CHAPTER **3**

Perspective-taking or Social Heuristics? Persuasion in a Group Discussion

Introduction

Picking up where we left off in Chapter 2, I will now follow up on the quantitative results concerning the group decision-making process. My goal will be to qualitatively analyze the processes by which groups of three children come to a unanimous group decision via discussion. Specifically, I am interested in answering the following questions: What arguments do individuals with differing individual preferences use to persuade each other and come to a common group decision? Are there some arguments that are more effective in persuading others? Does the success of persuasive arguments depend on developmental variables such as perspective-taking ability?

To answer these questions I will draw on research from social, developmental, and cognitive psychology. I will first summarize research on persuasion from social psychology. Next, I will argue that level of perspective taking and moral reasoning can be used as a suitable criterion to judge the validity of a persuasive argument. After that, an alternative approach will be presented that reasons that the validity of a persuasive argument might be determined by its social rationality. This approach is further elaborated in the section on algorithms of social life. Following this theoretical discussion, I will present the results of the qualitative analysis.

Persuasion in individuals and groups

In social psychology, the topic of persuasion has been strongly connected to research on attitudes and attitude change. The concept of attitudes is probably one of the earliest ideas social psychologists worked on, and according to Allport (1954, cited in Stahlberg & Frey, 1997), it belongs to one of the most important constructs in this discipline. In contrast to mere opinions about an object or topic, attitudes are not only characterized by their cognitive and affective reactions to an object but also by their potential to elicit behavior. Thus, in social psychology attitudes have been regarded as important causes of behavior, and ways to change certain attitudes has been the topic of a considerable amount of research. In this context, theories of persuasion have focused on the influence of persuasive (verbal) communication and messages on attitude change.

Two types of persuasion theories can be distinguished: First, there are theories that emphasize the importance of systematic processing of persuasive information for attitude change. For example, in his information-processing theory of attitude change, McGuire (1968) has distinguished five steps in the persuasion process: A potential "persuadee" has to be attentive to persuasive communication (step 1) and has to understand its content (step 2). These first two steps are usually subsumed under the concept of perception. Then, the persuadee has to accept the presented arguments (step 3), keep his or her now changed attitude (step 4), and act according to this changed attitude (step 5). Typical social psychological experiments usually only test the first three steps (i.e., reception and acceptance of a persuasive message) and not whether a change in attitude is stable or leads to behavior consistent with this attitude (for an overview see Stroebe & Jonas, 1997).

Second, there are two-process models of persuasion. These models rely on the idea that attitude change is not just the result of a more-or-less systematic processing of persuasive communication, but also of other factors. In their elaboration likelihood model of persuasion, Petty and Cacioppo (1986) distinguish between a central and a peripheral route of persuasion. If the central route of persuasion is more active, people spend time understanding and evaluating the persuasive messages and recall arguments they might have heard about the topic. This central route is identical with the systematic processing of persuasive information in McGuire's (1968) theory. But sometimes people are thought to use the peripheral route of information processing, which is a less systematic way to deal with the information at hand. Factors that might influence the elaboration (i.e. the depth of information processing) can be

motivation (e.g. high personal relevance of the message or topic), moods or situational factors that limit processing capacities.

In an approach similar to Petty and Cacioppo's, Chaiken (1987) differentiates between two kinds of information processing of persuasive information: systematic and heuristic. According to Chaiken's theory, people sometimes use simple cognitive heuristics when systematic processing is not possible. For example, they might follow heuristics such as "trust experts," , or "people whom I like have the right opinion about a topic,", or they consider longer sentences as more trustworthy than shorter ones.

Although especially Chaiken's (1987) approach has offered valuable explanations of why we are sometimes persuaded by persuasive statements themselves and sometimes by other unrelated factors, this "individualistic" approach to persuasion is not really applicable for the present investigation. First, in this research tradition persuasion is conceptualized as a rather passive process in which participants are confronted with messages and then tested to see if these messages lead to some change in opinion or attitudes. As indicated above, the connection of this supposed attitude change to real behavior is usually not studied. Second, all these theories assume that persuasion is a process that is entirely located inside a person's mind or information-processing machinery that is ignited by persuasive messages or other interpersonal factors. However, in our study, persuasion is a social process that takes place between three discussing individuals. In the course of such a discussion, there are inevitably several of these persuasive "input states" while group members exchange opinions. Thus, the structure of information presented might change in the course of the group discussion, and this might also depend on the group composition. I will therefore next discuss empirical research that has dealt with persuasive processes in group decision-making contexts.

Persuasion in group decision making

One of the most well-studied phenomena of "attitude change" in an actual group decision-making or group discussion context is the so-called group polarization or risky shift. Research in this area was stimulated by an unexpected finding by James Stoner in 1961 (cited in Myers, 1982). Stoner compared the risk-taking decisions of individuals and groups. He wanted to test the assumption that groups are more cautious and less creatively daring than individuals. In his original experimental setting, which has been replicated by numerous studies since, he assigned a small number of participants—usually about five—to one group. First, each

participant individually responded to a series of stories in which a fictional character was faced with a dilemma. For example, in one story, a writer was confronted with the problem of whether he should continue writing cheap Westerns, which provided him with a comfortable income, or whether he should take the risk to write a potentially successful novel. Participants were asked to advise the protagonist on how much risk he should take. In the writer story, participants had to indicate the lowest probability that they would consider acceptable for the writer to start on his novel (e.g. a 1 in 10 chance that the novel would be a success, a 2 in 10 chance, up to a 10 in 10 chance). Second, participants assembled as a group and discussed each of these stories until they agreed. Stoner's surprising discovery was that groups on the whole are more risk-prone than the average individual, that is, the point the group members converged to after discussion was usually more extreme (or more risky) than the average of their initial decisions. Thus, group discussion seems to intensify group opinion resulting in more extreme judgments than existed before discussion.

