CHAPTER 4

Us or Them and Quid Pro Quo? Prosocial Behavior in an Intergroup Situation

Introduction

In the last chapter I investigated the use of social heuristics in a group-decision-making situation. We have seen that social heuristics can be successful in persuading others to increase or decrease a monetary offer when groups discuss how to allocate a given sum of money. In this chapter, I investigate whether two of the social algorithms proposed in the last chapter, namely, the reciprocity and the coalitional group processes, are also used for determining *individual* prosocial allocations in a series of economic games. I will propose a social heuristic that people might use when they determine whether they should act prosocially. Specifically, I am interested in how children use this social heuristic compared to adults and whether we can find a developmental trend. Finally, the predictions of this heuristic is compared to the predictions of theories of social preferences. In the following sections, I will first elaborate why reciprocity and ingroup favoritism can indeed be viewed as socially rational algorithms for prosocial decision making by drawing on theoretical literature from evolutionary biology and anthropology and empirical data from social and developmental psychology. Next, I will introduce the prosocial heuristic as a model of prosocial decision-making in one-shot interactive situations. This prosocial heuristic is compared to another model of prosocial behavior, namely social preferences. Following that, I will introduce the hypothesis and methods of an empirical study, which tested the explanatory power of both of these models in a developmental context. Implications for social and developmental psychology, judgment and decision making and evolutionary research, and experimental economics are discussed after I presented the results of this investigation.

Reciprocity and ingroup favoritism as adaptive social algorithms for prosocial decisions

The social rationality approach, as it was introduced by Gigerenzer (e.g. Gigerenzer, 1996, 2000) and discussed in Chapter 3, does not judge the rationality of an action or decision by comparing it to the "rational" standards of utility maximization. Instead, this approach asks what kinds of social problems humans were and are confronted with in their lives, what kinds of phenomena cause these problems, and what kinds of solutions humans have developed, either individually or socially, over evolutionary and ontogenetic development to solve these problems adaptively. In this vein, researchers in the social rationality approach often look back into the evolutionary history of humans to identify the re-occurring and universal challenges of mankind and the cognitive and social solutions to these problems, and to explain seemingly "irrational" behavioral phenomena by referring to their adaptive value in the past and present. As we shall see, the question of why humans are such prosocial species—much more than any other animal—has bugged evolutionary theorists for a long time.

In contrast to psychologists, who predominantly focus on *proximate* causes when investigating prosocial behavior (i.e. explaining how organisms work by describing their structures, mechanisms, and ontogeny), evolutionary biologists and anthropologists explore the *ultimate* causes of such behavior, that is, the reasons why organisms are the way they are, by describing how they were shaped by natural selection over the course of phylogeny. For a long time, biologists have been puzzled by the incidence of prosocial, cooperative, and altruistic behavior in humans as well as some animals. In biology, altruism is defined as a behavior that enhances the fitness of another organism (the recipient) at some cost to the individual fitness of the actor (the donor; see McElreath et al., 2003). The term "strong reciprocity" has been introduced to refer to a behavior in which (1) an actor sacrifices resources to bestow benefits on those who have previously bestowed benefits or (2) sacrifices resources to punish those who are not bestowing benefits in accordance with some social norm, even if this behavior is costly and will not provide any present or future rewards for the agent (see Fehr & Henrich, 2003). Thus, the sharing behavior we have witnessed in our participants in the dictator and ultimatum games can from this perspective be regarded as both altruistic and strongly reciprocal. However, for reasons of clarity, in what follows, I will stick to the previously established term prosocial behavior.

From an evolutionary point of view, prosocial behavior (as defined above) is a trait that would be quickly stamped out over the course of phylogeny. The reason for this is pretty easy to grasp. Imagine a group from a large population consisting of *N* individuals indexed by *i*. Each individual possesses either an altruistic gene or an egoistic gene tracked by x_i. If $x_i = 1$, the individual *i* possesses the altruistic allele (version of the gene), and if $x_i = 0$, the individual *i* possesses the egoistic allele. Prosocial individuals bestow benefits on the members of their group at a cost to themselves, but both egoistic and altruistic group members will benefit from this prosocial behavior. This will lead, on average, to a higher fitness (usually conceptualized as the number of successful offspring an individual has per generation) for egoists and to a decline and an eventual vanishing of individuals with altruistic traits in the group (see also Henrich, 2004). Evolutionary models have focused on only a few explanations that describe the evolution and maintenance of prosocial behavior in animals and humans. In the following sections, I will discuss three theoretical approaches that have tried to solve the puzzle of human prosocial behavior.

Kin selection

The most well established explanation of human prosocial behavior is inclusive fitness and kin selection (Hamilton, 1964a, 1964b). The concept of inclusive fitness draws on the fact that an organism's abilities and traits are not only preserved in its own genes but that relatives carry replicas of the same gene. Hamilton's inclusive fitness theory leads to the prediction that natural selection will favor actions that cause a person's genes to be passed on, regardless of whether the person is the actual direct ancestor. Hence, by helping a relative in times of need, one would assist this relative to become an ancestor of offspring with similar genes. A genetic influence on the tendency to help relatives would increase the proportion of one's own genes in the population. Kin selection can therefore be denoted as altruistic actions toward relatives. A gene that promotes altruistic actions is likely to spread in a population if the benefit to the recipient of an altruistic action (*b*) multiplied by the degree of relatedness (*r*) exceeds all reproductive costs to the altruist (*c*), or:

$$rb > c \qquad \text{(Hamilton's rule)}$$

As indicated by this equation, the degree of relatedness matters. Hamilton's rule would therefore predict that altruistic actions would be most likely between closely related kin (for identical twins, the value of $r = 1.0$, for parents and their offspring and for siblings $r = 0.5$, for cousins $r = 0.25$), but that such acts will become less and less likely the more distant the relationship.

Kin selection is a fundamental mechanism explaining the evolution of cooperation in many animal societies as well as humans (see Harcourt, 1991 and Richerson & Boyd, 1998 for examples). Research on incest avoidance and patterns of homicide also demonstrates that humans recognize and differentiate between kin and non-kin. This is a prerequisite to make it impossible for free-riders to fake kin cues and collect the benefits of prosocial acts between relatives without paying the costs. However, kin-based mechanisms of prosocial behavior are designed to focus benefits only on close relatives. Hence, kin selection cannot explain prosocial behavior among (large) groups of unrelated individuals as we witness, for example, in economic games.

Reciprocal altruism

Trivers' (1971) seminal work on reciprocal altruism is probably the most well established theory that attempts to explain altruism or prosocial behavior among non-kin. Trivers showed that a behavior can be favored by natural selection if it follows the principle of reciprocity and if the costs for the performer of the altruistic act are less than the benefits of that act for the recipient (when costs and benefits are defined as increase or decrease in probability that the relevant allele will spread in the population). The recipient will reciprocate the altruistic act if cheating (i.e. not reciprocating) has an adverse effect on his life, for example, if the altruist stops behaving altruistically toward the cheater in the future. Given that the benefits of these lost altruistic acts outweigh the costs of reciprocating, the cheater will be selected against relative to individuals who exchange many altruistic acts. The chances that altruistic behavior will be selected for in one species are greatest when the number of such altruistic exchanges is high in the lifetime of an altruist, when a given recipient interacts repeatedly with the same small set of individuals, and when a pair of altruists are able to provide each other with roughly equivalent benefits at roughly equivalent costs. Trivers (1971) elaborated a set of biological parameters that influence whether reciprocally altruistic behavior will be selected for. A long lifetime of individuals increases the probability that individuals will experience many altruistic situations. A low dispersal rate of individuals of a given species maximizes the chance that an actor will repeatedly interact with the same set of individuals. Mutual dependence of individuals (e.g. to avoid predators) will keep them near each other and also will increase the possibility of encountering altruistic situations.

Theoretical analyses have frequently shown that strategies of reciprocal altruism or direct reciprocity can be favored by selection if they are sufficiently common in a population. Axelrod and Hamilton (1981) simulated a pairwise interaction of players in a repeated prisoner's dilemma where the interaction had a given probability of continuing for another round. In their model, the tit-for-tat strategy ("cooperate in the first round of the game, and then do whatever your partner did on the previous round of the game") proved to be the most successful (evolutionarily stable) strategy. If the payoffs of cooperation were high and if the game was repeated over many rounds, then even an unconditional defection strategy ("always defect") could not invade a population of tit-for-tat users.

However, as Henrich (2004) points out, such models of reciprocal altruism often operate with a number of constraints. First, they often analyze only two different strategies at a time and do not consider the presence of additional strategies even maintained at low frequency, for example, by mutation or immigration. Second, most theoretical models of reciprocity only explore two-person interactions. As Boyd and Richerson (1988) have demonstrated, the results of Axelrod and Hamilton (1981) do not generalize to groups with more than 10 group members. These results are also connected to the problem that individuals must be able to accurately recognize their partner(s) in repeated games and keep track of their actions. Thus, direct reciprocity, reciprocal altruism, or tit-for-tat seems to be a valuable strategy in small to medium-sized groups in which individuals repeatedly interact, but these strategies can explain neither the high cooperation rates in large-scale societies nor the prosocial behavior of people in one-shot situations.

The incorporation of punishment into theoretical models of reciprocity is often suggested to solve the problem of cooperation in large groups. If cooperators punish those who reciprocate their cooperation with defection or if they keep cooperating only with other cooperative individuals, then cooperation can be favored. However, if punishment is costly for those who punish, then cooperators who do not punish can invade a population. Those non-punishing cooperators have a fitness benefit because they avoid both the cost of being punished for not cooperating and the cost of punishing defectors. Thus, the problem is how to maintain punishers in a population and avoid the so-called second-order free-riders. Kameda, Takezawa, and Hastie (2003) offered one possible solution to the second-order free-rider problem for the communal sharing norm. In a series of computer simulations they showed that second-order free-riding did not emerge when intolerant enforcers of a norm (i.e. agents who do share and are also willing to punish non-punishers of defectors) only threaten tolerant enforcers (i.e. non-punishers of defectors) and do not actually engage in costly punishment.

At the same time, tolerant enforcers believe in this punishment threat; because they are "rational," they want to avoid costly fights with intolerant enforcers.

Cultural group selection

Henrich (2004) and Richerson and Boyd (1998) noted that all of the theoretical explanations suggested to tackle the evolution of cooperation and prosocial behavior in humans favor small groups in which related or at least acquainted individuals repeatedly interact. They claim that cultural evolutionary processes based on mechanisms of cultural group selection drove the evolution of human altruism, cooperation, and the emergence of norms and institutions (see also Richerson, Boyd, & Henrich, 2003). Genetic group selection is a mechanism that was already considered by Darwin as another evolutionary force besides individual-level selection and a possible explanation for the evolution of altruism:

> It must not be forgotten that although a high standard of morality gives but slight or no advantage to each individual man and his children over other men of the tribe, yet that an increase in the number of well-endowed men and an advancement in the standard of morality will certainly give an immense advantage to one tribe over another. A tribe including many members who, from possessing in a high degree the spirit of patriotism, fidelity, obedience, courage, and sympathy, were always ready to aid one another, and to sacrifice themselves for the common good, would be victorious over most other tribes; and this would be natural selection (Darwin, 1874, cited in Richerson, Boyd, & Henrich, 2003).

Yet genetic group selection has been rendered plausible only under very specific circumstances (see Henrich, 2004, and Wilson, 1983, for a discussion). For example, for genetic group selection to work there has to be a large (genetic) variation between different groups and a comparatively small (genetic) variation within one group. Furthermore, competition between groups should lead to a periodic extinction of one group by the more successful one. Anthropological data suggests, however, that due to migration and intermarriage the necessary difference of between- versus within-group variation does not exist in most human small-scale societies. And although genocides did and do exist in human history, they are (luckily) not common enough to serve as a model of genetic group selection.

Group selection is a more plausible process that can support the evolution of prosociality if it is not *genetic* variation between and within groups that is subject to selective pressure but rather *culturally* transmitted variation between and within groups. There are several mechanisms that might help reduce within-group variation on cultural traits while keeping between-group variation high. The first mechanism, conformist transmission, is conceptualized as a psychological propensity to copy the behavior of a majority in a group. If individuals engage in conformist transmission, this strategy tends to homogenize social groups and thus decreases within-group variance. On the other hand, conformity can stabilize between-group variation even when one allows for migration between groups, because new immigrants and their offspring will preferentially adopt the common practices in the new group. Henrich and Boyd (1998) demonstrated theoretically that individuals should rely on social learning rather than individual (trial and error) learning when environmental information needed for individual learning becomes less certain or when the difficulty of a problem increases. Moreover, individuals can rely on conformist transmission under a wide range of conditions (e.g. different rates of migration, validity of environmental information, fluctuations in the environment).

As Richerson and Boyd (1998) pointed out, variation between groups is constituted by different norms that are embedded in a group's belief system. Many social behaviors can be conceptualized as coordination games, that is, there is not just one correct solution (or equilibrium) but several. Different groups can therefore exhibit different solutions to the same social problem, and these solutions are transmitted over generations through conformist transmission. Furthermore, human groups are often explicitly defined and marked by symbolic boundaries, such as body ornaments or dialects, but also complex ritual systems and norms. These symbolic markers signal important social units or groups. The propensity to differentiate ingroup from outgroup and to cooperate selectively with ingroup members makes cultural intergroup competition possible. And success in intergroup competition is strongly dependent on within-group cooperation or, as Darwin put it, the ability to aid one another and sacrifice oneself for the common good.

To my knowledge, there have been very few attempts to theoretically investigate a social algorithm for coalitional group processes similar to what Axelrod and colleagues have done in the case of reciprocal altruism. Arguably, the simplest kind of strategy people could follow in intergroup situations would be to use the simple decision rule "Cooperate when you interact with an ingroup member. Don't cooperate when you interact with an outgroup member." Such a decision strategy is called *unconditional cooperation.* Takagi (1995) has demonstrated theoretically that an ingroup altruistic strategy (i.e. a strategy that dictates players give to ingroup but not to outgroup members) can robustly evolve in an egoistic society.

Such an unconditional cooperation heuristic can run into some problems, however. First, unconditional cooperation with an ingroup member or unconditional defection with an outgroup member is not a smart decision when further information about the interaction partner or the social situation is available. Imagine, for example, that you are paired with a person in a one-time-only situation, but you know this person's past behavior. If the person has cooperated with you in the past, it is very likely that you will also decide to cooperate, no matter whether she is an ingroup or an outgroup member (of course the reverse is also true: you will probably defect when you know that the person has defected in the past). This behavior can be seen as a direct derivate of the tit-for-tat heuristic (Axelrod, 1984; Axelrod & Hamilton, 1981; Axelrod & Dion, 1988): Cooperate on the first move and then do what the other player has done in the round before (direct reciprocity). Yamagishi and Kiyonari (2000) indeed showed that ingroup favoritism can be overridden by expectations of direct reciprocity or tit-for-tat. They made participants play a one-shot prisoner's dilemma game either simultaneously or sequentially with an ingroup or an outgroup member. Whereas ingroup favoritism emerged for the players of the simultaneous game, no ingroup favoritism occurred in the sequential condition, in which cooperation was reciprocated by the second player regardless of the first player's ingroup or outgroup status. Thus, when information about the past behavior of an interaction partner is available, people directly reciprocate and do not care about the group membership of the other.

