1, 2I and 2II.

Thus, the significant relationship within this model is the relationship between cooperation and the level of empathy ( $p < .05$ ). A two-tailed test confirms a significant relation between the level of empathy and cooperation. The coefficients belonging to the level of empathy are positive numbers in each model, indicating a positive relationship. This confirms hypothesis number one; cooperation is higher among individuals who feel empathy for their opponent than among individuals who feel no empathy for their opponent. There was no significant relationship between cooperation and any of the control variables.

*H2: Cooperation in simple economic experiments is higher among individuals with lower levels of psychopathic personality traits than among individuals who with higher levels of psychopathic personality traits.*

The second hypothesis was also tested using logistic regression. The results can be found in table 6, two pages ahead. Model 1 shows the results from the logistic regression using cooperation as the dependent variable, level of psychopathic personality traits as independent variable, and risk seeking, gender, age and field of study as control variables. Model 2I up to and including model 2V have included the product terms. The six models produce the robust finding that psychopathy has a positively significant effect on cooperation. Note that, in models including interaction terms, none of the product terms is significant, although model 2I, 2II, 2III, 2IV and 2V all reveal a higher model fit, shown by the increased  $\chi^2$ . However, the increased model fit is not associated with a higher  $R^2$ .

The only significant relationship within the models is the relationship between cooperation and the level of psychopathic personality traits ( $p < .05$ ). A two-tailed test confirms a significant relation between the level of psychopathic personality traits and cooperation. The coefficients

belonging to the level of psychopathic personality traits are positive numbers, indicating a positive relationship. This goes against the expectation of hypothesis number two; cooperation appears to be higher among individuals with *higher* levels of psychopathic personality traits than among individuals who with *lower* levels of psychopathic personality traits. Hypothesis number two has been falsified. This issue shall be discussed in the conclusion and discussion. There was no significant relationship between cooperation and any of the control variables.

Table 5

*Results logistic regression using cooperation as the dependent variable*

Model 1		Model 2				
	Odds ratio and standard error	Model 2I	Model 2II	Model 2III	Model 2IV	
Constant	$\beta$ 1.31 (SD 0.75)	Constant 1.30 (0.76)	1.31 (0.75)	0.86 (0.53)	0.84 (0.52)	
Empathy	1.17* (0.06)	Empathy 1.44* (0.27)	1.17* (0.07)	1.46* (0.08)	1.71* (0.36)	
Sex	1.07 (0.41)	Sex 1.02 (0.40)	1.07 (0.41)	1.39 (0.57)	1.31 (0.54)	
Age	1.02 (0.07)	Age 1.03 (0.07)	1.02 (0.07)	1.08 (0.08)	1.12 (0.08)	
Study	1.43 (0.64)	Study 1.57 (0.71)	1.43 (0.68)	1.31 (0.60)	1.70 (0.84)	
		Interaction empathy & sex 0.88 (0.10)			0.91 (0.11)	
			Interaction empathy & age 1.00 (0.02)		0.98 (0.02)	
				Interaction empathy & study 0.66 (0.08)	0.63 (0.09)	
LR $\chi^2$	9.31	LR $\chi^2$	10.82	9.31	21.97	24.20
Log likelihood	-86.28	Log likelihood	-85.52	-86.28	-79.94	-78.83
Pseudo $R^2$	0.05	Pseudo $R^2$	0.06	0.05	0.12	0.13

\* Significant result when  $\alpha=0.05$ .

#### 4.2 Part B

*H3: Cooperation in simple economic experiments is higher among individuals in a happy mood than among individuals in a sad mood.*

The third hypothesis was tested in two different ways, depending on the measurement of the level of cooperation. The first test used ordered logit regression because the level of cooperation was measured as an ordinal variable. The results can be found in table 7, two pages ahead. Model 1 shows the results from the ordered logit regression using cooperation as the dependent variable,

mood as independent variable, and gender and age as control variables. Model 2I up to and including model 2III have included the product terms. The four models produce the robust finding that only