The effect of group polarization is a robust phenomenon that has been reported for a variety of judgments and that has occurred for a variety of participants (e.g. students, industrial supervisors, jurors) in different countries and different settings (both in the psychological laboratory and naturalistic settings, see Baron et al., 1992; Myers, 1982). The two major theoretical explanations that try to explain the phenomenon of group polarization focus on either processes of social comparison or the influence of persuasive arguments.

According to social comparison theory (Festinger, 1954), people are constantly motivated to perceive and present themselves in a socially desirable light. People desire to be perceived as more favorable than average. Thus, once we determine how most other people present themselves, we try to portray ourselves in a more favorable light. When all group members engage in a similar comparison process, the group decision would result in an average shift in the direction of greater perceived social value (see Baron et al., 1992; Isenberg, 1986). Hence, social comparison theory assumes that prior to group discussion individual members initially underestimate the group norm. In the context of a group discussion, people discover the preferred tendency within the group (also called the group norm), and, because they want to outshine the others, give an even more extreme judgment.

In contrast to social comparison explanations of group polarization, which emphasize the social motivations of group members, persuasive arguments theory (e.g. Burnstein, 1982; Vinokur & Burnstein, 1974) maintains that an individual's choice or opinion is a function of the number and pervasiveness of pro and con arguments that this person recalls from memory. During a group discussion, a person will shift in a given direction to the extent that the

discussion exposes her to persuasive arguments favoring that direction. The persuasiveness of an argument, and thus its influence in causing a choice shift, is determined by two factors: the perceived validity of the argument (e.g. how true is the argument? Does the argument logically follow from accepted facts and assumptions?), and the perceived novelty of an argument (e.g. does the argument propose new ideas? Does the argument present a new way of organizing information?). According to persuasive arguments theory, choice shifts are therefore contingent upon the pool of arguments in the group. A given group may or may not shift, depending on the kinds of arguments expressed during group discussion. If discussion generates potent information predominantly in one direction, then group polarization can be expected. If, however, novel persuasive arguments are presented that are opposite to the direction originally favored by the group members, their decision will shift in the opposite direction (a phenomenon that is also called depolarization).

Empirical tests of social comparison and persuasive arguments theory provided, of course, support for both. Several investigations of social comparison theory demonstrated that the mere exposure to others' opinions or the simple knowledge about the other group members' preferences is a sufficient condition for polarization (Baron & Roper, 1976; Blascovich, Ginsburg, & Veach, 1975; Pruitt, 1971). For example, in a study by Blascovich and colleagues (1975) participants bet on several rounds of the card game blackjack as individuals, as a group in which the members only heard the bets of the others, or as a group that could discuss bets (all these conditions were played after participants played several rounds of blackjack by themselves). Results show that participants in the individual (control) condition did not increase the size of their bets (i.e., they did not become riskier), whereas in both group conditions the size of bets increased significantly compared to the individual condition. Since this increase in bets did not differ between the two group conditions, Blascovic and colleagues concluded that the mere knowledge of the other group members' bets is enough for group polarization to occur.

The opposite prediction has been tested and found to hold by researchers investigating persuasive arguments theory. For example, Burnstein and Vinokur (1973) and Myers, Wong, and Murdoch (1971) demonstrated that even if participants are only exposed to relevant arguments during a group discussion but are prevented from learning the other's position, group polarization would still occur. Group polarization effects were also obtained when participants were not allowed to mention their initial choices or when they were not aware of the response scale on which they had to indicate their individual choices (thereby preventing a comparison of choices).

In a review and meta-analysis of the relevant literature, Isenberg (1986) concluded that although "the average effect sizes from each type of study are substantial, […] the effect of persuasive argumentation is particularly strong" (p. 1148), both processes might interact and account for the phenomenon of group polarization. Emerging group norms, as they are proposed by social comparison theory, might influence what kind of information group members bring to the discussion; that is, they would rather mention information that is more in line with the general opinion of the other group members and censor information that is not. Similarly, arguments that do not fit the general opinion of the group might be disregarded as not valid by individual group members. Thus, the judgment of the validity of an argument, which is strongly linked to its persuasiveness in persuasive arguments theory, might be directly influenced by norms within the group.

How is the research on group polarization connected to the present study, especially to the model of the group decision-making process as investigated in Chapter 2? More recently, Ohtsubo and colleagues (2002) have combined the social combination theory, which we also employed in Chapter 2, with research on group polarization. They base their theoretical assumptions on Cartwright's (1971, reported in Ohtsubo et al., 2002) model of the risky shift. Cartwright suggested that a majority's influence during group decision making would make group judgments appear more extreme than the average of the members' individual judgments before discussion. A majority's influence in a group decision-making context can work in two ways: either with a pure majority process, that is, two of three group members initially make the same judgment and the group chooses this majority's initial position as the group judgment, or with a coalition process, in which two members with a similar initial judgment form a coalition. Because in both cases the minority member's choice will not be included into the final group judgment, the initially dominant judgment at the individual level will be exaggerated at group level. Ohtsubo and colleagues (2002) suggested and showed empirically that group polarization will occur when the distribution of the individual members' judgments before discussion are skewed.