The second problem of this heuristic is that unconditional cooperation can easily be subject to free-riding behavior within the group. Unconditional altruists give to everybody, even to absolute defectors, that is, agents who receive benefits from others but never contribute anything from their own payoff. Several evolutionary simulations have shown that unconditional cooperation is not an evolutionarily stable strategy and that agents using this heuristic will die out quickly in favor of defectors (e.g. Axelrod & Hamilton, 1981, Takagi, 1995). How can this problem of ingroup free-riding be solved?

Yamagishi and colleagues (Yamagishi, 2003; Yamagishi, Jin, & Kiyonari, 1999) introduced the concept of *bounded generalized reciprocity*. They argued that complex human societies could not have emerged and would not have been able to persist if humans had relied only on direct exchanges between particular identifiable partners. As a consequence, a *generalized exchange system* emerged, in which each member of the system gives a benefit to another with the expectation that one day he will be repaid—by some member of the system, though not necessarily the one he paid the favor to. Therefore, in a group where a system of generalized exchanges exists, members expect favorable treatment from all other members of the group, provided they are full members of the system, that is, that they pay their dues to other members.

How can systems of generalized exchanges buffer against free-riding? According to Yamagishi (2003, 2004), when facing a situation of generalized exchanges, people can commit two types of "errors." A Type I error occurs when the decision maker falsely assumes that free-riding will be detected, when in reality it is not likely to be detected. In this case, the cost for committing this error is the amount of "unnecessary" dues the decision maker is paying (i.e. the cost of cooperation). A Type II error occurs when the decision maker assumes that free-riding will not be detected when in fact it will be detected and punished. The cost of a Type II error depends on the seriousness of the punishment. Yamagishi (2004) assumes that in human evolutionary past, free-riding in a system of generalized exchanges was severely punished, for example, by expulsion of the defector from the group (which could have had lethal consequences for the exiled). Thus, when facing a situations in which a system of generalized exchanges is suggested, that is, by ingroup–outgroup cues, people feel more inclined to cooperate with the members of this system, their ingroup.

As formulated here, Yamagishi's conception of bounded generalized reciprocity can hardly explain ingroup favoritism in one-shot situations. His model assumes the existence of another altruistic or "strongly altruistic" behavior, namely, the punishment of defectors of generalized reciprocity. As has been shown for repeated interactions, (the possibility of) punishment can maintain or even increase cooperation (Fehr & Gächter, 2000). In one-shot situations, however, punishment is an individually costly and thus altruistic behavior, which cannot be "reciprocated" or offset by the future cooperation of punished defectors, as future cooperation is ruled out by the game.

In their discussion of explanations for strong reciprocal behavior, Fehr and Henrich (2003) asked whether the one-shot situations modeled in economic games have any genuine counterpart in the "real world"—both past and present. According to their argumentation, one-shot interaction is quite common in modern human societies. In contrast to other evolutionary theorists, they also concluded that situations with low continuation probability are also not uncommon in contemporary small-scale and non-human primate societies, which are frequently used as models for societal organizations in contemporary humans' evolutionary past. Thus, in contrast, to the strict economic model, Fehr and Henrich (2003) interpreted one-shot interactions as situations with a low probability of continuation. Various experiments (e.g. Gächter & Falk, 2002; Keser & van Winden, 2000) have shown that humans can differentiate between one-shot interactions, repeated interactions, and interactions that might continue with some probability. As the probability for reciprocal behavior, punishment, and forming a reputation increases with the probability of continued interaction, so does cooperation.

Following from Fehr and Henrich's definition of one-shot situations as situations with a low continuity probability is the fact that whenever people meet with a stranger, they try to find out how likely a continued interaction with this person might be. If the interaction is likely to be continued, then people should cooperate in a one-shot encounter (and vice versa). As the decision of whether to cooperate might have non-trivial consequences (monetary in laboratory experiments, fitness consequences in the evolutionary past), people should be sensitive to cues that indicate the "longevity" of this relationship. I believe that group membership is a useful cue for judging the probable length of a relationship. Relationships among group members are more likely to be long term than relationships among members of different groups (Axelrod, 1984; Yamagishi et al., 1999). That is, if there is no other reliable source of information, information about one's group membership might be a useful cue for inferring the possible length of a relationship. Note that in this formulation of one-shot situations, Yamagishi's concept of bounded generalized reciprocity is also applicable: If a relationship might be continued with some probability in the future, then of course non-compliance with generalized reciprocity with ingroup members might also be likely to be punished at a later time.

In sum, evolutionary models stress that mainly three kinds of mechanisms, kin selection, reciprocal altruism, and cultural group selection, are plausible explanations for the evolution of altruistic or prosocial behavior in humans and other animals. The adaptive tasks humans might have had to solve in order for prosocial behavior to evolve would be to distinguish kin from non-kin and to bestow benefits only on the former; and to understand cues that signal reciprocal social exchanges and cues that signify group membership. Proponents of modularity theories (e.g. Fodor, 1983) would argue that over the course of phylogeny cognitive modules (or heuristics) have evolved that enable agents to respond quickly and automatically to specific social cues. Thus, a fast and automatic reciprocity or coalitional group algorithm might have evolved as an adaptive solution to the problems posed above. In the next section, I will review research from social and developmental psychology and experimental economics that provides empirical evidence for the reciprocity and coalitional group algorithm.

Empirical evidence for reciprocity and ingroup favoritism

Can we find empirical evidence that shows that reciprocity and ingroup favoritism are important social algorithms for people's prosocial decision making and action? In social psychology, reciprocity has often been defined as the provision of equivalent benefits over a period of time between functional equals. Reciprocity can be realized through various means, for example, through taking turns, one-to-one correspondence, or balancing (see Fiske, 2004), and it usually involves short-term accounting processes among a small number of people. In social psychology, reciprocity has often been investigated in research on procedural justice or justice in social exchanges. Although legal regulations have been established for many non-contractual relationships specifying the rights and duties of the exchange partners (e.g. between marriage partners, between the state and its citizens), most of the exchange relationships we experience in our daily lives are not regulated by laws but by social norms. Such social exchanges are generally regarded as just if reciprocity is established (see Montada, 2004). However, as discussed in Chapter 1, the quality of one's relationship with an exchange partner shapes the expectation of what would be an appropriate reciprocal treatment. Clark and Mills (1979) distinguished between a communal-norm and an exchange-norm orientation in intimate partnerships. Whereas with the exchange-norm orientation, benefits are directly balanced against costs, with a communal-norm orientation the ratio between benefits and costs does not matter as much, as one's own inputs are not viewed as costs but as an opportunity to meet a partner's need.

In experimental economics, reciprocity has mainly been studied in social dilemmas, such as the prisoner's dilemma and public goods games. Komorita, Hilty, and Parks (1991) investigated the effects of immediate versus delayed reciprocity and demonstrated that immediate reciprocation of cooperation is most important for cooperation to arise in a repeated prisoner's dilemma game. Furthermore, Komorita, Parks, and Hulbert (1992) showed that with increasing group size the effectiveness of reciprocity or tit-for-tat declines in creating cooperation. Although there is recent evidence of reciprocal behavior in iterated public goods games, the proportion of participants who choose conditional cooperation or reciprocity as their preferred strategy varies: Fischbacher, Gächter, and Fehr (2001) found that in their public goods experiment 50% of their participants exactly matched the contributions of the other players. About 30% of players behaved purely selfishly, and 14% were so-called hump-shaped contributors. The latter displayed perfect conditional cooperation up to a certain number of tokens that were contributed by the other group members but started to free-ride when the other group members contributed more. Kurzban and Houser (2001), on the other hand, found that only 28% of the participants in their public goods game could be classified as reciprocators. Thus, the composition of the group seems to matter for reciprocal cooperation to emerge in a group (see also below).

Reciprocity has also been documented in trust games (e.g. Berg, Dickhaut, & McCabe, 1995). In a trust game, a proposer receives an amount of money and can send any amount to the responder. The amount sent is tripled by the experimenter, so that the responder has thrice the amount that he initially received from the proposer. The responder then can decide how much he wants to return to the proposer. Although the economically rational strategy would be for the responder to keep everything and for the proposer—in anticipation of this behavior—not to send anything in the beginning, many proposers send money and many responders return. Moreover, there is often a positive correlation between the amount sent by the proposer and the amount returned by the responder (see also Fehr & Gächter, 2000b). Obviously, proposers also expect this reciprocation from responders, otherwise sending any money would seem very odd indeed.

Are humans sensitive to cues that might establish a reciprocal or social exchange relationship or to cues that indicate a violation of reciprocity? Cosmides (1989) and Cosmides and Tooby (1992) empirically investigated the hypothesis that the human mind is designed to keep track of the reciprocal provision of benefits in social interactions and to detect violations of these implicit social contracts. Such implicit social contracts relate benefits to costs and therefore express a social exchange in which an individual is required to pay a cost when she has received a benefit. Cooperation (or paying costs) in social exchange relationships is not unconditional; an individual should always pay attention to whether the exchange partner has paid her costs when she collects her benefits and vice versa. Cosmides (1989) claims that humans have evolved a cheating detection module that helps them pay attention to such inconsistencies and to cooperate selectively only with non-cheaters. In a series of experiments, Cosmides and colleagues (Cosmides, 1989; Cosmides & Tooby, 1992; Gigerenzer & Hug, 1992) demonstrated that adults are indeed sensitive to information that might indicate cheating in social exchanges. They showed that if the classical selection task by Wason and Johnson-Laird (1968, cited in Cosmides, 1989) is framed as a social contract, up to 75% of adult subjects selected the correct card choices.

In social psychology, there is ample evidence for a social algorithm of coalitional group processes, for example, from research on ethnocentrism (LeVine & Campbell, 1972), intergroup conflict and competition (Sherif, Harvey, White, Hood, & Sherif, 1961; Ng, 1978, 1980), and social categorization (Rabbie & Horwitz, 1969; Tajfel, Flament, Billig, & Bundy, 1971). People pay attention to external or internal criteria that make them belong to a group. Attachment to an ingroup—also called ingroup bias (Tajfel, 1982)—is found cross-culturally. In general people evaluate their ingroup more positively than outgroups and prefer to stay in that group. However, if the ingroup is associated with low status (as is the case for some ethnic groups), people can come to prefer the outgroup and will try to leave their own ingroup (outgroup bias). In cases of intergroup conflict and competition, interactions between people are largely determined by their group memberships and very little by their personal relationships or individual characteristics. Behavior and characteristics of the outgroup members are perceived as unified and, in extreme cases of intergroup conflict, can be subject to social stereotyping. However, as Sherif and colleagues (1953, 1961) showed in their study in a boys' summer camp, both intergroup conflicts as well as (previous) interpersonal attachments were strongly dependent on the framing of the situation—and their participants' interpretation of it. Thus, the interaction between groups can change dramatically when groups are competing compared to when they have to cooperate to solve a task.

The strongest support for a social algorithm of coalitional group processes probably comes from research on the minimal intergroup situation (MIS, Tajfel, 1970; Tajfel et al., 1971). Tajfel and his colleagues set out to determine the minimally necessary and sufficient conditions that lead to intergroup discrimination and competition. To their surprise their experiments showed that the random classification of people into trivial social categories can lead to them treating their ingroup members more favorably than outgroup members: From a set of allocations, participants chose those that gave more money to an ingroup than to an outgroup member. These findings cannot be explained by self-interest as the participants could not give money to themselves.

The fact that people appear to perceive and treat ingroups and outgroups differently and that they favor their ingroup in the allocation of money seems to be directly relevant for the one-shot game situations I am investigating. Do people allocate resources differently when playing against an ingroup or an outgroup member? To my knowledge, there has been no study that has directly investigated this question in the dictator or the ultimatum game. Messick, Moore, and Bazerman (1997) made students play the ultimatum game as a proposer and let them allocate money to five anonymous responders. Although there was no difference in allocations to ingroup (own class) as compared to outgroup members (other class), the ingroup–outgroup manipulation was not the focus of the study and thus was not made salient to the participants, that is, it was not used in any functional way.

However, intergroup relations have attracted more interest in the study of social dilemmas. In these games, a group of people have to choose between maximizing self-interest or maximizing the interests of the group. In general, it is more profitable for an individual to maximize self-interest, but if everybody did so, all would be worse off than if every person in the group had maximized collective interest. Social dilemmas suffer from the problem of free-riding, that is, from people not contributing to the public good but accepting the benefits of it. When social dilemmas are played repeatedly, the initial contributions decrease and players start to free-ride (Komorita & Parks, 1995).

Research has shown, however, that intergroup competition can decrease the problem of free-riding in social dilemmas and increase cooperation (Bornstein, 2003; Bornstein & Ben-Yossef, 1994; Bornstein, Budescu, & Zamir, 1997; Dawes, van de Kragt, & Orbell, 1988; Wit & Wilke, 1991; Yamagishi, et al., 1999). For example, Bornstein and his colleagues (2003; Bornstein & Ben-Yossef, 1994) let their participants play a prisoner’s dilemma game against another group (intergroup prisoner’s dilemma, IPD) and compared the behavior of participants in this condition with the behavior of players in a single-group prisoner’s dilemma. Their results clearly show that intergroup conflict can lead to increased cooperation in the ingroup: The level of contribution was twice as high in the IPD than in the single-group prisoner’s dilemma. It seems that intergroup conflict increases group identification, which in turn enhances cooperation, as individual group members replace their selfish motivation with the motivation to maximize the collective payoffs of the ingroup. Participants in the IPD condition also reported a higher motivation to maximize the *relative* ingroup advantage and distinguished themselves positively from the outgroup.

Yamagishi and colleagues (1999) used the minimal intergroup situation to classify people into trivial social categories. The results from their experiments clearly show that players in a one-shot prisoner’s dilemma game cooperate more with an ingroup than an outgroup member. Wit and Wilke (1991) reported similar results for the prisoner’s dilemma game, the chicken game, and the trust game when participants were classified according to group rather than according to personal categories.

Ontogenetic development of reciprocity and ingroup favoritism

Research on the development of reciprocity in psychology has focused on many phenomena, appearing from infancy to adulthood. Early in life, reciprocal processes in the interaction between mothers and their infants, for example, in feeding and nursing sessions, appear to be universal (Adamson & Bakeman, 1991). At around 3 to 4 months, infants engage in vocal dialogues that involve turn-taking exchanges (Papousek, 1995). In general, much of the positive, playful interaction between parents and children and between peers involves imitation routines and reciprocity-based games (see e.g. Parrott & Gleitman, 1989). Violations of turn-taking procedures have clear consequences for the relationship; they lead to negative affect on the side of the victim and avoidance of the offender, and they activate compensation motives, including efforts to obtain an apology from the violator.

Although this research suggests that children engage in reciprocal behavioral patterns very early in life, it is still an open question when they come to understand the social cues that might activate this social algorithm. The social-cognitive approach has emphasized that children come to truly understand reciprocity when they start interacting with peers (e.g. in preschool and kindergarten; Youniss, 1980). In these interactions peers are likely to have conflicting views about how to play, how to solve a problem, and so on. Reciprocity provides a good means for a (temporary) solution to such problems.

Suls, Witenberg, and Gutkin (1981) made elementary school children and undergraduate students judge a story character that did or did not reciprocate help or non-help. Even the youngest participants understood the meaning of positive and negative reciprocity and rated it as a good strategy for determining whether to help or not. Dreman and Greenbaum (1973) investigated whether preschool children would share candies with a classmate when the classmate would know who donated the sweets (reciprocity conditions) or not (non-reciprocity condition). Donations were significantly higher when the classmate knew the donator, indicating that even preschoolers can take into account the possibility of future reciprocation.