Table 6

*Results logistic regression using cooperation as the dependent variable*

Model 1		Model 2					
	Odds ratio and standard error		Model 2I	Model 2II	Model 2III	Model IV	Model V
Constant	$\beta$ 1.31 (SD 0.78)	Constant	1.29 (0.77)	1.30 (0.43)	1.32 (0.79)	1.25 (0.77)	1.17 (0.73)
Psychopathy	0.96* (0.01)	Psychopathy	0.96* (0.01)	0.96 (0.04)	0.96* (0.01)	0.95* (0.02)	0.97 (0.04)
Risk seeking	1.04 (0.03)	Risk seeking	1.04 (0.03)	1.04 (0.03)	1.04 (0.03)	1.04 (0.03)	1.04 (0.03)
Sex	1.05 (0.42)	Sex	1.06 (0.42)	1.06 (0.43)	1.04 (0.41)	1.07 (0.43)	1.11 (0.47)
Age	0.99 (0.07)	Age	0.99 (0.07)	0.99 (0.03)	1.00 (0.07)	1.00 (0.07)	1.01 (0.07)
Study	1.65 (0.76)	Study	1.65 (0.76)	1.65 (0.76)	1.81 (0.92)	1.53 (0.72)	1.75 (0.88)
		Interaction psychopathy & risk seeking	1.00 (0.00)				1.00 (0.00)
		Interaction psychopathy & sex		1.00 (0.03)			0.99 (0.03)
		Interaction psychopathy & age			1.00 (0.00)		1.00 (0.00)
		Interaction psychopathy & study				1.02 (0.03)	1.02 (0.03)
LR $\chi^2$	9.22	LR $\chi^2$	9.28	9.23	9.43	9.51	10.18
Log likelihood	-86.32	Log likelihood	-86.29	-86.32	-86.22	-86.18	-85.84
Pseudo $R^2$	0.05	Pseudo $R^2$	0.05	0.05	0.05	0.05	0.05

\* Significant result when  $\alpha=0.05$ .

gender has a positively significant effect on cooperation. Note that, in models including interaction terms, none of the product terms is significant, although model 2I and 2III reveal a higher model fit, shown by the increased  $\chi^2$ . However, the increased model fit is not associated with a

higher  $R^2$ .

The only significant relationship within this model is the relationship between cooperation and gender ( $p < .05$ ). A two-tailed test confirms a significant relation between gender and cooperation. The coefficients belonging to gender are positive numbers in each model, indicating a positive relationship. As zero is the value for males, and one is the value for females, the data indicate that the level of cooperation is higher among females than among men. There was no significant relationship between mood and cooperation, falsifying hypothesis number three. The results do not show that cooperation experiments is higher among individuals in a happy mood than among individuals in a sad mood.

Table 7

*Results ordered logit regression using the level of cooperation as the dependent variable ('PDsim\_num')*

Model 1		Model 2		
	Coefficient and standard error	Model 2I	Model 2II	Model 2III
Mood	$\beta$ 0.03 (SD 0.05)	Mood 0.31 (0.54)	0.03 (0.07)	0.03 (0.07)
Gender	0.53* (0.19)	Gender 0.53* (0.19)	0.53* (0.19)	0.53* (0.19)
Age	0.03 (0.08)	Age 0.03 (0.09)	0.03 (0.08)	0.03 (0.09)
		Interaction mood & age -0.01 (0.05)		-0.01 (0.05)
			Interaction mood & gender -0.00 (0.11)	-0.00 (0.11)
LR $\chi^2$	7.69	LR $\chi^2$ 7.72	7.69	7.73
Log likelihood	-522.89	Log likelihood -522.88	-522.89	-522.88
Pseudo $R^2$	0.01	Pseudo $R^2$ 0.01	0.01	0.01

\* Significant result when  $\alpha = 0.05$ .

The second way to test the third hypothesis was a test using logistic regression because the level of cooperation was measured as a dichotomy variable. The results can be found in table 8 on the next page. Model 1 shows the results from the logistic regression using cooperation as the dependent variable, mood as independent variable, and gender and age as control variables. Model 2I up to and including model 2III have included the product terms. Again, the four models produce the robust finding that only gender has a positively significant effect on cooperation. Note that, in models including interaction terms, none of the product terms is significant, although model 2I, 2II



and 2III all reveal a higher model fit, shown by the increased  $\chi^2$ . However, the increased model fit is not associated with a higher  $R^2$ .