Following from this analysis we could conclude that a majority process is a more parsimonious way to model group polarization or persuasion in groups in general than social comparison theory or persuasive argument theory. I believe indeed that the predictions of social comparison theory are basically the same as the predictions of a majority process and that the "group norms" that social comparison theory assumes to be at the heart of group polarization can be explained as the "norm" or the "pressure" of the majority. Concerning persuasive argument theory, we also can expect that a majority will produce more

(persuasive) argument for explaining why their position should be the one adopted by the group. However, I believe that persuasive argument theory might be an interesting theoretical framework for cases in which the group decision-making process is not following a majority process. Remember the results from the dictator game discussion in Chapter 2! Overall, in third and eighth grade the group decision-making process could be captured by the SJS model, which models a majority process for continuous choice options. In sixth grade, on the other hand, the group decision-making process could be best captured by an averaging model, although the groups were (initially) composed of a generous majority. I suggest that the influence of the minority members is connected to the types of arguments they use during group discussion. In line with persuasive arguments theory I believe that the minority uses arguments that are novel (i.e. not mentioned by the majority members before) and valid (see below). More specifically, I have derived the following hypotheses concerning the *frequency* and *distribution* of arguments during group discussion.

> *Hypothesis 1: In groups in which the group decision-making process is dominated by a majority model, only a few types of different arguments will be employed as reasons for offers.*

> *Hypothesis 2: In groups in which the group decision-making process is best modeled by an averaging model, the minority member will produce novel and valid arguments. Therefore, averaging groups will produce more different types of arguments than groups in which the group decision-making process is best described by a majority model.*

The validity of persuasive arguments

According to persuasive arguments theory, the persuasiveness of an argument is determined by its novelty and its validity (see above). Whereas novelty can be rather straightforwardly defined as an argument introducing a novel idea to a discussion (i.e. an argument is novel when it has not been mentioned before), the definition of validity is more tricky. What could be considered as a valid argument in the context of our group discussions? Surely, an argument that points out the rationality of a (selfish) offer in terms of rational choice theory can be considered as a valid argument. But are there reasons that could seem valid in the eyes

of the other group members that would not argue for selfish utility maximization? In what follows I present two frameworks that might attach "validity" to arguments other than utility maximization. The first framework follows from research in the tradition of moral reasoning development. The second draws on the concept of social rationality and social heuristics.

Moral reasoning and perspective-taking

Research on the development of moral reasoning has already been discussed in Chapters 1 and 2. As pointed out there, Kohlberg's theory of the development of moral reasoning still presents the most comprehensive framework for the study of moral development. Kohlberg believed that moral reasoning development can be captured by six stages, which he defines as "hard" developmental stages according to Piaget. The characteristics of such cognitive-structural stages are (1) that they denote a qualitative difference between distinct knowledge structures (e.g. ways of thinking) at different points in development; (2) that they constitute an invariant sequence and order, which cannot be changed by environmental (e.g. socio-cultural) influences; (3) that reasoning at higher stages integrates reasoning at lower stages; and most importantly in this context, (4) that higher stages are better adaptations to the environment than lower stages. The transition from lower to higher stages is thought to be caused by a cognitive disequilibrium. That is, a person cannot assimilate a given experience in her environment into her existing cognitive or moral schemata. This disequilibrium leads to an accommodation, that is, a change or restructuring, of her schemata. The emerging new cognitive structure is thus thought to better account for environmental experiences.

I also discussed above that Kohlberg views social perspective-taking ability as an important impetus for creating disequilibrium and therefore moral development. His moral reasoning stages are therefore also characterized by different abilities to differentiate and coordinate the perspectives of self and others. The development of social perspective taking has been extensively studied by Selman (1980) and Keller (1976a). Their research indicates that criteria for hard cognitive-structural stages sensu Piaget also apply for social perspective-taking stages. Thus, higher stages are supposed to be more equilibrated (i.e. more adapted to environmental experiences) than lower stages.

How is this research connected to our question of the mechanisms of (prosocial) persuasion in the context of a group discussion? I believe that the cognitive-structural theories of moral reasoning and perspective taking can present a framework for defining what makes a persuasive argument valid or not. Since reasoning at higher stages is thought to be better adapted to environmental experiences and presents a more comprehensive and integrated way

of structuring (social) experiences, one could assume that higher-stage arguments should also appear more valid during a group discussion and therefore be more persuasive.

There is no direct empirical evidence that reasoning at higher moral stages is more persuasive compared to reasoning at lower moral stages. However, researchers in the Kohlberg tradition have repeatedly reported developmental change in moral reasoning after peer discussions of relevant topics. These moral discussions can be seen as equivalent to peer-collaboration tasks that are used in the Piagetian tradition to foster cognitive development (see Doise & Mugny, 1984; Perret-Clermont, 1980). Similar effects have been reported for moral reasoning development. For example, Berkowitz, Gibbs, and Broughton (1980) asked student dyads to engage in a series of dialogues on morally relevant topics. Their results indicate that moral reasoning of the lower-stage members of the dyads developed by approximately one-third of a stage after approximately four moral discussions. The authors hypothesized that for moral development to result from moral discussions, the discussants must focus on justifications for moral positions. In a follow-up study, Berkowitz and Gibbs (1983) analyzed the discussion transcripts. They found that dyads that demonstrated considerable change in their moral reasoning in a post-test engaged significantly more in operational transactive communication. In this kind of communication, people do not just assert or react to what the other said but try to provide extensions, refinement, or antithetical reasoning to their communication partner.