More recently, Keller, Gummerum, Wang, and Lindsey (2004) investigated the ontogenetic development of the cheater detection module proposed by Cosmides and Tooby (1992). Children between the ages of 3 and 10 were presented with two contracts with bilateral cheating options, one between a parent and a child and one between two peers. Keller and colleagues' (2004) results demonstrate that even the youngest children understood the violation of these contracts, when they were given all the relevant information. This finding is in line with other research on the development of understanding of rule violations in social contexts (e.g. Girotto, Blaye, & Farioli, 1989; Harris & Núnez, 1996; Harris, 2000). However, elementary school children had difficulties checking for the relevant information that might indicate contract violation (or a violation of reciprocity) in the selection task, in which part of the information had to be inferred. These findings might indicate that although even very young children implicitly understand the violation of reciprocity, in the course of development they might become better able to explicitly understand what kind of information or cues constitute reciprocal exchanges and act according to these cues' implications.

The question of whether children, adolescents, and adults react differently to cues that denote ingroup and outgroup and whether this understanding changes over the course of development is very relevant, because it might help us to understand how an algorithm in the coalitional group domain is acquired developmentally. Studies in developmental psychology demonstrated changes in how children react to cues of group membership. Ingroup bias, that is, the preference for one's ingroup over an outgroup, starts to emerge around the age of 4, reaches a peak between age 5 and 7, and shows a steady decline past the age of 9 (Aboud, 1988). In a study by Yee and Brown (1992), in which groups were formed according to performance in a racing game, 3-, 7-, and 9-year-old children in the "slow" (i.e. less valued) group showed clear outgroup bias and would use the chance to change to the "fast" (i.e. more valued) group.

Studies on racial and gender prejudices demonstrated that even 3- to 4-year-old children exhibit different behavior toward their ingroup and outgroup. Especially (white) majority children at that age can exhibit considerable prejudice against (black) minority children (Aboud, 1988). These investigations, however, studied grouping categories that were especially salient in the society the children grew up in. When children were grouped into non-salient categories, that is, categories not used for categorizing people in daily life (i.e. a "green" group and a "yellow" group), this ingroup bias only appeared if the group categories were used in a functional way (Bigler, Brown, & Markell, 2001; Bigler, Jones, & Lobliner, 1997). Bigler and her colleagues (1997, 2001) grouped elementary school children in a blue and a yellow group, assigned either on the basis of biological attributes or randomly. Teachers made functional use of these group assignments or not. For the random categorization, ingroup bias and intergroup stereotypes only appeared when teachers made functional use of the group classification (e.g. when they treated the two groups differently in the daily classroom interaction).

The findings of Bigler and colleagues (1997, 2001) are in line with research demonstrating that it is not until middle childhood that children show consistent ingroup preference and outgroup exclusion in their actions and increasing sensitivity to the triggers of group processes (Hirschfeld, 1996; Thorne & Luria, 1986). In a study by Vaughan, Tajfel, and Williams (1981), 8- and 11-year-old children reacted in accordance with the MIS paradigm: Participants consistently gave more to an ingroup member, and the money was allocated in order to achieve the biggest difference in reward between an ingroup and an outgroup member. In contrast, kindergarteners in a study by Spielman (2000) only rewarded more to an ingroup than to an outgroup member when they were competitively primed. In a no-prime or neutral-prime condition, no differences in the allocation of resources occurred. Thus, we can conclude, that young children are not "naturally" biased toward preferring their ingroup, but that cues that trigger intergroup processes have to be made salient to them.

The prosocial heuristic

So far, both theoretical and empirical research indicated that reciprocity and ingroup favoritism are adaptive social algorithms that lead to the establishment and maintenance of prosocial behavior among non-kin. People seem to react to cues that signify reciprocal and intergroup relations; although children might be born with some preparedness for reacting to such relationships (see also Fiske, 2004), the appropriate cues seem to be learned over the course of development. First theoretical and empirical analyses have also indicated that if people have information about their interaction partner's past behavior, this information seems to be more valid than information about group membership. Others (e.g. Yamagishi, 2003) have further argued that unconditional cooperation with an ingroup member might not be a smart strategy, because it can be subject to free-riding. Instead, information about group membership should rather be seen as an indicator signaling the probability of further future interaction.

Figure 4.1 depicts the representation of a possible decision process in a one-shot situation. On the basis of the research discussed above, I chose three instances of social information that might help a decision maker to decide whether to act prosocially in a one-shot situation. Further types of social information can be added to this structure. However, I think that this *prosocial heuristic* (see also Yamagishi, 2003; Yamagishi et al., 1999) might account for decision processes in situations when information about past behavior of the interaction partner, the likelihood of future interaction, and the interaction partner's group membership status are offered. Furthermore, this prosocial heuristic might explain decision-making processes in situations tested in the minimal intergroup paradigm (see Rabbie, Schot, & Visser, 1989).

In Figure 4.1 the prosocial heuristic is depicted as a so-called fast and frugal decision tree, which has been proposed as a psychologically plausible description of processes by which humans classify and make decisions (see Katsikopoulos, Brighton, Gigerenzer, &

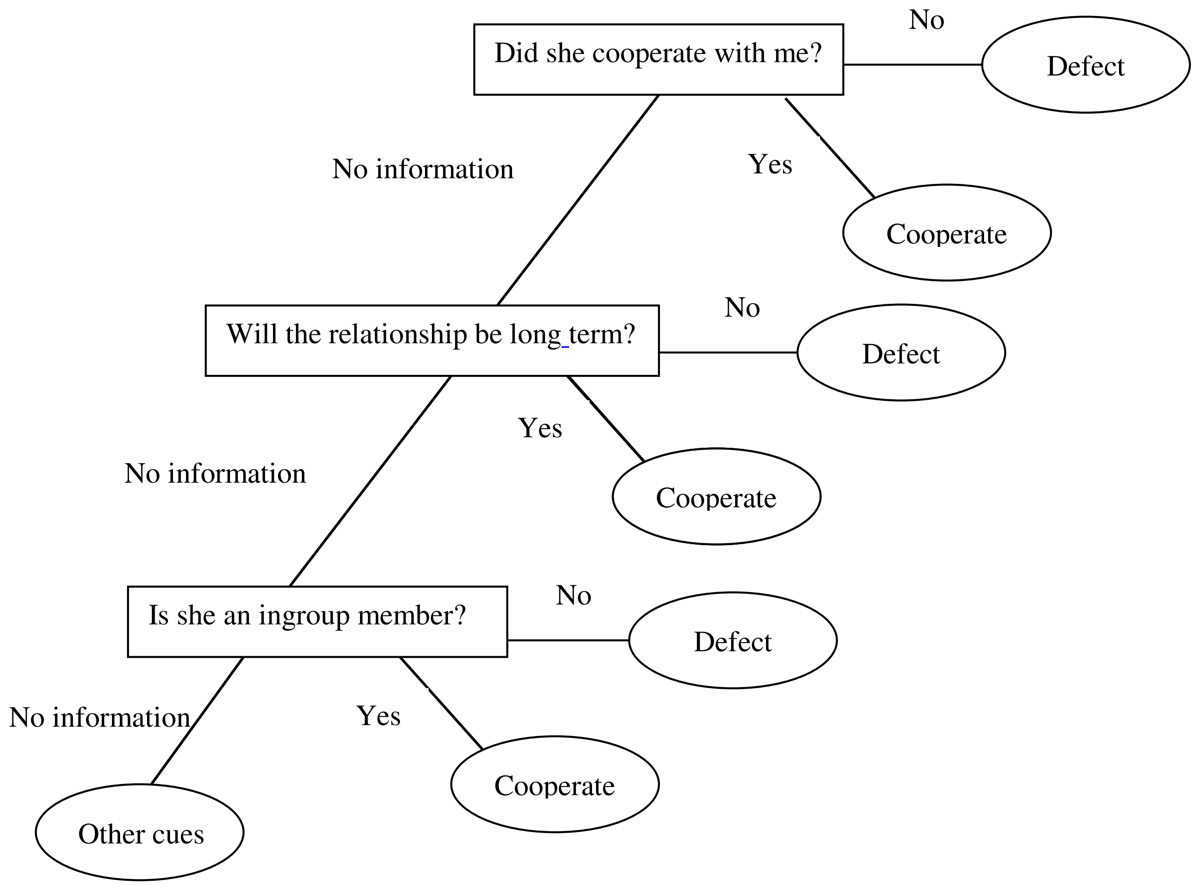


Figure 4.1: The prosocial heuristic

Martignon, 2005; Martignon, Vitouch, Takezawa, & Foster, 2003). In the prosocial heuristic, three types of social information are looked up sequentially: information about past interaction (reciprocity), likelihood of future interaction, and group membership. If the interaction partner has acted prosocially with the decision maker in the past, then he himself should also act prosocially and vice versa. If no information about past interaction is available, the decision maker explores the next piece of social information, which deals with possible length of the relationship in the future. If there is information about a possible future interaction, then the decision maker should decide to act prosocially. If the relationship is judged to be short term or only one-shot, that is, when the possibilities for reciprocation or punishment are minimal, the decision maker should not act prosocially. If no (direct) information about the continuation probability of the relationship is given, the decision maker should turn to the next cue, which contains information about his group membership. As argued above, common group membership might be a valuable cue to judge the possibility of future interactions with a person (or at least has been in the evolutionary past). Thus, if the interaction partner is from the same group as the decision maker, he should act prosocially. If the other player is from an outgroup, the decision maker should defect. If there is no information given, then the decision maker should act according to his social preferences (see below).

In the study presented below, we did not investigate the exact process of decision making as it is proposed in the prosocial heuristic. Thus, it was not a test of whether people search through information according to this heuristic's search rule or whether people stop and decide according to the stopping and decision rules. Rather, we went one step back and investigated whether people actually differentiate between these pieces of social information and whether this influences the outcome of their (prosocial) decisions. We wanted particularly to focus on how these pieces of social information are understood and differentiated over the course of ontogenetic development. Do children of various age groups understand information about reciprocal and ingroup behavior and, most importantly, does this influence their prosocial decision making? What kinds of social cues do they first pay attention to and at what age? These questions about the ontogenetic origins of social heuristics or decision-making algorithms in general have not been considered so far in judgment and decision-making research. Nor have developmental psychologists asked how the understanding of social information, such as understanding group membership, influences prosocial allocation decisions. In this study, we tried to fill this gap.

Social preferences revisited

The prosocial heuristic is a model for prosocial decision making in both repeated and one-shot interactions with non-related strangers. In our formulation of the prosocial heuristic, past interaction, anticipation of future interaction (or long-term relationship), and group membership were treated as cues for inferring the status of the relationship and consequently for deciding whether to act prosocially. We compared the predictions derived from this model both with the actual behavior of people in economic games and with the prediction of a different model of prosocial decision making, namely the concept of social preferences.

Within experimental economics, the concept of social preferences allows us to maintain the assumptions that players of economic games maximize utility but that this utility also reflects a concern for what others get (see also Chapter 1). Although critics fear the possibility of changing the utility function to explain every empirical phenomenon post hoc, Camerer (2003) points out that the goal of the social preferences approach is to find parsimonious utility functions that are general enough to explain many (also conflicting) empirical phenomena in different kinds of economic games and to make new predictions, and are furthermore supported by psychological findings. Theories that have tried to incorporate social preferences into the economic model are, for example, the equity, reciprocity, and competition (ERC) model of Bolton and Ockenfels (2000), the model of inequality aversion of Fehr and Schmidt (1999), and the fairness equilibrium approach of Rabin (1993).

In their theoretic models, Bolton and Ockenfels (2000) and Fehr and Schmidt (1999) more or less explicitly assumed the existence of players with different types of social preferences in the populations. These types of players are distinguished, for example, by different parameter values for disadvantageous and advantageous inequality aversion (Fehr & Schmidt, 1999). In Fehr and Schmidt's (1999) model, bargainers are conceptualized as either selfish minded or fairness minded. Bolton and Ockenfels (2000) treated bargainers as either egoists or relativists (i.e. those who compare their own payoff with the payoffs of others and care about equal outcomes). Murnighan, Oesch, and Pilluta (2001) divided dictator proposers into the categories of rational (taking the maximum), equal (splitting equally), or other, which will be greedy only in dictator games with predefined, restricted choices. Fehr and Henrich (2003) proposed that strong reciprocity only constitutes an evolutionarily stable strategy if strong reciprocators and selfish humans coexists both within and between groups.

In social psychology, social preferences have been investigated as social value orientations. In the social psychological literature (e.g., McClintock, 1972; Messick & McClintock, 1968), three types of outcome or social value orientations are differentiated: prosocial (maximizing joint outcomes), competitor (maximizing the difference between one's own outcomes and those of others), and individualist (maximizing one's own outcomes regardless of others' outcomes). The latter two motivations are usually combined to create a "proself" orientation. These social value orientations are usually measured by letting people decide between different choice options (i.e. between an option beneficial for the self only and an option beneficial for two players but with a lower payoff than the first one). Social value orientations are interpreted as motivations that "bias" people toward a particular choice option in a neutral situation.

Can we expect that social preferences or social value orientations affect our prosocial heuristic? That is, do proself and prosocial people decide differently when they are confronted with cues of group membership? De Cremer and van Dijk (2002) conducted a public goods game in which players received cues stressing either their personal identity or their group identity. Participants played a public goods game once without feedback and once with feedback about the other players' decisions in one of the two identity conditions. Prosocials contributed more than proselfs in the personal identity condition, but there was no difference between their contributions in the group identity condition. Whereas prosocials' contributions stayed equally high across both conditions, proselfs' offers were significantly higher in the group conditions. These results indicate that proselfs need a strong cue to act cooperatively (e.g. a cue indicating their group membership), but prosocials cooperate even when there are no such cues. We conclude from these findings that if the reciprocity heuristic is a good model of people's decision making, then social value orientation should not matter when both proselfs and prosocials receive information about the group membership of the other player.

However, if the group membership of the other is not known, then proselfs should strive to maximize their own outcomes, whereas prosocials should strive to maximize the outcome of all interaction partners and thus should act more prosocially than proselfs. If, on the other hand, the prosocial heuristic is not a good model of human decision making and people's prosocial behavior is rather determined by their internal motivations or social preferences, then we would expect differences in proselfs' and prosocials' behavior also when different kinds of social information (reciprocity, likelihood of future interaction, group membership) are available.

Hypotheses and experimental design

The focus of this study was to determine whether people's (prosocial) behavior in one-shot situations can be best explained by their social preferences or whether their prosocial decisions can be regarded as inferences based on cues that signify important social information for making socially adaptive decisions. Specifically, we asked: Are social preferences different in different age groups, and if yes does this influence prosocial decision making? Alternatively, do children take into account social information indicating the status of one's relationship with an interaction partner differently from adults, and if yes, how does this influence prosocial allocation decisions?

In this study our participants played a one-shot dictator game, a one-shot sequential prisoner's dilemma, and a one-shot third-party punishment game in a within-subject design with two conditions: a minimal intergroup situation and a neutral situation (see also Method section). In the minimal intergroup situation, participants were grouped in two trivial social categories. In the neutral situation, no such classification was used. Participants were drawn from three age groups: adults (undergraduate students), 12-year-old children, and 7-year-old children.

Dictator game

The one-shot dictator game measures altruism on the side of the proposer. We were especially interested in the allocation decisions of the proposers when they played with (a) an ingroup responder, (b) an outgroup responder, or (c) a neutral responder. If the prosocial heuristic is correct, we would expect proposers to allocate more money when they played with an ingroup than an outgroup or a neutral responder, provided there was no other social information given (about past interaction or future duration of the relationship). We expected different results for proselfs and prosocials only in the neutral condition. When no social information was given, proselfs' allocations should be considerably lower than prosocials'. Table 4.1 summarizes these hypotheses. However, if participants decide according to their social preferences, then we would expect a significant difference between the allocations of proself and prosocial proposers independent of the group membership of the responder.