So the only significant relationship within this model is the relationship between cooperation and gender ( $p < .05$ ). The coefficients belonging to gender are positive numbers in each model, indicating a positive relationship. As zero is the value for males and one is the value for females, the data indicate that the level of cooperation is higher among females than among men. Comparing the results of the two tests shows that when the level of cooperation is measured as a dichotomy variable, the effect of gender is larger and stronger. There was no significant relationship between mood and cooperation, again finding no support for hypothesis number three.

Table 8

*Results logistic regression using the level of cooperation as the dependent variable ('PDsim\_num\_binary')*

Model 1		Model 2			
	Odds ratio and standard error		Model 2I	Model 2II	Model 2III
Constant	$\beta$ 1.00 (SD 0.12)	Constant	1.00 (0.12)	1.00 (0.12)	0.99 (0.12)
Mood	1.05 (0.06)	Mood	1.05 (0.06)	1.04 (0.07)	1.04 (0.07)
Gender	1.87* (0.41)	Gender	1.89* (0.42)	1.88* (0.42)	1.89* (0.42)
Age	0.95 (0.08)	Age	0.93 (0.09)	0.95 (0.08)	0.93 (0.09)
		Interaction mood & age	0.97 (0.05)		0.97 (0.05)
		Interaction mood & gender		1.04 (0.13)	1.03 (0.13)
LR $\chi^2$	9.43	LR $\chi^2$	9.92	9.52	9.98
Log likelihood	-273.33	Log likelihood	-273.09	-273.29	-273.06
Pseudo $R^2$	0.02	Pseudo $R^2$	0.02	0.02	0.02

\* Significant result when  $\alpha = 0.05$ .

## 5. Conclusion and discussion

This research has aimed to elucidate the role of social motives in game theory. This was done by using two different datasets on game theoretical games; Prisoner's Dilemma and Decomposed Games. The main question that has been raised in this area of research, is why do individuals cooperate if they could make themselves better off by not cooperating? The three possible explanations for cooperative behaviour in simple economic games, explored in this research, are

empathy, certain levels of psychopathic personality traits and emotions. Empathy and psychopathy are traits a person can have, and the third factor, emotions, addresses a state. Therefore, this research was a trait versus state debate in explaining decision-making in game theory.

Using an experiment collected by Utrecht University on Dictator's Games, it seems that there is a positive relationship between empathy and cooperation. Empathy leads to altruistic behaviour in simple economic games. These results are in line with Batson's (1991) empathy-altruism hypothesis, which states that when people feel empathy for others, this leads to motivation to behave in a truly selfless way to help others. The data from Utrecht University have shown that empathy leads to higher levels of cooperation. And cooperation can be seen as altruistic behaviour, as competitive behaviour yields a higher outcome for oneself.

Second, again using the Dictator's Games experiment, this research has shown that there is indeed a relationship between levels of psychopathic personality traits, but not the relationship that was expected. The data have shown that the higher the levels of psychopathic personality traits, the more likely someone is to cooperate in an economic game. The opposite relationship was expected. The data have shown that the higher the level of primary psychopathic personality traits, the higher the levels of cooperation. Primary psychopathic traits include selfish, uncaring and manipulative behaviour towards others (Levenson, Kiehl & Fitzpatrick, 1995). The data also checked for a relationship between secondary psychopathic traits and cooperation, and the mediating effect of secondary psychopathy on the relationship between primary psychopathy and cooperation. Secondary psychopathic traits include impulsiveness and self-destruction. The lack of significant relationships with secondary psychopathic traits with the other two variables may explain the unexpected relationship between primary psychopathic personality traits and cooperation. When a person has primary psychopathy traits, but no secondary psychopathy traits, they may be deceitful and pretend to want to cooperate (or not) because they are able to control and repress their impulses. However, when a person has primary as well as secondary psychopathy traits, he or she will most likely act in a way true to his or her nature because he or she is unable to repress impulses. Therefore, the positive relationship between primary psychopathic personality traits and cooperation may be deceitful, as these individuals might have been able to fully control their psychopathic impulses. To prevent this problem in future research, levels secondary psychopathic personality traits should not be measured only by using levels of risk seeking behaviour as an indicator for secondary psychopathy traits. The most widely used instrument to measure psychopathy is the Hare Psychopathy Checklist-Revised (Hare & Neuman, 2007). This checklist makes the distinction between primary psychopathy and secondary psychopathy. For each category, several items were created to measure psychopathy. These items were used to

measure primary psychopathy in this research, but not secondary psychopathy. A future recommendation is to also use this checklist to measure secondary psychopathy.