More empirical evidence exists concerning the relationship between level of (social) perspective taking and the development of persuasive skills (e.g. Burleson & Fennelly, 1981; Clark & Delia, 1976, 1977; Delia, Kline, & Burleson, 1979; Kline & Clinton, 1998; Nippold, 1994; Pellegrini, Gelda, & Rubin, 1984; Ritter, 1979; Shepherd & O'Keefe, 1984). In this line of research, perspective taking is regarded as a critical social-cognitive ability children must develop to effectively adjust their style of communication to relevant interpersonal and situational factors. Yeates and Selman (1989) pointed out that effective interpersonal negotiation rests both upon the structural ability to coordinate social perspectives as well as on the functional ability of individuals to engage in cognitive problem solving. Thus, rhetorical and persuasive competence includes producing messages that advance one's agenda while simultaneously motivating the recipient to act on one's proposal.

Clark and Delia (1976, 1977) and Delia and colleagues (1979) showed that the quality of persuasive messages in terms of social perspective-taking ability increases with age. The participants (second through ninth grade in Clark & Delia, 1976, 1977; kindergarten through twelfth grade in Delia et al., 1979) had to develop three persuasive messages in which they

had to ask a parent to buy something they wanted, try to have an overnight birthday party, or urge a stranger to keep a lost puppy. Participants' requests and the support for their requests were coded according to four levels of social perspective taking. These levels significantly correlated with other measures of social perspective taking, even when age was partialled out. With increasing levels, participants better integrated the target's perspective and adapted their persuasive message to the needs and desire of the other. The use of higher-level persuasive strategies monotonically increased with age with major increases between grades three and four and eight and nine. Interestingly, the "puppy task," in which the children did not pursue a selfish goal but were purely altruistically motivated, elicited higher-level persuasion strategies than either of the other two tasks. The coding system of social perspective taking developed by these authors was successfully used and validated in studies with other populations and objectives, for example, with adolescents by Ritter (1979) and with children from fourth and tenth grade investigating compliance-resisting strategies by McQuillen (1986).

In the studies cited above, the effectiveness of the message on the target of the persuasion was not measured. Burleson and Fennelly (1981) investigated the influence of forms of appeal on children's sharing behavior. Second-grade children were presented with persuasive messages that were designed according to the hierarchy of persuasive strategies of Clark and Delia (1976, 1977). Results show that children exposed to the highest-level appeal form, which focuses on the positive consequences of the action in question for the persuadee, donated significantly more candy to a group of unknown children than participants exposed to any other appeal form. This result is in line with findings from Eisenberg-Berg and Geisheker (1979) who found that children exposed to an empathic appeal (emphasis on the positive consequences of sharing for the recipient) shared more than children in a no-appeal condition. However, Shepherd and O'Keefe (1984) in a study with undergraduate students demonstrated that there was no positive linear relationship between level of appeal and the effectiveness of a persuasive message. Rather, the effectiveness of a persuasive strategy was strongly dependent on the situation and thus, people who are capable of producing a full range of different persuasive strategies will be more effective.

In sum, research in moral development and development of persuasive communication indicates that the effectiveness and the validity of persuasive arguments might be connected to perspective-taking ability. People with higher perspective-taking ability are better able to adapt their persuasive messages to the situational context and to the needs and desires of the recipient. At the same time, messages that express a higher level of perspective-taking might

also seem more valid in the context of a group discussion, since they better account for social experiences than lower levels of reasoning.

> *Hypothesis 3a: The validity of an argument is determined by its level of perspective taking. Arguments expressing a higher level of perspective taking are more valid and therefore more persuasive.*

Bounded rationality and fast and frugal heuristics

The bounded rationality approach offers an alternative theoretical avenue for studying the validity of persuasive messages (see Gigerenzer, 1996, 2000; Gigerenzer, Todd, & the ABC Research Group, 1999). Rather than comparing human decisions to an external criterion (such as the laws of logic and probability, utility maximization, or deontological ethics), this approach looks at how humans manage to make reasonable and adaptive decisions about their real social and physical world in limited time and with limited knowledge. As Gigerenzer and colleagues have repeatedly shown, such decision mechanisms do not have to be complex and integrate many different pieces of information to lead to adaptive decisions. Instead, they proposed that fast and frugal heuristics can serve as models of human decision making in the real world, which take into account both the (computational) limitations of the human mind as well as the structure of the decision environment and the decision circumstances (e.g. time pressure). Fast and frugal heuristics are simple, clearly defined algorithms that do not integrate information but often make decisions based on one valid cue (or one reason) only. What makes these heuristics such successful models of human decision making is that they are anchored in both the mind and in the environment. That is, fast and frugal heuristics are ecologically rational. They exploit the way information is structured in the environment and tap that structure to be fast, frugal, and accurate at the same time.

For example, the recognition heuristic, a decision mechanism for making forced comparison choices (see Goldstein & Gigerenzer, 1999, 2002), bets on the positive relationship between the recognition of an object and its value on a criterion. In some cases, this correlation can be genetically coded; in other cases it has to be learned through experience. However, in cases in which recognition is used for inferring or predicting a criterion, the criterion is inaccessible to the organism. The recognition heuristic is defined as follows: If one of two objects is recognized and the other not, then infer that the recognized object has a higher value with respect to the criterion (Goldstein & Gigerenzer, 2002, p. 76). Goldstein and Gigerenzer (2002) demonstrated that the recognition heuristic is a good

description of people's decision making. They asked American and German students which of two American cities has a higher population. In 90% of the inferences in which participants only recognized one city, the recognized city was judged to be more populous. Furthermore, they showed both formally and empirically that under specific conditions (see below) ignorance pays, that is, that people who recognize fewer cities, and thus have less knowledge, can make more accurate population inferences than people who recognize all cities and use general knowledge. This effect is called the less-is-more effect.