Table 4.1: Hypotheses of the prosocial heuristic for proposer in the dictator game

	Ingroup responder	Outgroup responder	Neutral responder
Proself	Fair	Selfish	Selfish
Prosocial	Fair	Selfish	Fair

We also expected age effects: When information about group membership is provided, only 12-year-old children and adults should be sensible to this and give more to an ingroup than to an outgroup member or a neutral player. Seven-year-old children should not be sensitive to the minimal group manipulation and should give similar amounts in every condition.

Sequential prisoner's dilemma

This game is also played by two players. The first player decides how much to give to a second from his initial endowment. His donation is doubled and added to the second player's endowment. In a second step, the second player decides how much to return to the first player. Again, her contribution is doubled and added to the first player's payoff. This game is structurally similar to the trust game introduced above. We were particularly interested in the behavior of the second player, because it allows us to measure her reciprocal behavior. If the prosocial heuristic is correct, we would not expect differences in reciprocal behavior based on whether participants interacted with an ingroup, outgroup, or neutral player. However, if people follow their social preferences, we would again predict that proselfs would reciprocate less in this game than prosocials.

We did not have particular hypotheses for developmental effect. Because, according to our hypothesis, group affiliations should not matter for the reciprocal behavior of the second player, we did not expect effects of group membership for the child samples. Although studies from developmental psychology have indicated that even preschool children act reciprocally with their parents and peers in play situations, it is not clear whether these findings can be generalized to the game situation investigated in this study, in which children are paired with an anonymous other player and where reciprocal behavior is costly. We therefore investigated children's behavior exploratively.

Third-party punishment game

This game was introduced by Fehr and Gächter (2000a). They demonstrated that allocations in a public good dilemma remain stable when there is the possibility that defectors can be punished. Defectors were punished for free-riding behavior, even when this imposed monetary costs to the punishers. In our study, the third-party punishment game was played with three players, and we were especially interested in the behavior of the third party—the punisher. This punisher was confronted with the following scenarios: He had the option to punish an unfair dictator offer of an ingroup to an ingroup member, or an unfair offer of an outgroup to an outgroup member, or an unfair offer in a situation with players without group affiliation. The third-party player could punish the unfair allocator by paying a sum from his own endowment. For every unit he paid, two units were subtracted from the unfair dictator's payoff.

The third-party punishment game is not directly related to the kind of social cues searched for in the prosocial heuristic but instead offers an interesting opportunity for investigating Yamagishi's (2003) conception of a Type II error. Remember that Yamagishi proposed that within a group, non-cooperators would be seriously punished for not following the norm of cooperating with an ingroup member (norm of indirect reciprocity). Thus, one could expect that participants would punish an unfair offer of an ingroup to an ingroup member more strongly than an unfair offer among neutral or outgroup players. Again, we expected that this effect would not appear in the youngest age group. As for players' social value orientation, Takezawa (2003) showed that proselfs punish much less than prosocials in a third-party punishment game in which no information about group membership was provided. For the situations in which such information was presented in our study, we investigated proselfs' and prosocials' behavior exploratively.

Method

Participants

The adult sample consisted of 155 people (90 females and 65 males; M = 25.3 years, SD = 3.8). Participants were mostly students from the Free University Berlin and were recruited from a participant register at the Max Planck Institute Center for Adaptive Behavior and Cognition. Most subjects had participated at least once in an experiment of the Center.

The child sample included 82 students from second grade (45 girls, 37 boys; mean age = 7 years and 1 month, SD = 0.6) and 75 students from sixth grade (42 girls, 33 boys; mean age = 11 years 6 months, SD = 0.5). They were recruited from two primary schools in the southwestern part of Berlin. About 85% of the students had German parents; the remaining 15% had at least one parent of a different nationality. Most students came from middle-class families. Only the children who brought a signed consent form from their parents were allowed to participate in the experiment.

Procedure

Adult sample

Three experimenters simultaneously took part in the experiment: the first experimenter was in the lab and interacted with the participants. The second experimenter sat outside the lab, received the decision sheets of the participants, and was responsible for matching the decisions and determining the payoff for each participant. If one of the participants did not show up for the experiment, the third experimenter filled in the position of this missing participant and acted as a participant. However, the decisions of the third experimenter were not counted in the experiment, because she was familiar with the focus of the experiment and had to act as a "participant" repeatedly. If all 12 invited participants showed up for the experiment, the third experimenter helped the second experimenter. It was made sure that the second and third experimenter had no personal interaction with the participants and that they could identify the participants only with their identification numbers (IDs).

Twelve participants were invited at the same time to the laboratory of the Max Planck Institute. Upon arrival, the participants were welcomed by the first experimenter and led to their seats in the lab. The seats were arranged such that participants could not see how the others filled out their forms and such that communication between participants was difficult. All participants faced the same direction.

Participants filled out and signed a consent form. The experiment started when all 12 participants had arrived. Usually, some participants were about 5 minutes late. When all participants were present, the experimenter explained issues of anonymity and storage of the data. Participants were told that payment was determined by the experimenters randomly picking one of the three tasks after the experiment was finished. All participants would then be paid according to their decision in this one task. This procedure was used to make sure that participants would regard the decisions in the three games as independent. Then, the first experimenter handed out the identification numbers (IDs) to the participants. The ID consisted of a random arrangement of three- to four-digit-numbers. She pointed out that the second and third experimenters could only identify participants by their IDs and were blind to their real identity. At the same time, the first experimenter in the room would not know the decisions of the participants. This ensured that the decisions of the participants were really anonymous.

Dot-estimation task. In the case of the ingroup–outgroup condition, participants were presented with the dot-estimation task. They were shown three pictures for 2 seconds each. On each of these pictures 70–80 yellow dots were displayed on a blue background. Participants were asked to estimate the total number of yellow dots and to write this number on an answer sheet. It was explained that these numbers would be put in a rank order by the second and third experimenters outside; the six people with the highest numbers would be in the blue group, and the six participants with the lowest numbers would be in the yellow group. After participants wrote down their estimated numbers, the answer sheets were collected and handed to the second and third experimenters outside the lab. After some minutes' waiting time, participants were handed their group membership on a folded sheet. They were asked to keep the information of their group membership to themselves. It was also pointed out that the first experimenter was not aware of their group membership. This dot-estimation task was not run for the participants in the neutral condition, as it was not necessary to categorize them into groups.

After the dot-estimation task, the experiment started. Here I will report the procedure for the dictator game–sequential prisoner's dilemma–third party punishment order. Instructions for the order sequential prisoner's dilemma–dictator game–third party punishment game were the same.

Dictator game. The rules of the dictator game were explained to the participants with the help of a PowerPoint presentation. Participants were given one example and were asked whether they had any questions about the structure of this game. It was explained to the participants that some of them were randomly picked to play the proposer and some to play the responder and that it was randomly determined whether they would play with a member from their own group or a member from the other group.

Because the participants could guess who was a proposer and who a responder by simply observing who filled out the answer sheet and who did not, they were told that the proposers would get the answer sheet and that the responders at the same time had to fill out an irrelevant task. In fact, all participants played the dictator game as a proposer.

Answer sheets were handed out to the participants in brown envelopes. After making their decisions, participants put their answer sheets back in the envelope and all envelopes were given to the second experimenter outside the room.

Sequential prisoner's dilemma. The rules of the sequential prisoner's dilemma game were explained with a PowerPoint presentation. Participants were given an example and were asked whether they had any questions about the rules. It was explained that it was randomly determined whether they would play the first or second player and also whether they would play with a member from their own group or the other group.

The game consisted of two time points. At the first time point, the first players decided how many euros they wanted to give to the second players. Participants were told that the second experimenter would write down the decisions of the first players on the answer sheets for the second players. At the second time point, the second players were informed of the first players' decisions and now had to decide how many euros they wanted to give to the first players. To avoid having players guess who played first and second players from observing the others, participants were told that while the first players decided at the first time point, the second players filled out an irrelevant task, and vice versa. In fact, all participants were playing the role of second players, so that they all filled out an irrelevant task at the first time point and made their decision as second players at the second time point. Both the irrelevant task and the real decision task contained quiz questions designed to ensure the participants' understanding of the game structure.

Envelopes with the irrelevant task were handed out to all participants at the first time point. After all participants had filled out the irrelevant task, the envelopes were handed to the second experimenter outside. After 5 minutes' waiting time, the second experimenter handed the envelopes with the answer sheets to the first experimenter who distributed them among the participants. They were collected and given to the second experimenter outside after all participants made their decision.

Third-party punishment game. The rules of this game were explained with a PowerPoint presentation and one example was given. Participants were told that it was randomly determined whether they would be Player A, B, or C and also whether they would play with people from their own group or the other group.

Again, this game consisted of two time points. At the first time point, Players A and B played a dictator game with Player A deciding how to allocate 20 euros between himself and Player B. At the second time point, Players B and C were informed of the decision of Player A. Player C could now decide whether she wanted to punish Player A. As in the other two games, participants were told that while Player A decided at the first time-point, Players B and C would fill out an irrelevant task. At the second time point, Player C would decide and Players A and B would fill out an irrelevant task. In fact, all participants played the role of Player C, so that all filled out the irrelevant task at the first time point and the answer sheet for Player C at the second time point. Both the irrelevant task and the real decision task contained quiz questions designed to ensure the participants' understanding of the game structure.

Envelopes with the irrelevant task were handed out to all participants at the first time point. After all participants had filled out the irrelevant task, the envelopes were handed to the second experimenter outside. After 5 minutes' waiting time, the second experimenter handed the envelopes with the answer sheets to the first experimenter who distributed them among the participants. They were collected and given to the second experimenter outside after all participants made their decision.

Empathy questionnaire. While the second experimenter determined the payment for every participant outside the lab, the first experimenter handed out a questionnaire measuring emotional empathy, designed by Mehrabian and Epstein (1972). The payment was sealed in an envelope and handed to each participant by the first experimenter. After participants finished the questionnaire, they were debriefed and dismissed.

Social value orientation. Six to 10 weeks after the experiments, participants were invited to the lab again. They were asked to complete another questionnaire measuring their social value orientation.

Child Sample

The whole class was tested together. Only the data of students who brought a signed consent form were included in this experiment; the data of the other students were destroyed. Three female experimenters and, in some cases, the teacher were present. The first experimenter explained the games to the children; the other two experimenters assisted children who had difficulties with reading and writing, especially in second grade.

Participants were instructed that they would play three consecutive games, each played with a different partner or partners, and that they could earn some money in these games. How much money they would earn would depend on the decisions of all players. It was explained that after all the experiments were finished, the experimenters would randomly pick one of the games and all students would be paid according to their decision in this game. It was explained that their decisions would not be divulged to their classmates, parents, or teachers.

Students were told that for this experiment it would be necessary to divide them into two groups, a blue group and a red group. The children were asked to write down a number. These numbers would be rank-ordered and then split at the median. The half of the children with the higher numbers would be in the blue group, the other half in the red group. The students wrote down their numbers on a piece of paper and one of the assistant experimenters took them and went outside. After a few minutes' waiting time, the students were informed about their group membership on a piece of paper.

As for the adult sample, the main experiment consisted of three consecutive games. Because the order dictator game–sequential prisoner's dilemma–third-party punishment game proved to be most easily understood, particularly by second graders, in a pilot study, only this order was used in the experiment. All games were explained by the main experimenter to all students using the blackboard. The second and third experimenter assisted when children had difficulties understanding the questionnaire.

Dictator game. The rules of the dictator game were explained to the participants with the help of paper cartoon figures and paper coins. Participants were given several examples and quiz questions to ensure understanding of the game structure. It was explained to the participants that it was randomly determined whether they would play with a member from their own group or a member from the other group. On the answer sheets the group membership of proposer and responder was indicated by blue and red circles, respectively. All participants played the dictator game as a proposer.

Answer sheets were handed out to the participants. The experimenters made sure that the children made their decisions by themselves without talking to others or looking at others' answer sheets. After the children made their decisions, the answer sheets were collected by the second experimenter.

Sequential prisoner's dilemma. The rules of the sequential prisoner's dilemma game were explained with the help of cartoon figures. Participants were given several examples and quiz questions to ensure understanding of the game structure. It was explained that it was randomly determined whether they would play with a member from their own group or the other group. The group membership of the first and second player was indicated by blue and red circles on the answer sheet, respectively. All participants played the role of second player.

Answer sheets were handed out to the participants. The experimenters made sure that the children made their decisions by themselves without talking to others or looking at others' answer sheets. After the children made their decisions, the answer sheets were collected by the second experimenter.

Third-party punishment game. The rules of this game were explained with cartoon figures at the blackboard and several examples and quiz questions were given. Participants were told that it was randomly determined whether they would play with people from their own group or the other group. The group memberships of Players A, B, and C were indicated with blue and red circles on the answer sheet, respectively. For the ingroup condition, Players A, B, and C shared the same color. For the outgroup condition, only Players A and B were circled with the same color, Player C was circled with the complementary color. All participants played the role of Player C.

Answer sheets were handed out to the participants. The experimenters made sure that the children made their decisions by themselves without talking to others or looking at others' answer sheets. After the children made their decisions, the answer sheets were collected by the second experimenter.

Social value orientation. After 3 to 4 weeks, the experimenters visited the classrooms again and asked students to complete a questionnaire measuring their social value orientation. The payment for the experiment was handed out at the end, sealed in an envelope for each student.

Measures

Adult Sample

Dictator game. All participants played the dictator game as a proposer. It was their task to allocate 20 euros between themselves and an anonymous responder. Allocations could be made in steps of 1 euro. The smallest allocation could be 0, the largest 20 euros.

Sequential prisoner's dilemma. All participants played the second player. In this game, both players initially had an endowment of 5 euros each. Participants were given all 5 euros from the first player. Thus, according to the rules of the game, they possessed 15 euros altogether before they made the decision of how much to send back to the first player. They could send back any sum between 0 and 15 euros in steps of 1 euro. It was explained to the participants that whatever amount they gave to the other player would be doubled and added to the other player's account.

Third-party punishment game. All participants played Player C. They were endowed with 10 euros. Their task was to decide how much of this 10 euros they were willing to pay to reduce the payoff of Player A. All participants were presented with a scenario in which Player A had given only 2 of 20 euros to Player B and had kept 18 euros for himself. Participants could pay any amount between 0 and 10 euros in steps of 1 euro. The sum they would pay would be subtracted from their endowment. However, twice that amount would be subtracted from the payoff of Player A.

Empathy questionnaire. Consistent with the procedures suggested by Mehrabian and Epstein (1972), 33 items were presented to the participants, including such items as "it makes me sad to see a lonely stranger in a group" or "I like to watch people open presents." Participants responded to each item on a 9-point scale ranging from +4 (very strong agreement) to −4 (very strong disagreement). There were 17 negative and 18 positive items on this scale; for the negative items, the direction of the scoring was reversed. Cronbach's α for the whole empathy scale was 0.97. To compute a total empathy score, the signs of the participants' responses to the negative items were changed and for each participant an algebraic sum of all 33 responses was obtained.