The last issue this research investigated was the relationship between emotions and cooperation in economic games. This was done by using a dataset containing information on Prisoner's Dilemma Games, collected by Tilburg University. No relationship was found between the mood someone is in before playing a game, and the levels of cooperation. This result is not in line with previous research (e.g. by Wood et al., 1990; Green et al., 2003; Rowe et al., 2007). A possible explanation for failing to find a positive relationship between mood and cooperation is the size of the scale that was used to measure mood. It was a nine-point scale, one indicating an extremely unpleasant mood, and nine indicating an extremely pleasant mood. This is a wide range. The modus of the variable was four and the average was 4.71 with a standard deviation of 1.76. This shows that there are very few values near either of the extreme ends of the scale. The music used to induce a certain mood has proven not to lead to extreme moods. Perhaps there is a relationship between mood and cooperation, but only when the mood is either extremely positive or extremely negative. Future research could explore this issue further by inducing more extreme moods than was done in this research. Another possible explanation for the unexpected results, is that all participants of the experiment were first year economic students. They may have a different mind-set than individuals from other disciplines. It is often said that economists act more rationally and selfish, and are more outcome-oriented than individuals from other fields. This might especially be the case here, because the students wanted to perform well in order to prove themselves and win money. Future research should therefore include participants from other fields of studies.

Returning to answer the main question: feeling empathy and having psychopathic personality traits lead to higher levels of cooperation in simple economic games, yet emotions do not appear to play a role. For this reason, traits are a more plausible explanation for cooperative behaviour than is the state a person is in. This research has shown that social motives play a role in explaining behaviour in simple economic games, as individuals do not act fully selfish. Finally, it should be noted that these results are applicable to students, and future research is needed to find out whether these results can be generalized to other population groups too.

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## **Appendix A. Instructions experiment ELSE Laboratory**

## Appendix B. Instructions experiment Tilburg University

### GAME SETTING

#### For both experiment parts I-a and I-b

Two firms operate in the same market: firms A and B. The firms are identical, offering the same homogenous product and being equally cost efficient. As a result of deep pockets as a result of 2,600 TEuro (thousand Euro) earnings from last year, bankruptcy is not an issue here. Both firms can choose among two price strategies: setting a low price (L) or setting a high price (H). Consumers select their preferred product on the basis of price only. The profits depend on the pair of price strategies chosen. The following strategy-profit matrix reports the four possible profit combinations resulting from the four possible strategy pairs. Profits are reported for one quarter of a year.

		Profits in thousand Euro (TEuro)	
		FIRM B	
		Low price	High price
FIRM A	Low price	(A: -200, B: -200)	(A: +600, B: -600)
	High price	(A: -600, B: +600)	(A: +200, B: +200)

**Note:** In the cells, profits and losses are reported in parentheses: (A: firm A's loss or profit, B: firm B's loss or profit).

Each cell contains the profit and / or loss combination that results from the corresponding strategy pair (firm A's loss or profit, firm B's loss or profit):

- 1) *[upper left cell]* Both firms choose to set the same low price. The profit margins are negative. Both firms have a loss of 200 TEuro.
- 2) *[upper right cell]* Firm A offers a lower price than firm B. The customers of firm B prefer to buy from the cheaper firm A, which can also generate economies of scale. The profit of firm A is therefore 600 TEuro, and the loss of firm B is 600 TEuro.
- 3) *[lower left cell]* Firm B offers a lower price than firm A. The resulting profit combination is the opposite of the second case. Firm A generates a loss of 600 TEuro, and firm B reaps a profit of 600 TEuro.
- 4) *[lower right cell]* Both firms choose to set the same high price. The profit margins are positive. However, due to the split of the market between both firms, economies of scale are smaller. Both firms gain a profit of 200 TEuro.