Because fast and frugal heuristics are adapted to the environment, they are not general-purpose mechanisms and will not be successful under all circumstances. In the case of the recognition heuristic, Goldstein and Gigerenzer showed that the less-is-more effect will appear only if the recognition validity α (the probability of a correct inference given that an individual uses the recognition heuristic and the strength of the relationship between recognition and the criterion) is larger than the knowledge validity β (the probability of a correct inference given that the individual uses knowledge). In these cases, using the recognition heuristic will be a smart and fast and frugal idea. If $\beta > \alpha$, the less-is-more effect is not predicted, so that using the recognition heuristic will not lead to more accurate inferences than using knowledge. Thus, in such cases, recognition cannot be regarded as a valid cue people can use to make fast and adaptive decisions.

Fast and frugal heuristics are not only promising candidates for judgments about the physical world but also about the social world. Some of the most important decisions humans and other social species face arise from interaction with other agents. Social environments often demand a quick response to decisions made by others or for coordinated decisions and actions. Fast and frugal social heuristics exploit the information structure of the social environment; often these social environments are structured in such a way (e.g. through social institutions or social norms) that they foster a particular decision strategy. For example, in many cultures, there exist elaborate rules about whom to greet first when you meet with a group of people. In many cultures, the general rule is that the more senior person or the person with the highest rank is greeted first and other people are introduced to her or him. If no differences in rank exist, then the woman is greeted before the man (at least in European cultures). Thus if a person wants to decide whom to greet first, she can base her decision on only two valid cues (rank and gender) and can follow the simple decision strategy "Greet people in order of their rank and start with the highest. If hierarchies do not exist, greet the woman first!" In contrast to fast and frugal heuristics for judgment about the physical world, however, such social fast and frugal heuristics have been subject to much less research.

However, some examples for social heuristics do exist (e.g. Davis and Todd, 1999; Dhami & Ayton, 2001; Marsh, 2002).

How is the concept of fast and frugal heuristics related to the decision-making processes of a group discussion? Reimer and Katsikopoulos (2004) investigated the use of the recognition heuristic in group decision making. One of their goals was to find out whether people who use the recognition heuristic when inferring which of two cities has a larger population have more impact on the group decision than people who recognize both cities and therefore use knowledge. They examined this question for cases in which the two models make opposing prediction about which of two cities is more populous. Their results demonstrate that in a group of three, a single individual who uses recognition can trump a majority of two people who use knowledge in 59% of the cases. In cases in which one member uses knowledge, one member uses recognition, and the third member does not recognize any city, the group chose in accordance with the recognition heuristic in 61% of the cases. These findings are very surprising, since they are in contrast to the findings of the group decision-making literature, which revealed that if a task is judgmental (i.e. has no correct solution), groups are more likely to apply the majority rule (see also above). Although the processes by which a more "ignorant" minority can have more influence on the group decision than a knowing majority still awaits investigation, this finding is of course very relevant for our research question, as well. Agreeing with Reimer and Katsikopoulos (2004), I would argue that the minority members who used recognition relied on a more valid cue than the group members who used knowledge. Similarly, we can ask whether the selfish minority group members in the sixth grade in our study are more influential in the group decision-making process because they draw on simple but still valid truths about the social world. Do they use simple social heuristic(s) as arguments for their decision choices? Are these arguments more influential because they are socially rational? What kind of socially rational arguments do they use, if at all?

The examples cited above show that it is possible to apply the concept of fast and frugal heuristics in the social domain. However, the heuristics that would be appropriate models for prosocial decision making differ from those mentioned above. Particularly, whereas the performance of the recognition heuristic, for example, is easy to assess (indeed one city in the city comparison task is more populous than the other), in the case of a prosocial allocation decision, or a moral decision in general, it is more difficult to judge whether this was the "correct" choice, since there is no "objective" outside criterion.

Nevertheless, Gigerenzer (2004) presented a framework for the application of fast and frugal heuristics in the moral domain that can be extended to prosocial allocation decisions. Like fast and frugal heuristics in the physical domain, moral heuristics exploit evolved abilities, such as the human capacity for behaving reciprocally, for imitation and social learning, and cheating detection. Furthermore, moral heuristics exploit structures of the social environment, such as social institutions or the redundancy of information (*ecological/social rationality*). Gigerenzer (2004) proposed that the heuristics that underlie moral action or intuitions share their building blocks, that is, the rules for searching for information, stopping information search, and deciding, with other heuristics, and they are not bad or good per se. Consequently, a heuristic can lead to morally laudable behavior as well as action that would be condemned from a moral point of view. For example, a heuristic such as "help members of your family first" can lead to positive (moral) actions and support for relatives. On the other hand, the same heuristic can lead to nepotistic behavior, for example, when an employer preferably gives jobs or other amenities to family members or when he neglects moral duties to other non-related persons.

In sum, the bounded rationality approach proposes that people can make adaptive decisions with the help of fairly simple heuristics or decision algorithms under limited time and with little computational effort. The performance of such simple decision heuristics often matches the performance of more complex decision algorithms, because they rely on valid cues from the environment. Several studies have expanded this approach to the social domain. Reimer and Katsikopoulos showed that in group decision-making situations the group member who bases her decision on an ecologically rational cue (the recognized city is the larger one) can be more influential (i.e., more persuasive) than a majority who do not.