Social value orientation scale. We used a scale measuring social value orientation that was developed by Takezawa and McElreath (2004). Participants were presented with 26 decomposed games. It was explained that these games were hypothetical but that participants should decide as if they were making real choices. In each game, participants had to select one of two alternatives, each allocating some money to oneself and another person. For example, in the first game, Alternative A gave self 1,500 (euros) and the other 1,000. Alternative B gave both 1,000. After a choice was made in each game, desirability of the choice was questioned with a Likert scale (1: like it a little to 4: like it very much). The whole scale can be found in Appendix A.

Theoretically, social value orientation as conceptualized by Takezawa and McElreath (2004) can be seen as a categorical form of the social preference model of inequality aversion proposed by Fehr and Schmidt (1999). Fehr and Schmidt (1999) assumed that in a two-player case, the utility $U(x)$ of a player i can be defined as

$$U_i(x) = x_i - \alpha_i \max\{x_j - x_i, 0\} - \beta_i \max\{x_i - x_j, 0\},\ i \neq j$$

The first term in this equation measures the loss in utility from disadvantageous inequality (i.e. when the other person gets more than self), and the second term measures the utility loss from advantageous inequality (i.e. when self gets more than the other person).

For six of the decomposed games, the values of α and β were estimated using maximum-likelihood estimates by a search through all possible values of these parameters. The estimate was chosen that maximizes the likelihood of observing the participant's actual choice in these six games. These values were cross-validated with a set of six more decomposed games. The obtained values for β were categorized into the two social value orientations of proself and prosocial. Although Takezawa and McElreath (2004) report a high correlation between α and β, they consider a classification on the basis of β as more appropriate.

Child Sample

Dictator game. All participants played the dictator game as a proposer. It was their task to allocate 10 coins between themselves and an anonymous responder. In second grade, each coin was worth 20 eurocents; in sixth grade each coin was worth 50 eurocents. Allocations could be made in steps of 1 coin. The smallest allocation could be 0, the largest 10 coins.

Sequential prisoner's dilemma. All participants played the second player. In this game, both players initially had an endowment of 3 coins each. Again, each coin was worth 20 eurocents in second grade and 50 eurocents in sixth grade. Participants were given all 3 coins from the first player. Thus, according to the rules of the game, they possessed 9 coins altogether before they made the decision of how much to send back to the first player. They could send back any sum between 0 and 9 coins in steps of 1 coin. It was explained to the participants that every amount they gave to the other player would be doubled and added to the other player's account.

Third-party punishment game. All participants played Player C. They were endowed with 5 coins. Each coin had a worth of 20 eurocents in second grade and 50 eurocents in sixth grade. The participants' task was to decide how many of these 5 coins they were willing to pay to reduce the payoff of Player A. All participants were presented with a scenario in which Player A gave only 1 of 10 coins to Player B and kept 9 coins for herself. Participants could pay any amount between 0 and 5 coins in steps of 1 coin. The sum they paid would be subtracted from their endowment. However, twice that amount would be subtracted from the payoff of Player A.

Social value orientation scale. The same scale that was administered to the adult sample was also presented to the children. However, whereas adults made choices between 3- and 4-digit numbers, children were presented with 1- and 2-digit numbers. For example, in the first game in which adults could choose between an Alternative A that gave self 1,500 (euros) and the other 1,000, children were presented with a choice that gave self 15 (euros) and the other 10, and so forth. Participants were presented with 26 decomposed games. It was explained that these games were hypothetical but that participants should decide as if they were making real choices. In each game, participants had to select one of two alternatives, each allocating some money to oneself and another person. After a choice was made in each game, desirability of the choice was questioned with a Likert scale (1: like it a little to 4: like it very much).

Results

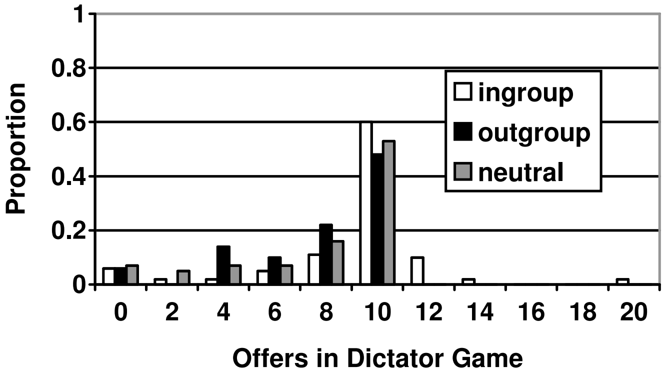
Analyses for adult sample

Dictator game

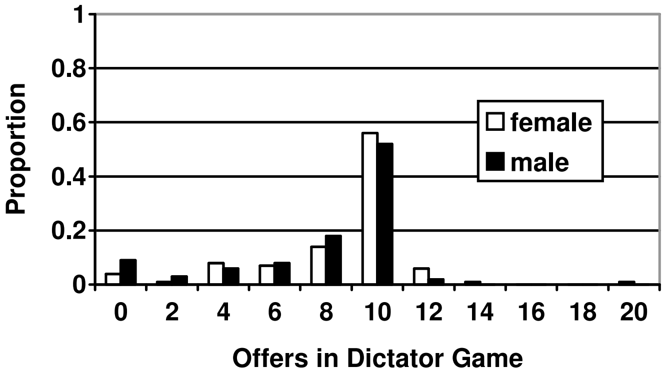
Figure 4.2 displays the distributions of offers in the dictator game for the different conditions of group (ingroup/outgroup/neutral), gender (female/male), and task order [dictator game/prisoner's dilemma game (DG/PDG), PDG/DG]. Table 4.2 shows the mean offers in the dictator game for the same three conditions. We conducted a univariate analysis of variance (ANOVA) with group, gender, and task order as the independent variables. This analysis revealed a significant main effect for group membership, $F(2, 152) = 3.46$, $p = 0.03$. The main effect of gender was marginally significant, $F(1, 152) = 3.08$, $p = 0.08$. All other main or interaction effects were not significant. We also conducted a Kruskal–Wallis test for the variable group to account for the non-normal distribution of the data. This test was also significant ($\chi^2 = 12.64$, $p = 0.00$). As can be seen from Table 4.2, when dictators played with ingroup responders, they on average gave around 1.40 euros more than when they were playing with outgroup responders or in the neutral condition. The average offers for neutral and outgroup responders were almost the same. Post hoc Games–Howell tests revealed, however, that the average offers to ingroup members were significantly higher than the average offers to outgroup members, but that there was no significant difference between the ingroup and neutral condition.

The distributions presented in Figure 4.2 confirm this trend: participants who played in the ingroup condition were more generous than participants playing against an outgroup member. Interestingly, hyperfair offers, that is, offers larger than an equal split, emerged only for the ingroup condition. To test whether the group membership effect would also emerge if offers larger than the equal split were excluded from analysis, the same parametric and non-parametric analyses were conducted again excluding the participants who offered more than 10 coins. This time, there was no significant difference concerning dictator game offers in the three group conditions ($F(2, 141) = 0.97$, $p = 0.38$; Kruskal-Wallis test; $\chi^2 = 4.39$, $p = 0.11$). This result indicates that playing with an ingroup member especially motivated people to give more to the other player than they kept for themselves. Mann–Whitney U tests also revealed no significant effects for gender or task order (gender: $U = 2204.0$, $p = 0.28$; task order: $U = 2438.5$, $p = 0.84$, see Table 4.2 and Figure 4.2), although offers of females were on average slightly more generous than offers of males.

(a)



(b)



(c)

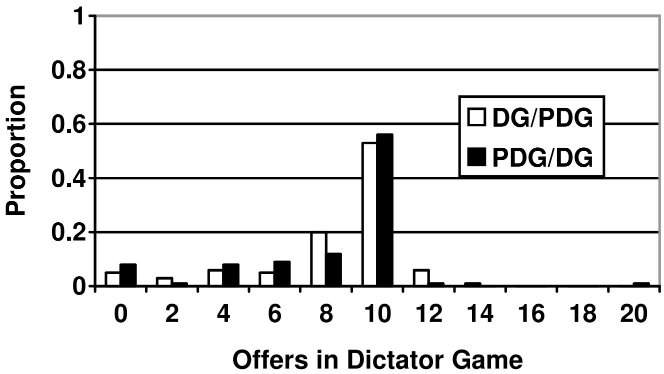


Figure 4.2. Adult sample: Distribution of offers in the dictator game for the different conditions of (a) group membership, (b) gender, and (c) task order (DG/PDG: dictator first; PDG/DG: sequential prisoner's dilemma first)

Table 4.2. Adult sample: Average offers in the dictator game (DG), average reciprocity in the sequential prisoner's dilemma game (PDG), and average punishment in the third-party punishment game for the different conditions of group membership, gender, and task order

		Dictator game	Sequential prisoner's dilemma	Third-party punishment game
Group	Ingroup	N = 61	N = 60	N = 62
		9.31 (3.25)	−0.53 (1.56)	1.50 (2.52)
	Outgroup	N = 50	N = 50	N = 50
		7.94 (2.77)	−0.68 (1.54)	0.60 (1.09)
	Neutral	N = 41	N = 42	N = 42
		8.00 (3.08)	−0.48 (1.25)	1.07 (1.57)
Gender	Female	N = 88	N = 88	N = 90
		8.86 (2.99)	−0.61 (1.36)	1.13 (1.75)
	Male	N = 64	N = 64	N = 64
		8.02 (3.21)	−0.50 (1.61)	1.03 (2.17)
Order	DG/ PDG	N = 79	N = 78	N = 79
		8.66 (2.86)	−0.72 (1.48)	1.37 (1.93)
	PDG/DG	N = 73	N = 74	N = 75
		8.34 (3.36)	−0.41 (1.44)	0.80 (1.90)

Note: Numbers in parentheses are standard deviation. DG/PDG: order dictator game first, sequential prisoner's dilemma second; PDG/DG: order sequential prisoner's dilemma first, dictator game second.

When I divided the sample by gender, analyses revealed that the effect of group membership was due to the female participants. On average, females gave more than 2 euros more to ingroup than to outgroup responders (9.83 vs. 7.78) and about 1 euro more to ingroup compared to neutral responders (9.83 vs. 8.85), and this effect was significant (χ^2 = 9.02, p = 0.01). The group effect was not significant for the males (χ^2 = 4.40, p = 0.11), who on average gave almost as much to ingroup responders as they did to outgroup responders (8.56 vs. 8.22) but gave much less to neutral responders (7.19).

When I divided the sample by task order, the effect of group membership was significant in both task-order conditions. Participants in the DG/PDG condition gave on average 1 euro more to an ingroup than to an outgroup responder (9.22 vs. 8.28) with the neutral condition holding a middle position (8.28 vs. 8.48; $\chi^2 = 6.00$, $p = 0.05$).

In the PDG/DG condition, participants gave on average almost 2 euros more to ingroup than to outgroup responders (9.38 vs. 7.48) but less to neutral than to outgroup responders (7.39 vs. 9.38; $\chi^2 = 7.73$, $p = 0.02$).

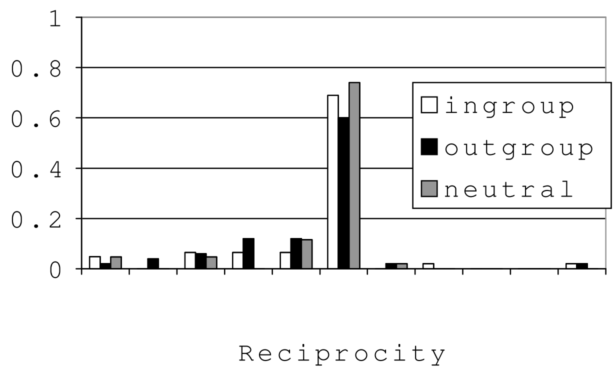
In sum, I can conclude that our hypotheses concerning the effect of group membership were confirmed in the dictator game: Overall, participants gave more to ingroup than to outgroup responders. This group effect was prevalent in both task-order conditions. However, females seemed to be more sensitive to the group membership of the responders than males.

Sequential prisoner's dilemma game

I calculated the variable *reciprocity*, which measures to what degree the offer of the second player was reciprocal to the offer of the first player. The variable reciprocity is calculated as the difference between the second player's and the first player's offers. Thus, a value of zero on the reciprocity variable indicates perfect reciprocity, that is, that the second player sent as much back as she received from the first player. Negative values, on the other hand, imply that the second player sent less than she received from the first player, and positive values suggest that the second player gave more to the first player than the other way round. Figure 4.3 shows the distribution of reciprocity for the three independent variables of group membership, gender, and task order. In all conditions, the vast majority of second players reciprocated perfectly, although there was also a minority of players who sent less to the first player than they received. Only very few players, however, showed positive reciprocity and gave more to the first player than they got. An ANOVA with the independent variables group membership, gender, and task order revealed only a significant interaction effect of Group × Gender, $F(2, 152) = 3.32$, $p = 0.04$. Females' reciprocity was lowest in the outgroup condition, whereas males were most reciprocal when playing with an outgroup member. Similarly, a Kruskal–Wallis test, which tested the main effect of group membership on reciprocity, was not significant ($\chi^2 = 1.87$, $p = 0.39$), and neither were the Mann–Whitney U tests for gender ($U = 2433.0$, $p = 0.08$) and task order ($U = 2722.0$, $p = 0.46$).

Again, the sample was divided to test the effect of group membership separately for gender and task order. In none of the subgroups was the effect of group membership on reciprocity significant.

(a)



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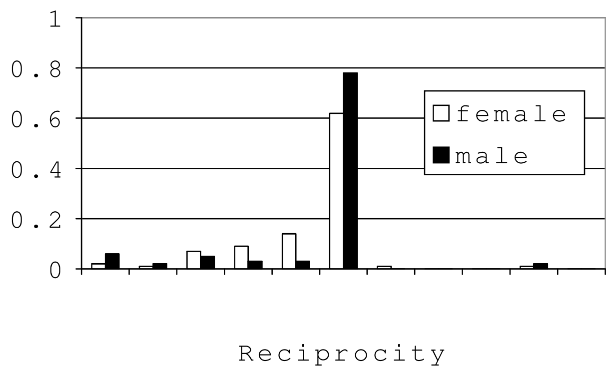

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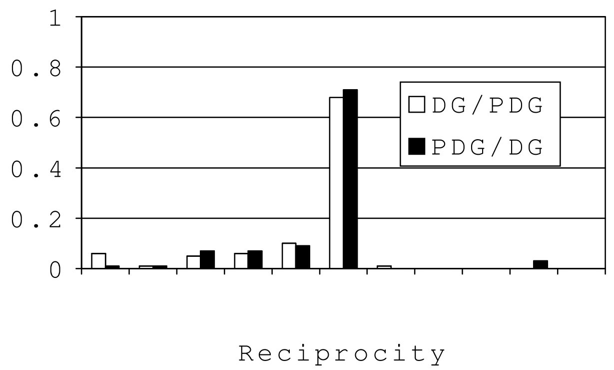


Figure 4.3. Adult sample: Distribution of reciprocity in sequential prisoner's dilemma for the different conditions of (a) group membership, (b) gender, and (c) task order (DG/PDG: dictator game first; PDG/DG: sequential prisoner's dilemma first)

Third-party punishment game

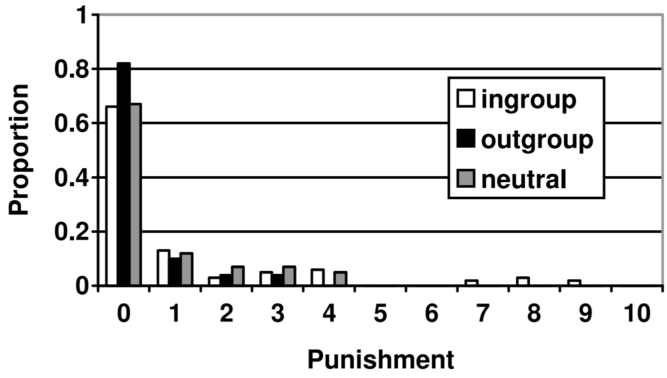
Figure 4.4 shows the distribution of punishment by the third party for the three independent variables group, gender, and task order. The vast majority of participants did not punish an unfair dictator, no matter whether the dictator and the responder were from the same group (ingroup), from different groups (outgroup) as Player C, or if no group membership was indicated. An ANOVA that tested the effects of group membership, gender, and task order revealed a significant main effect of group, $F(2, 154) = 3.72$, $p = 0.03$. As indicated in Table 4.2, the punishment for unfair dictators was on average more than twice as high when they came from the ingroup than from the outgroup, and this difference was significant in a post hoc Games–Howell test. Moreover, the ANOVA revealed a significant main effect for task order, $F(1, 154) = 4.64$, $p = 0.03$. Participants punished significantly more when the dictator game preceded the sequential prisoner's dilemma game than vice versa.