Suppose you are Chief Executive Officer of one of these firms. You decide autonomously on the price strategy of your company. Starting with the 2,600 TEuro earnings from last year, depending on your and the other firm's decisions, in the following year (with decisions for four quarters) the firm can lose 2,400 TEuro (leading to a firm value of 200 TEuro), but also win 2,400 TEuro (leading to a firm value of 5,000 TEuro). To incentivize you to maximize the firm's profit, the owner-shareholder of your firm decided to introduce performance pay: your earnings will be the final firm value divided by 40,000 in Euro. Thus, you can earn between 5 Euro and 125 Euro.

**This setting applies to ALL parts of experiment I. Therefore, please keep this page with the strategy-profit matrix in front of you, after carefully cutting off this page.**

## Please wait!

*Please continue on the next page*

### Instruction for part I-a of the experiment

You have an agreement with your distributor to fix the future price levels for your product. It is a custom in this industry that yearly contracts with distributors are drawn, in which the price level you prefer to set in each quarter for the coming year is fixed in advance. It is impossible to change the terms of the contract during the year. The Chief Executive Officer of the other firm will simultaneously determine her/his price strategy with her/his distributor (another one than yours) for the four quarters of the following year, such that neither firm does know the other firm's price strategy for the coming year. That is, neither you nor the other CEO is informed about the other's price strategy for the coming year. Indicate in the table below for each quarter of the year the price level that you prefer (capital L indicates a low price and capital H indicates a high price). Note that all sequences of low and high prices are feasible.

If I am CEO of firm A and decide simultaneously with firm B, and if we both do <u>not</u> know what the other does, then I will do the following ...				
	Quarter			
	I (Jan-Mar)	II (Apr-Jun)	III (Jul-Sep)	IV (Oct-Dec)
Price (L or H)	<input type="checkbox"/> L <input type="checkbox"/> H	<input type="checkbox"/> L <input type="checkbox"/> H	<input type="checkbox"/> L <input type="checkbox"/> H	<input type="checkbox"/> L <input type="checkbox"/> H

*Please continue on the next page*



**Please judge the just finished part of the experiment.**

1. In making the making the preceding decisions, I invested ... [ ]

... very, very low mental effort,

[ ] ... very low mental effort, [ ] ...

low mental effort,

[ ] ... rather low mental effort,

[ ] ... neither low nor high mental effort, [ ] ...

rather high mental effort,

[ ] ... high mental effort,

[ ] ... very high mental effort,

[ ] ... very, very high mental effort.

2. Please answer the following questions regarding your previous decision-making; only circle one number per question.

a) Have you been sure about your decisions?

*Always very uncertain* 1\_\_\_\_2\_\_\_\_3\_\_\_\_4\_\_\_\_5\_\_\_\_6\_\_\_\_ 7 *Always very sure*

b) Did you feel that you could easily make up your mind?

*Always very easy* 1\_\_\_\_2\_\_\_\_3\_\_\_\_4\_\_\_\_5\_\_\_\_6\_\_\_\_ 7 *Always very difficult*

c) Were you uncertain about what would be the best choice for you?

*Always very uncertain* 1\_\_\_\_2\_\_\_\_3\_\_\_\_4\_\_\_\_5\_\_\_\_6\_\_\_\_ 7 *Always very sure*

d) If you could have had the experiment in Dutch or English, what would have been your preference?

*Strong preference for*

*English*

1\_\_\_\_2\_\_\_\_3\_\_\_\_4\_\_\_\_5\_\_\_\_6\_\_\_\_ 7

*Strong preference for*

*Dutch*

3. Given that the experiment was pretty complex, which percentage (0-100) of the questions/text/game did you fully understand?

.....%

4. How do you rate your current mood? Please choose the appropriate response for each item on a scale ranging from 1 to 9 by circling the corresponding number (1 = *extremely pleasant*, 9 = *extremely unpleasant*).

*Extremely pleasant* 1-2 \_\_\_\_3\_\_\_\_4\_\_\_\_5-6 \_\_\_\_7\_\_\_\_8-9 *Extremely unpleasant*

5. How do you rate your overall level of arousal at this moment? Please choose the appropriate response for each item on a scale ranging from 1 to 9 by circling the corresponding number (1 = *extremely low*, 9 = *extremely high*).

*Extremely low* 1 2 3 4 5 6 7 8 9 *Extremely high*

*Please continue on the next page*