Gigerenzer (2004) suggested that in the moral domain people's decisions and judgments can also rely on fast and frugal social heuristics. In my opinion, this framework is also relevant for the questions we are trying to answer in this study. Is a group member who uses social heuristics more influential in the group decision-making process than a majority who do not because social heuristics are perceived as more socially rational and valid? Do the social heuristics people use develop over the life course or are they inborn? This question concerns the concept of evolved abilities proposed by Gigerenzer (2004). Although one might conclude that indeed people do have an inborn propensity for reciprocity or social learning, these abilities also develop ontogenetically (see Harris & Núñez, 1996; Keller, Gummerum, Wang, & Lindsey, 2004). Thus, the form of social heuristics people use might change over time, and this change might be connected to development in evolved abilities. Lastly, and

most importantly, what is the structure of the social environment in which people make (prosocial) decisions and what are the cues on which they base their decisions? Can we find patterns of how information is structured in the social world and are these structures related to adaptive challenges humans were and are facing during their evolutionary and ontogenetic development? This question is not trivial, since the "success" of a social fast and frugal heuristic depends on how well it is adapted to the social environment. In the next section, I present research that tried to identify such patterns in human social life.

Algorithms of social life

What could be possible candidates for socially rational algorithms? Can we differentiate domains of social life in which such algorithms or heuristics were likely to evolve? How is social information structured in social domains? Researchers in (social) psychology have offered a multitude of explanations of how particular kinds of interactions can be conceptualized according to particular situational constraints and features of specific domains or personality dynamics. What was missing for a long time was a kind of "meta-theory" of what all these different kinds of relationships have in common and how possible underlying commonalities influence the perception, initiation, norms, and behavior in one kind of relationship versus another.

Such a comprehensive theory has been suggested recently by the proponents of relational model theory. Fiske and his colleagues (Fiske, 1992, 2004; Haslam, 2004) have maintained that human social life is based on four types of relational models, which people use to constitute and conduct social relationships. People use these models to initiate, understand, evaluate, and sanction mutually oriented action, and each model generates emotions that motivate people to sustain interaction and (moral) commitment to act in accord with it. The four relational models are constituted by different kinds of social information and are associated with different relationship norms or appropriate behavior.

The first relational model, *communal sharing*, is based on a conception of a bounded group of people as equivalent and undifferentiated. Members of this group treat each other as the same and focus on commonalities while disregarding distinct individual identities. Since people in communal sharing relationships often think of themselves as sharing some common substance, it is "natural" for them to be kind and altruistic to people of their own kind.

The second type of relationship, *authority ranking*, is associated with asymmetries among people who are ordered along a hierarchical social dimension. In this relational model, people focus on cues that arrange persons in space, time, magnitude, and force, which Fiske (2004) calls "the physics of social relationships" (p. 63). Whereas higher-ranking people in the hierarchy have more prestige, access to resources, and privileges, subordinates are often entitled to protection and care provided by the superior(s).

Equality matching relationships, the third type of relational model, are constituted by concrete operations of balancing procedures, such as taking turns, one-to-one correspondence, flipping a coin, or (direct) reciprocity between equals. Each person in the relationship is entitled to the same amount of a resource as every other person. People are primarily concerned about whether their relationship is balanced, and they keep track of how far out of balance it might be.

Finally, *market pricing* relationships are based on a model of proportionality. Relationships are organized in terms of cost–benefit ratios and rational calculations of efficiency, which can be reduced to a single value, utility metric, or other kind of currency (e.g. money). In this relational mode, people try to achieve ratios that are equal to the ratios of others in their reference group or market.

More explicitly than Fiske (1992, 2004), Bugental (2000) proposes algorithms of social life that are acquired as domain-based processes and that might serve as candidates for social heuristics. She differentiates between five basic social (knowledge) domains that act as guides for solving recurring social problems organisms were and are faced with throughout evolutionary and ontogenetic history. To manage and solve these problems, domain-specific social algorithms (formulated as "if-then contingencies") have evolved that draw on different kinds of social information or cues (the "if" part), lead to different social-emotional responses (the "then" part), are acquired in relatively distinct ways, and are (presumably) regulated by different neurohormones.

Bugental's five basic domains are attachment, hierarchical power, coalition group, reciprocity, and mating (see Figure 3.1). Algorithms in the *attachment domain* help to solve the social problem of maintaining proximity and providing protection. Information or cues that trigger these algorithms are relevant stimulus features of the other (e.g. faces, voices, specific identity of the other), proximity to other or stranger cues. In the *hierarchical power* domain, social algorithms involve the management of interest between individuals with unequal resources or resource-holding potential. Cues activating this domain are the resource-holding potential of the actors in this situation, threat intention cues, or resource provision
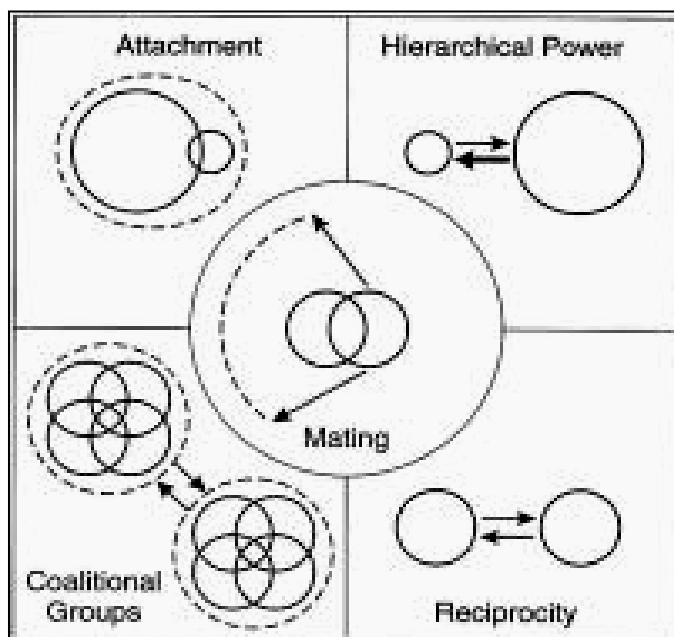
Figure 3.1. The five domains of social life (taken from Bugental, 2000)