The group effect did not reach significance in a non-parametric Kruskal–Wallis test ($\chi^2 = 2.67$, $p = 0.26$). Likewise, a *U* test testing the effect of gender was not significant ($U = 2583.0$, $p = 0.21$). However, the effect of task order reached significance ($U = 2315.0$, $p = 0.01$). Again, I split the sample by gender and task order and tested the effect of group separately. There was no significant group effect in either males or females. Also, for the different task-order conditions, no significant effect was detected.

Empathy questionnaire. T tests with gender and task order as independent variables and empathy as dependent variable revealed no significant effects, respectively [gender: $t(64.46) = -0.86$, $p = 0.39$; task order: $t(152) = 0.63$, $p = 0.53$]. Similarly, a univariate ANOVA with group membership as independent variable and empathy as dependent variable did not reach statistical significance, $F(2,153) = 0.76$, $p = 0.47$. Thus, the degree of empathy can be assumed to be similar for the different conditions of gender, task order, and group membership.

I next investigated whether people with a higher dispositional empathy also made higher offers in DG and PDG or punished more in the third-party punishment (TPP) game. All the correlations between participants' offers and dispositional empathy were small and non-significant (DG empathy: $r = 0.01$; PDG empathy: $r = 0.05$; TPP empathy: $r = -0.05$). This was also the case when I performed the same analysis for the different conditions of gender, task order, and group separately.

(a)



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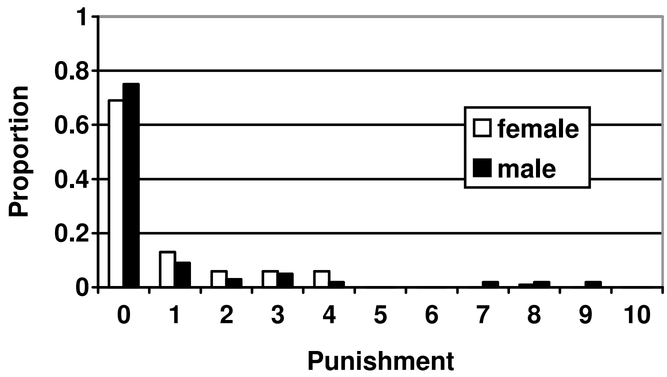

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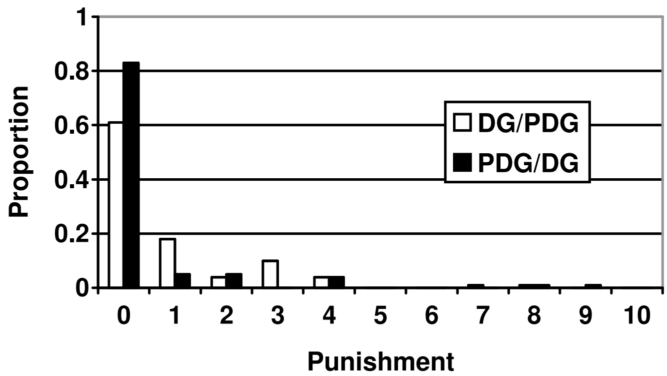

Figure 4.4..Adult sample: Distribution of punishment in the third-party punishment game for the different conditions of (a) group membership, (b) gender, and (c) task order (DG/PDG: dictator game first; PDG/DG: sequential prisoner's dilemma first)

Social value orientation. The social value orientation of each participant was calculated as described in the Method section. Overall, 71 participants could be classified as prosocial and 50 as proself. Table 4.3 shows the distribution of proselfs and prosocials by grade, gender, and task order. Chi-square tests for the independence of these factors revealed no significant effects.

For each of the three games, we conducted an ANOVA with the independent factors group membership and social value orientation. If the reciprocity heuristic hypothesis is correct, then we would expect a significant interaction effect of Group membership × Social value orientation. If the allocation offers in the three games are instead influenced by social preferences, a significant main effect of social value orientation would be expected.

Table 4.3. Frequencies of prosocial and proself players by the different conditions of group membership, gender, and task order

		Prosocial	Proself
Group	Ingroup	24	22
	Outgroup	23	15
	Neutral	24	13
Gender	Female	40	28
	Male	31	22
Task order	DG/ PDG	44	23
	PDG/DG	27	27

Note: DG/PDG: order dictator game first, sequential prisoner's dilemma second; PDG/DG: order sequential prisoner's dilemma first, dictator game second

In dictator game, we obtained a significant main effect for group membership, $F(2,119) = 3.08$, $p = 0.05$, and a significant main effect for social value orientation, $F(1,119) = 8.97$, $p = 0.003$. On average, participants in the ingroup condition offered significantly more than participants in the outgroup and neutral condition, and prosocial players made significantly larger offers ($M = 9.07$) than proselfs ($M = 7.39$). No main or interaction effects were obtained in the sequential prisoner's dilemma.

In third-party punishment game, both the main effects for group membership, $F(2,120) = 3.45$, $p = 0.03$, social value orientation, $F(1,120) = 10.15$, $p = 0.002$, and the interaction effect of both variables were significant, $F(2,120) = 3.18$, $p = 0.05$. Participants punished more in the ingroup and neutral compared to the outgroup condition. Overall, prosocials punished more (M = 1.59) than proselfs (M = 0.48), however this difference in punishment was especially pronounced in the ingroup and neutral but not the outgroup condition.

Analyses for Child Sample

Dictator game

Figure 4.5 shows the distribution of offers in the dictator game in second grade and sixth grade for the different conditions of group membership (ingroup, outgroup, neutral) and gender (female, male). Tables 4.4 and 4.5 display the mean offers in the dictator game for the same two conditions.

For each of the two grades, we separately conducted a univariate ANOVA to test the effects of group membership and gender on the dependent variable offer in the dictator game. In second grade, none of the main or interaction effects were significant. There was a marginally significant group x gender effect $F(2, 80) = 2.79$, $p = 0.07$, indicating that girls gave on average as much to ingroup and neutral members and less to outgroup members, whereas boys gave similar amounts to ingroup and outgroup but less to neutral members. Because our data is not normally distributed (which might lead to not detecting significant effects with an ANOVA), we also conducted a Kruskal–Wallis test to investigate the effect of group membership of the responder on dictator game offers. In second grade, this test revealed no significant effect for group ($\chi^2 = 1.07$, $p = 0.56$). Although children gave on average 50 eurocents more when they played against an ingroup opposed to an outgroup or neutral responder, as shown in Figure 4.5a the distribution of offers was similar across group conditions. However, because the number of participants was considerably lower in the two child samples than in the adult sample, it could have been possible that the group effect did not reach significance because of small sample size. I therefore calculated the estimated effect size η^2 for the effect of group membership: $\eta^2 = 0.01$ for the effect of group membership in second grade, which can be classified as a basically non-existent effect. A Mann–Whitney U test assessed the effect of gender on dictator game offers. As can be seen from Table 4.4 and Figure 4.5c, the offers of girls and boys in second grade were not significantly different ($U = 795.5$, $p = 1.00$).

In sixth grade, an ANOVA with group membership and gender as independent

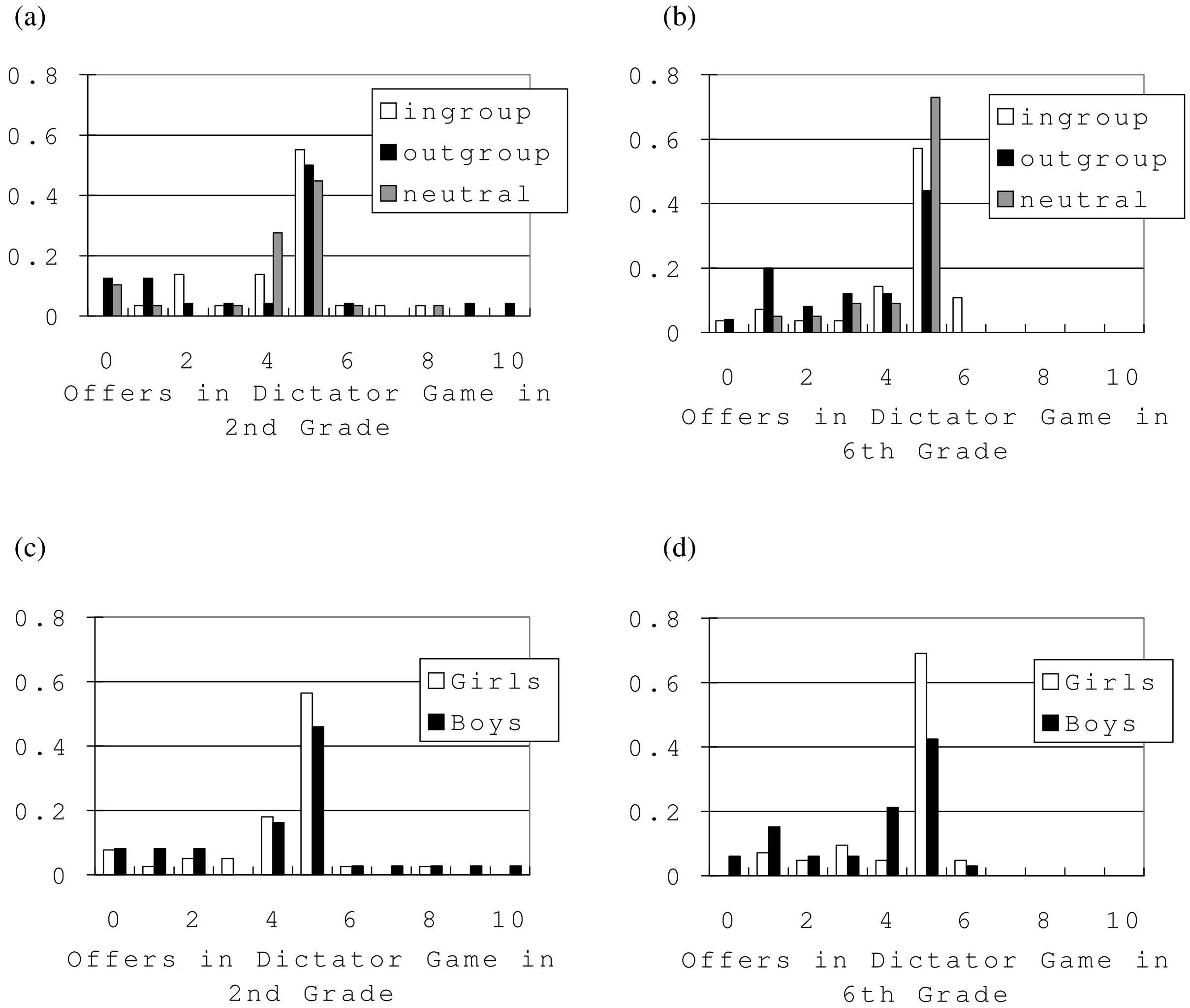

Figure 4.5. Children sample: Distributions of offers in dictator game for the different conditions of grade, group membership (a, b), and gender (c, d)

variables revealed the two significant main effects for group membership, $F(2, 75) = 4.82$, $p = 0.01$, and gender, $F(1, 75) = 6.30$, $p = 0.01$. The interaction effect was not significant. The same results were obtained with non-parametric tests. A Kruskal–Wallis test revealed a significant effect for group membership ($\chi^2 = 6.42$, $p = 0.04$). Table 4.5 and Figure 4.5b indicate that this significant effect was mainly due to the difference in offers between the ingroup and neutral condition on the one hand and the outgroup condition on the other. When participants played with outgroup responders, they gave on average about 1 euro less compared to when they played against ingroup and neutral responders. Figure 4.5a also shows that offers larger than the equal split were only offered to ingroup members. The equal split, on the other hand, was the most common choice in the neutral condition. The results of a Mann–Whitney *U* test for the effect of gender indicated that girls in the role of proposers gave significantly more than boys ($U = 497.5$, $p = 0.02$)—on average about 80 eurocents more.

Table 4.4. Second grade: Average offers (and SD in parentheses) in the dictator game, average reciprocity (and SD) in the sequential prisoner's dilemma, and average punishment (and SD) in the third-party punishment game for the different conditions of group membership, gender, and task order

		Dictator game	Sequential prisoner's dilemma	Third-party punishment game
Group	Ingroup	$N = 28$ 4.54 (1.48)	$N = 28$ −1.36 (1.25)	$N = 28$ 2.18 (1.39)
	Outgroup	$N = 24$ 4.04 (2.61)	$N = 24$ −1.08 (2.04)	$N = 23$ 2.70 (1.22)
	Neutral	$N = 28$ 4.11 (1.83)	$N = 29$ −1.24 (1.48)	$N = 29$ 1.93 (1.19)
Gender	Female	$N = 43$ 4.21 (1.68)	$N = 44$ −1.14 (1.13)	$N = 44$ 2.20 (1.17)
	Male	$N = 37$ 4.27 (2.31)	$N = 37$ −1.35 (2.00)	$N = 36$ 2.24 (1.30)

Sequential prisoner's dilemma

As for the adult sample, we calculated the variable *reciprocity* (second player's offer minus first player's offer), which measures to what extent the offer of the second player was reciprocal to the offer of the first player. As can be seen from the distribution in Figure 4.6a, children in second grade did not tend to reciprocate but sent less to the first player than they received from him. When checking whether this was similar for the three group conditions and for the two genders, a univariate ANOVA did not show any significant main or interaction effects. A Kruskal–Wallis test revealed no significant effect for group ($\chi^2 = 0.05$, $p = 0.97$), and a Mann–Whitney U test revealed no significant effects for gender on reciprocity ($U = 647.0$, $p = 0.11$).

In sixth grade, a very high number of participants displayed negative reciprocity (see Figure 4.6). However, perfect reciprocity (i.e. giving as much back to the first player as the first player has given to you) was the modal choice for participants playing with an ingroup or neutral first player, whereas participants in the outgroup condition reciprocated far less (see also Table 4.5). This main effect of group membership was significant in an ANOVA with group membership and gender as independent variables, $F(2, 75) = 3.72$, $p = 0.03$. A

Kruskal–Wallis test revealed the same result (χ^2 = 6.48, p = 0.04). However, no significant effect for gender was obtained in either the parametric or the non-parametric test.