cues. The adaptive problems to be solved in the *coalitional group* domain include the facilitation and mutual defense and the acquisition or protection of resources through coalition formation and activity. Social information that triggers algorithms in this domain are grouping features (e.g. socially important categories), conformity cues within one group, and intergroup threat cues. Within the *reciprocity* domain, algorithms serve the function of assisting coordinated, matched, and mutually beneficial action between related or unrelated strangers. Important cues in this domain are the investment potential of the interaction partner, the reciprocity history, and cheater cues. Finally, the adaptive problems to be resolved in the *mating* domain are optimal selection, retention, and protection of access, and bonding between mating partners. Algorithms in this domain are activated by gender cues, relatedness, and attractiveness cues.

These relational models or domains of social life put forward by Bugental and Fiske overlap to a great extent and may serve as an important basis of social algorithms in people's adaptive toolbox[1]. Both theories maintain that four to five relational models or algorithms may be enough to adaptively solve social problems humans are repeatedly faced with. These models or algorithms are triggered by different cues or social information. How could these

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[1] The adaptive toolbox is defined as the repertoire of rules or heuristics available to a species at a given point in its evolution (Gigerenzer & Selten, 2001).

relational models be related to moral intuition and action? More recently, Haidt and Joseph (2004) integrated the two approaches by proposing four basic moral modules. Similar to Fiske and Bugental they assumed that these four moral modules (depicted in Table 3.1) evolved as a reaction to adaptive challenges humans were faced with during evolutionary history. The term "moral module" is taken from research on the modularity of mental functioning (e.g. Fodor, 1983). An evolved cognitive module is conceptualized as an input–output processing system that was designed to handle reoccurring problems in the ancestral environment of species and that enables fast and automatic responses to specific environmental cues.

Table 3.1. Four moral modules and the emotions associated with them (adapted from Haidt & Joseph, 2004)

	Suffering	Hierarchy	Reciprocity	Purity
Proper domain (original triggers)	Suffering and vulnerability of one's children	Physical size and strength, domination and protection	Cheating vs. cooperation in joint ventures, food sharing	People with diseases or parasites, waste products
Actual domain (modern examples)	Baby seals, cartoon characters	Bosses, gods	Marital fidelity, broken vending machines	Taboo ideas
Characteristic emotions	Compassion	Resentment vs. respect/awe	Anger/guilt vs. gratitude	Disgust

According to Haidt and Joseph (2004), the first of their moral modules, *suffering*, could have evolved as an adaptive solution to the prolonged dependence and infancy of primates and especially humans. This (biological) fact would have made it beneficial for care-givers to detect signs of suffering and distress in their offspring. Parents who were more successful at detecting such signs would also raise more offspring and over time a communication system would have developed in which children's distress signals trigger compassion and aid. *Hierarchy*, the second moral module, has evolved to help animals living in social groups make the most of their relative abilities to dominate others. As in the approaches of Fiske (1992) and Bugental (2000), Haidt and Joseph (2004) assume that cues that trigger this moral module are associated with relations, which arrange people in space, time, magnitude, and force. Higher-ranking individuals not only "deserve" the respect of their

subordinates but are also supposed to provide protection and care to their subordinates. A readiness for *reciprocity* evolved to help animals obtain the benefits of cooperation with non-kin. Individuals who felt bad when they cheated and who were motivated to get revenge when they were cheated themselves were able to engage more successfully in mixed-motive and coordination situations (see also Chapter 1). The last module Haidt and Joseph consider, *purity*, deals with the adaptive challenges of a life full of dangerous microbes and parasites. Things associated with these dangers in the evolutionary past, such as rotting corpses or excrement, and people who come in contact with them, trigger an automatic feeling of disgust.

Haidt and Joseph (2004) distinguish between a proper domain, that is, a set of specific scenarios or stimuli that the module has originally evolved to manage, and the actual domain of a module, that is, the set of things that (nowadays) happen to trigger the module. For example, the suffering module is not only triggered by the suffering of one's own child but also by the suffering of other people in general. Similarly, the purity module has been elaborated by many cultures and religions into sets of rules regulating bodily functions and practices. Once norms were in place for such practices, violations of them produced negative emotional reactions and moral punishment.

In sum, all three approaches discussed above maintain that human social life can be captured by a small number of relational models or social algorithms. Each of these models is triggered by specific social cues and leads and is associated with different kinds of behavior that are regarded as appropriate in the specific relational model or social domain. Moreover, Bugental, Fiske, and Haidt and Joseph suggest that the social or moral algorithms they proposed are socially rational, because they present adaptive solutions to recurring problems humans were and are faced with in their social life. Luckily, some of the domains proposed by the four authors overlap. Each of the three approaches includes authority and reciprocity relationships; whereas Fiske (1992) categorizes relationships between kin and relationships between group members in one relational model (communal sharing), Bugental (2000) differentiates between them. Haidt and Joseph (2004) only mention ingroup relations as a possible fifth moral module in a footnote, but the moral module of suffering can be regarded as an equivalent to the attachment domain put forward by Bugental. Generally, all the authors seem to agree that authority and reciprocity and relationships between undifferentiated group members (either kin or ingroup) constitute the core domains of humans' social life. As pointed out by Haidt and Joseph (2004), these three domains could also play and important role in moral action.