Table 4.5. Sixth grade: Average offers (and SD in parentheses) in the dictator game, average reciprocity (and SD) in the sequential prisoner's dilemma, and average punishment (and SD) in the third-party punishment game for the different conditions of group membership, gender, and task order

		Dictator game	Sequential prisoner's dilemma	Third-party punishment game
Group	Ingroup	*N* = 28 4.32 (1.54)	*N* = 28 −0.79 (1.10)	*N* = 28 2.07 (1.39)
	Outgroup	*N* = 25 3.40 (1.76)	*N* = 25 −1.28 (1.10)	*N* = 25 1.44 (1.33)
	Neutral	*N* = 22 4.41 (1.14)	*N* = 22 −0.55 (0.67)	*N* = 22 2.22 (1.19)
Gender	Female	*N* = 42 4.38 (1.31)	*N* = 42 −0.74 (0.91)	*N* = 42 1.98 (1.33)
	Male	*N* = 33 3.61 (1.77)	*N* = 33 −1.06 (1.14)	*N* = 33 1.82 (1.36)

Third-party punishment game

Figure 4.7 and Tables 4.4 and 4.5 display the distributions and means of punishment in second and sixth grade for the two conditions of group membership and gender. In contrast to the adult sample, participants in both grades preferred to punish unfair proposers than not to punish. There was no consistent trend for punishment behavior in either of the two grades. An ANOVA with group membership and gender as independent variables obtained no significant main or interaction effects in second grade, but a marginally significant effect for group membership in sixth grade $F(2, 75) = 2.85$, $p = 0.07$. Kruskal–Wallis tests demonstrated two marginally significant effects for group membership in both grades (second: χ^2 = 4.98, p = 0.08; sixth: χ^2 = 4.93, p = 0.09). Mann–Whitney U tests, which assessed whether the punishment behavior was different for girls and boys, revealed no significant effects for gender (second: $U = 776.0$, $p = 0.87$; sixth: $U = 645.5$, $p = 0.60$).

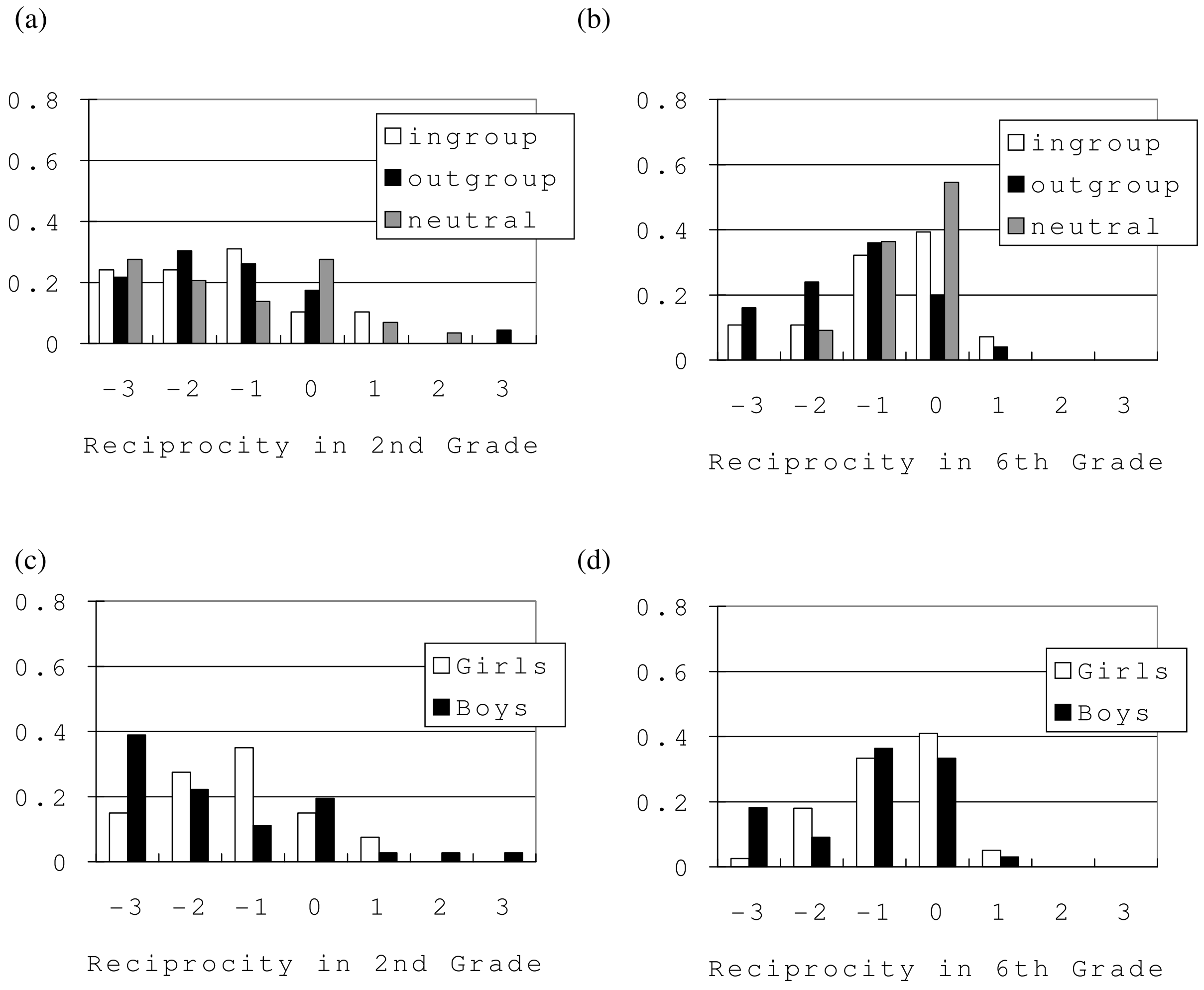

Figure 4.6. Child sample: Distributions of reciprocity in the sequential prisoner's dilemma for the different conditions of grade, group membership (a, b), and gender (c, d)

Social value orientation

Social value orientation was computed according to the procedures described in the Method section. We differentiated between two kinds of social value orientation: prosocial and proself. In second grade, 27 children could be classified as proself and 25 as prosocial. In sixth grade, 16 participants could be classified as proself and 45 as prosocial. A chi-square test revealed that the distribution of proselfs and prosocials in the two grades was significantly different from what would be expected if the two variables were independent. Specifically, in second grade there were more proselfs and fewer prosocials than expected, and in sixth grade there were more prosocial and fewer proself participants than expected. However, the distributions of proself and prosocial participants for the different conditions of group membership were not significantly different in each grade. In sixth grade, girls more often than expected were classified as prosocials, and boys were more often than expected classified as proselfs

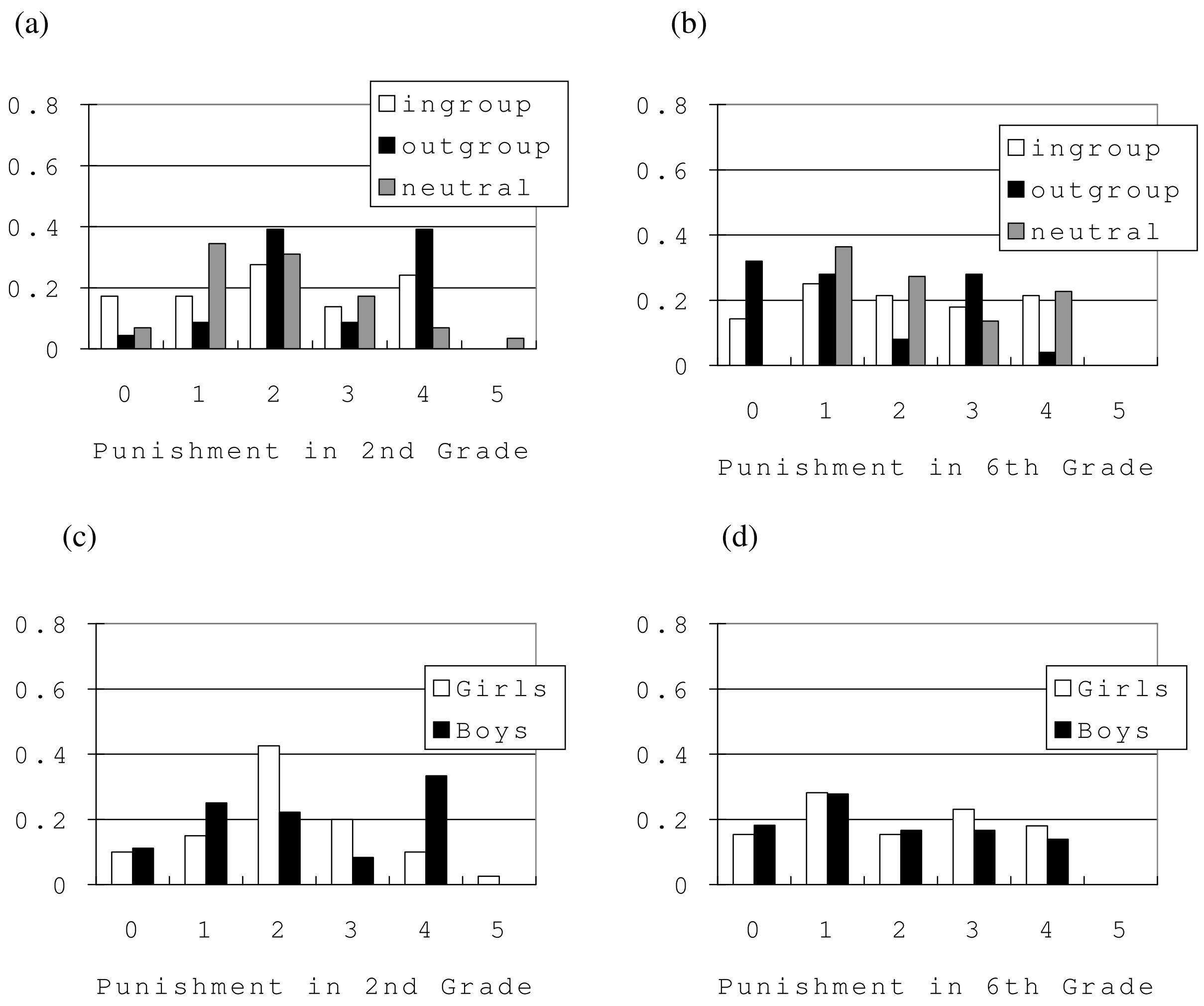

Figure 4.7. Child sample: Distributions of punishment in the third-party punishment game for the different conditions of grade, group membership (a, b), and gender (c, d)

(χ^2 = 10.38, *df* = 1, *p* = 0.00). There was no such gender effect in second grade.

As for the adult sample, we conducted three separate ANOVAs on offers in the dictator and the sequential prisoner's dilemma games, and on punishment in the third-party punishment game. If the reciprocity heuristic hypothesis is correct, then we would expect a significant interaction effect of Group membership × Social value orientation. If the allocation offers in the three games are instead influenced by social preferences, a significant main effect of social value orientation would be expected. In second grade, none of these expected main and interaction effects was significant. In sixth grade, on the other hand, we obtained significant main effects for social value orientation in all three games. In the dictator game, prosocials on average offered significantly more than proselfs, $F(1, 61) = 4.57$, $p = 0.04$. In the sequential prisoner's dilemma, prosocials reciprocated significantly more than proselfs, $F(1, 61) = 6.51$, $p = 0.01$. In the third-party punishment game, prosocials punished more than proselfs, and this difference was marginally significant, $F(1, 61) = 3.69$, $p = 0.06$.

Age comparisons

Next we compared the behavior of adults, second graders, and sixth graders to investigate possible developmental effects. Because we did not use the same scale in each of the three age groups (i.e. adults had to divide 20 coins in the dictator game, and children 10), we standardized each dependent variable. That is, the dictator game offer of each participant was divided by 20 for the adult sample and by 10 for the child sample, resulting in a variable ranging from 0 to 1. Similarly, each coin participants paid in the third-party punishment game was divided by 10 for the adult sample and by 5 for the child sample. Offers in the sequential prisoner's dilemma were divided by 5 for the adult sample and by 3 for the child sample. We decided to use these numbers for standardization because the second players in the sequential prisoner's dilemma initially had 5 or 3 coins to exchange, respectively. However, if participants were given coins by the first player, they theoretically could give back more than 5 or 3 coins. Thus, the standardized variable for the sequential prisoner's dilemma could reach values larger than 1. Values larger than 1 indicate positive reciprocity. For each of the three games, we conducted an ANOVA with the three independent variables age (second grade, sixth grade, adult), group (ingroup, outgroup, neutral), and gender (female, male).

For the dictator game this analysis revealed a significant main effect of group, $F(2, 307) = 4.31$, $p = 0.01$, and a marginally significant main effect of gender, $F(1, 307) = 3.55$, $p = 0.06$. Post hoc Games–Howell tests indicated that participants gave significantly more to ingroup than to outgroup members, but that there was no difference between participants playing with ingroup or neutral members. On average, females gave more than males in the dictator game. No significant effect of age group emerged.

For the sequential prisoner's dilemma, a significant main effect of age was obtained, $F(2, 308) = 17.72$, $p = 0.00$. Post hoc Games–Howell tests indicated that adults showed a significantly higher amount of reciprocity than students from both second and sixth grade, whereas there was no significant difference between the latter two groups. No other main or interaction effects were significant.

ANOVA for the third-party punishment game again indicated a significant main effect for age, $F(2, 309) = 72.14$, $p = 0.00$. Again, the adult sample was significantly different from the two child samples, but this time the adults punished significantly less than the children.

There was no difference between students from second and sixth grade concerning their punishment behavior. The ANOVA revealed another interaction effect of Age × Group, $F(4, 309) = 3.79$, $p = 0.01$. Whereas both adults and sixth-grade students punished more in the ingroup and neutral condition and less in the outgroup condition, for second graders it was the other way round: They punished more in the outgroup than in the ingroup or neutral condition.

Social value orientation

We investigated whether there was any age difference concerning the distribution of prosocials and proselfs in the three age groups. A χ^2 test indicated a significant age difference ($\chi^2 = 7.94$, $df = 2$, $p = 0.02$). Closer inspection of the data revealed that in second grade there were more proself children than expected and fewer prosocial children, whereas this was reversed in sixth grade. In the adult sample, there was no difference concerning the expected and observed numbers of proselfs and prosocials. As can be seen in Figure 4.8, the proportion of proselfs and prosocials was different in each of the three age groups. Whereas in second grade, there were about as many prosocials as proselfs, the number of prosocials dramatically increased in sixth grade. Among the adult sample, prosocials were still more prevalent than proselfs, but their proportion decreased compared to sixth grade.

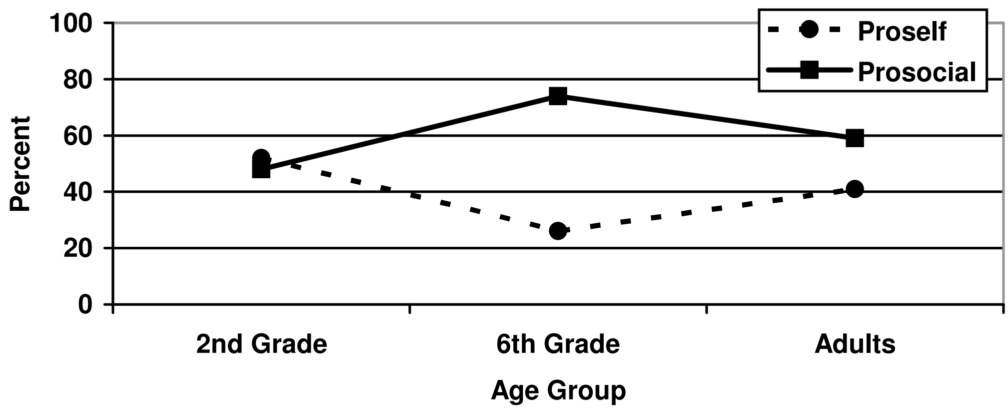

Figure 4.8. The prevalence of social value orientations in three different age groups

Discussion

In the present study we investigated reasons for prosocial behavior of adults and children in three one-shot situations, in which participants interacted with one or two anonymous other players. We proposed two models that might explain such prosocial behavior. The first model, social preferences, assumed that participants have stable internal motivations or preferences for certain prosocial or selfish outcomes. The second model, the prosocial heuristic, postulated that people's prosocial decisions and actions should rather be seen as inferences based on cues that signify important social information for making socially adaptive decisions. We were interested in determining which of these two models could describe people's decisions best. Furthermore, this study was intended to test whether people really differentiate between information about reciprocity and group membership according to the prosocial heuristic and whether this influences the outcome of their decisions. Lastly, we investigated ontogenetic differences in social preferences and the prosocial heuristic and their relation to prosocial behavior.

Social preferences

Contrary to predictions of experimental economists (e.g. Bolton & Ockenfels, 2000, Fehr & Schmidt, 1999) and empirical findings by social psychologists (e.g. De Cremer & Van Lange, 2001; Takezawa & McElreath, 2004), adults with a prosocial social value orientation did not act more prosocially than proselfs in either of the three games. There are several reasons why this is the case, apart from the conclusion that social preferences do not influence adults' prosocial action.

First, the set-up of our study was different from previous studies relating social value orientation and cooperation. In two of the three conditions in our study, participants received information about the group membership of their interaction partner. As has been shown by De Cremer and van Dijk (2002), prosocials and proselfs contributed equally in a public goods game when information about the group membership of their group was emphasized. Nevertheless, their findings cannot explain why there was no difference in the behavior of proselfs and prosocials in the neutral situation (no information about group membership), which equals earlier investigations of social value orientation.

Second, our measure of social value orientation differed from those previously employed. Traditionally, social value orientation is assessed by presenting participants with a series of decomposed games that involve making choices about *three* combinations of outcomes for oneself and for another person (see De Cremer & van Dijk, 2002; Van Lange, Otten, de Bruin, & Joireman, 1997). In this investigation, we adopted the procedures of Takezawa and McElreath (2004) for measuring social value orientation. In their instrument, people have to choose between two combinations of outcomes for onself and for the other. Additionally, participants have to indicate for each decomposed game how much they like their choice compared to the alternative. It is possible that the specifics of our measurement could explain why we did not find any differences between prosocials' and proselfs' allocations in the adult sample. On the other hand, Takezawa and McElreath (2004) reported significant differences between adult prosocials and proselfs in the dictator game, public goods dilemmas, and the third-party punishment game.

Third, social value orientation may not have been a good predictor for prosocial behavior, because it was measured with a series of hypothetical choices. In experimental economics, social preferences are usually determined by the actual behavior of people in economic games. Therefore, prosocial behavior in these situations is actually costly to participants, whereas in our measurement of social value orientation being prosocial was "cheap talk." On the other hand, in a recent study Biele and Rieskamp (2005) demonstrated that even if participants are paid according to their choices in a social value questionnaire, social value orientation did not correlate with cooperation in a repeated public goods dilemma.

Similar to the adult sample, the decisions of children in second grade were not influenced by their social value orientations. In sixth grade, however, prosocials acted more prosocially than did proselfs in all three games. This difference in the influence of social value orientation is surprising and not easy to explain, also because studies on the development of social value orientation are very rare. Van Lange and colleagues (1997) cross-sectionally investigated the development of social value orientations in adolescents and younger, middle-aged, and older adults. They found that the number of prosocial participants increased with increasing age, whereas the number of proselfs decreased. We did not find such a linear trend in our study: The prevalence of prosocials increased from second to sixth grade, but decreased again in the adult sample. On the other hand, the proportion of prosocials (and proselfs) in the adult sample was similar to the proportion found by Van Lange and colleagues (1997) in their sample of 15- to 29-year-olds (which is roughly the age group our adult participants fell in). In general, both their results and the findings from our study suggest that future research should investigate the development of social preferences and their connection to (prosocial) behavior more thoroughly.

The prosocial heuristic

Overall, the results of our study indicate that the behavior of adults was more in tune with the predictions of the prosocial heuristic than with the predictions of the social preference model. Participants took into account the group membership of their interaction partner when no information about past interaction behavior was available in the dictator game and gave more to ingroup responders than to outgroup or neutral responders. Playing with an ingroup responder seems to be especially motivating to give more than half of the original amount to the other player, a behavior that was not observed when participants played with an outgroup or neutral responder.

In contrast, in the sequential prisoner’s dilemma, in which participants as second players had information about the previous prosocial behavior of their partner, no effect of group membership emerged. The vast majority of participants perfectly reciprocated the offer of the first player. These findings imply that reciprocity indeed seems to be a more important cue for prosocial decision making than group membership. Thus, the order of how social information is arranged in the prosocial heuristic seems to be valid.

Moreover, in contrast to proponents of social identity theory (e.g. Billig & Tajfel, 1973; Tajfel, 1970; Tajfel et al., 1971) who hypothesized that information about group membership changes people’s focus of attention from an individual to a group perspective, our study suggests that adults can employ social information in an adaptive way. If people have information about the past behavior of their interaction partner available, this does not override the decision suggested by the reciprocity cue. In this way, reciprocity acts as a non-compensatory cue. This is also because a cue about past interaction behavior provides information about directly reciprocal actions, whereas a group membership cue implies information about indirect reciprocity in a group (see also Yamagishi & Kiyonari, 2000).

Although our study provides evidence that adults utilize social information as proposed by the prosocial heuristic, we do not know whether people’s decision making really follows the process described by this heuristic. In this study, we were interested in the outcome predicted by this heuristic (i.e. the allocations of our participants), and not in the decision-making processes per se. Do people really focus on the three kinds of social information presented in a sequential way? Do they stop searching for more if one of these social cues provides enough information? Are their decisions based on only one kind of social information or is the information integrated?

One way to find out about people’s decision processes is to collect verbal descriptions of their decision strategies—either during decision making by “think-aloud” or “write-aloud” (Gigerenzer & Hoffrage, 1995) techniques or retrospectively after the decision has been made through introspection. Because these methods have been criticized with the argument that people cannot accurately describe their own decision processes (e.g. Bröder, 2000; Dieckmann & Rieskamp, 2005; Rieskamp & Hoffrage, 1999), studies in judgment and decision-making research have increasingly presented people with computerized information boards (e.g. Rieskamp & Hoffrage,). During such experiments, people are presented with the relevant information (e.g. in our case the three cues reciprocity, future interaction, and group membership) and their possible cue values (yes, no, no information available) on a computer screen. The cue values are usually hidden in boxes but can be retrieved by clicking on these boxes. With the help of the computer program Mouselab (Payne, Bettman, & Johnson, 1993) it is possible to retrieve information about the sequence in which a participant opened the boxes, the period of time she kept a box open, and how much information she collected before she stopped information search and made a decision. Thus, this technique makes it possible to investigate whether participants really look up information in the sequence proposed by the group heuristic and whether they use the available information in a non-compensatory way. In future studies, we are planning to use this technique to investigate the prosocial heuristic more thoroughly.

Whereas the findings from the adult sample provide encouraging first evidence in favor of the prosocial heuristic, the situation is different for the child sample. In second grade, children did not differentiate between ingroup, outgroup, and neutral responders in the dictator game. In sixth grade, on the other hand, group membership mattered: Participants gave significantly more to ingroup and neutral responders than to outgroup responders, and offers larger than the equal split were exclusively offered to ingroup members. These results are in line with previous research on the development of intergroup behavior. Bigler and colleagues (1997, 2001) and Spielman (2001) demonstrated that trivial grouping categories, as were used in this investigation and in the majority of studies in the minimal intergroup paradigm, do not influence the behavior of young preschool or elementary school children if these grouping categories are used in a non-salient way. Older children, however, pick up the information about group membership provided by these trivial categories and act more favorably toward the ingroup. Our findings indicate that although humans might be prepared by evolution to pay attention to group membership status of others, information about what or who constitutes an ingroup or outgroup member has nevertheless to be learned over ontogenetic development. This might be the reason why even 3- to 4-year-old children show ingroup bias on the basis of gender or ethnicity (Aboud, 1988)—because these are very salient categories for classifying people in the culture they grow up in—but not for trivial group categories, as in our study. A way to test this assumption would be to replicate this study with meaningful social categories instead of trivial ones. If our conclusion is correct, then also children in the youngest age group should exhibit ingroup favoritism.

In the sequential prisoner's dilemma, children reciprocated to a much lesser degree than adults. Although with increasing age perfect reciprocity increased as well, even the sixth graders acted more selfishly than adults: If they had the opportunity, children sent back less to the first player than what the first player sent to them. A quite substantial number of children (15–20%) did not reciprocate at all in the sequential prisoner's dilemma. Although earlier research has shown that even preschool children exhibit reciprocity, for example, when they play with peers (swapping toys, taking turns; Parrot & Gleitman, 1989); have (passive) knowledge about what constitutes a reciprocal behavior; and can identify violations of such behavior (see Keller et al., 2004) in an interaction with a rather abstract, anonymous interaction partner, this knowledge might influence their reciprocal behavior only to a limited degree. Moreover, even among sixth graders, reciprocity does not seem to be a non-compensatory cue as it is among the adult sample: sixth-grade children reciprocate more with members from the ingroup and with neutral players than with outgroup players. Hence, the order of social information as proposed in the prosocial heuristic is not as valid for sixth graders as it is for adults. Increasing the salience of the reciprocity cue (i.e. by making the interaction between the first and the second player more concrete) in future research should make it possible to find out whether children indeed do weigh the three social cues in the prosocial heuristic differently from adults or whether the social exchange characteristic of the game situation has to be more emphasized in order for children to act reciprocally.

Punishment

This study constitutes one of the first attempts to investigate people's punishing behavior in a one-shot intergroup situation. According to Yamagishi's (2003) bounded generalized reciprocity theory, participants should punish other players who violate the norm of generalized reciprocity that exists within the ingroup. On the other hand, violations of this norm in the outgroup should not be punished. Although we did obtain a significant main effect of group membership with a parametric test, indicating that unfair dictators were punished more severely when they came from the ingroup than when they came from the outgroup, this result should be interpreted with caution. The majority of the adult participants (around 70%) did not punish at all in the third-party punishment game, and the distribution of punishment was highly skewed. This amount of punishment was lower than that reported in other studies, both when the third-party punishment game was played repeatedly (e.g. Fehr & Gächter, 2000), and when it was run as a one-shot game (e.g. Kiyonari, Shimoma, & Yamagishi, 2004; Shinada, Yamagishi, & Ohmura, 2005). Because a non-parametric test for effect of group membership did not reach significance, we conclude that the robustness of this group effect should be tested in future studies. However, Shinada and colleagues (2005) investigated ingroup versus outgroup punishment in a one-shot gift-giving game.[1] They found that participants who had cooperated with other ingroup members before also will punish uncooperative ingroup members when they have the opportunity to do so.

The children in this study punished unfair dictators significantly more frequently and more harshly than did the adults. Since we investigated the punishment behavior of children exploratively, I do not have a ready-made explanation for this behavior. It could be that children view the norm of generalized reciprocity more strictly than adults do, and therefore are more willing to enforce costly punishment to violators of this norm. This explanations has its flaws, however, considering that only a few of the same children did not act according to the norm of direct reciprocity in the sequential prisoner's dilemma played only a few minutes before. Another reason for the higher punishment in children than adults could lie in emotions elicited by the unfair behavior of the dictator. Negative emotions of anger or moral outrage have been proposed as proximate causes for the punishment of cheaters by Fehr and Gächter (2000a), and Shinada and colleagues (2005) have indeed demonstrated that feelings of anger, unfairness, and guilt correlated with the punishment behavior toward ingroup members. Hence, it could be that children more than adults feel outraged by the unfair treatment of another person and punish a dictator, even when this comes with costs for themselves. Studying the relationship between emotions and punishment behavior and its development, as Shinada and colleagues (2005) have done, seems to be a fruitful avenue for future studies.

Open questions

In the current study, we did not investigate the influence of the second cue of the prosocial heuristic, that is, information about the future length of the relationship, on the prosocial behavior of adults and children. To our knowledge, no study so far has investigated whether people would still treat ingroup and outgroup members differently when they know how probable a future interaction with them is. An obvious future step would thus be to give participants information about the probability of future interaction (e.g. telling them that the probability for future interaction with the same player will be 0.2, 0.5, 0.8, etc.). Following the prosocial heuristic, we would expect that people would pay more attention to this *direct* information than to the *indirect* information about the probability of future interaction via

[1] The gift-giving game differs from the dictator game in that the transferred money is doubled by the experimenter before it reaches the responder.

group membership. Therefore, if people know that the probability for future interaction will be very high, they should cooperate equally with ingroup and outgroup members.

Although the behavior of adults in our study provides some first evidence in favor of the prosocial heuristic, critically minded people will note that especially the differences between the different conditions of group membership were not too dramatic. For example, the modal offer of proposers in the dictator game was the equal split, no matter whether they played with an ingroup, outgroup, or neutral responder. However, I would like to reply to this critique by pointing out that the manipulation of group membership in this study was very minimal indeed. Participants were almost arbitrarily grouped into meaningless categories on the basis of their estimations of yellow dots or a random number they produced. Considering this weak manipulation of group membership, the fact that we did find differences in the treatment of ingroup, outgroup and neutral members is surprising. I believe that the differences in behavior toward ingroup, neutral, and outgroup players would increase if the group membership was determined by salient social categories. Comparing the allocations of our participants to the classical studies on the minimal intergroup paradigm (e.g. Billig & Tajfel, 1973; Branthwaite, Doyle, & Lightbown, 1979; Tajfel, 1970; Tajfel et al., 1971) is difficult, because those studies only provide information about either the difference in rank or the mean differences of ingroup compared to outgroup offers.

A more general question concerns the cognitive construal of ingroups and outgroups and its development. In his model of egocentric social categorization, Simon (1993) assumed that at the most basic level of cognitive differentiation, people differentiate between the social categories “me” and “not-me.” Thus, as soon as another person is not a part of one’s ingroup that person is automatically assumed to be an outgroup member and treated accordingly. This sort of social categorization can also be observed in the behavior of adults in our study: In the dictator game, adult participants only treated ingroup responders more favorably; neutral responders were treated more similarly to outgroup than to ingroup members. The opposite was true for the sixth-grade children in our study: In the dictator game, they treated ingroup and neutral responders alike, whereas the outgroup responders were the ones who were treated markedly differently. This finding, although not the major focus of our study, is interesting, and I think that the way social categories are constructed in the course of development is worth some more investigation in the future.

This study was a first step into the realm of the social rationality of prosocial behavior. We have seen that rather than by internal motivations, adult’s prosocial decisions can be better explained by a social heuristic that helps people infer the status of their relationship with an interaction partner and consequently the adaptiveness of a prosocial action. In contrast to many other studies in the social rationality framework, we did not assume that the social heuristics that people use are solely shaped by their evolutionary history. Rather, over the course of ontogenetic development, children, adolescents, and adults face many changes in their social environment. One can assume that these changes as well as growing experience with and feedback from others influence what is socially rational or which kind of social information is more valid than another. Adding an ontogenetic perspective will help make the social rationality framework more socially rational.