How is this related to the question I want to answer in this investigation, namely, what kind of arguments are most effective in persuading others in a group decision-making situation? As discussed above, following research in the bounded rationality approach I would predict that arguments are regarded as valid and persuasive if they draw on ecologically rational information or heuristics. In the social domain, Fiske, Bugental, and Haidt and Joseph have identified domains in which people have been confronted with re-occurring problems of social life. I believe for these domains, social heuristics have evolved that are triggered by specific social cues and that help people to solve these social problems effectively. Therefore, one could hypothesize that arguments that draw on these socially rational heuristics are perceived as more valid and are therefore more persuasive during a group discussion.

Hypothesis 3b: The validity of an argument is determined by the extent to which it draws on socially rational knowledge or heuristics. Such arguments will be perceived as being more valid and are therefore more persuasive during a group discussion.

This is an alternative to Hypothesis 3a. Whereas in Hypothesis 3a I suggested that it is higher perspective-taking ability that makes an argument more valid, here I maintain that it is socially rational information that makes an argument more valid and therefore more persuasive.

Summary of hypotheses

From reviewing the relevant literature, I derived the following hypotheses:

Hypothesis 1: In groups in which the group decision-making process is dominated by a majority model, only a few types of different arguments will be employed as reasons for offers.

Hypothesis 2: In groups in which the group decision-making process is best modeled by an averaging model, the minority will produce novel and valid arguments. Therefore, averaging groups will produce more different types of arguments than majority groups.

Hypothesis 3a: The validity of an argument is determined by its level of perspective taking. Arguments expressing a higher level of perspective taking are more valid and therefore more persuasive.

Hypothesis 3b: The validity of an argument is determined by the extent to which it draws on socially rational knowledge or heuristics. Such arguments will be perceived as being more valid and are therefore more persuasive during a group discussion.

These hypotheses will serve as guiding principles or heuristics for the following analyses. Since I qualitatively analyze the transcripts of the videotaped group discussions, these hypotheses can only be investigated exploratively and not experimentally. Note that the hypotheses especially apply to the group decision-making process in the dictator game. As described in Chapter 2, only in the dictator game were we able to find marked differences in the group decision-making process between the three age groups. For the ultimatum game, neither of the two models we employed (majority and averaging) fit the data better than the other, therefore making it impossible to draw any conclusions regarding the group decision-making process. Thus, for the ultimatum game discussions, I will only perform descriptive analyses.

I also do not have any specific hypotheses concerning developmental differences in the use of social heuristics. Although both Bugental (2000) and Fiske (1992) summarize literature indicating a developmental trajectory of when the proposed relational models should be acquired, to my knowledge no empirical study has ever directly addressed this question. Thus, this study is a first exploratory step investigating whether and when children use these relational models or social heuristics when making allocation decisions. A more elaborate study on the ontogenetic development of people's actions in the coalitional group domain is presented in the next chapter.

Experiment

Method

Participants

Participants were the same students from the third, sixth, and eighth grades who participated in the study described in Chapter 2.

Procedures

The experimental procedures are described in Chapter 2. The videotaped group discussions were transcribed. For each group, two transcripts (one for the dictator game, one for the ultimatum game) were obtained.

Scoring

The transcribed interviews were coded by using the computer program ATLAS.ti. Participants' utterances were analyzed using qualitative content analysis.

Offers and requests. Codes were given to sentences or units of a sentence in which a group member suggested how much he or she would be willing to give to the other group (offer) or how much he or she would expect the responder group to want from the proposer group (request). Codes clearly identified the group member and the offer or request.

    Examples:

    "We don't give them anything."

    "I would give them 10."

    "They would at least want 10 coins."

Perspective-taking levels. Reasons group members gave for their offers or requests were coded according to four perspective-taking levels. These levels follow in their developmental logic the social perspective-taking levels proposed by Selman (1980).

- *Level 0: Egocentric perspective:* Participants focus in their reasoning on their own needs, desires, and wants and do not take the perspective of the other group into account.

    Examples:

    "But look, if it is seven coins, how much do we have then?"

    "Then everybody of us has one euro."

    "Then we lose money."

    "So much money for us!"

- *Level 1: Differentiated perspective/perspective of other:* Participants take the other group's perspective into account and wonder what this group would want, need, consider fair, and so forth.

  Examples:

  "This would be unfair for them."

  "This is stupid! Then they don't get anything."

  "We should give them something."

- *Level 2: Coordinated perspective:* Participants simultaneously focus on their own and the other group's desires and needs. They reflect on the other group's situation and know that the other group members do the same for them.

  Examples:

  "I would give them half but I am relatively sure that they wouldn't give us anything."

  "Imagine that they could decide now and they would tell us that it is all theirs and we wouldn't get anything."

  "If we were in their position we would be happy with about 80 cents."

- *Level 3: Complex perspective taking:* Participants' reasoning is distinguished by several role-taking loops. They reflect on what the other group believes that they think about the others' needs, desires, wants, and so forth.

  Examples:

  "Imagine we would be the other group and the others would decide for us how much we would get, that would be really unfair."

  "If we were the other group that could not decide then it would be completely stupid for us if we would get nine and the others get eleven."

Two independent coders coded 15 complete transcripts of group discussions in dictator and ultimatum game for offers, requests, and perspective-taking level. Inter-rater agreement was 68%.

Social heuristics. Independent of the coding for perspective-taking level, reasons for offers or requests were coded according to social heuristics. Units of analysis were sentences or parts of sentences in which a group member gave a reason for his or her offer or request. The manual developed by Gummerum, Keller, Hoffmann, & Seefeldt (2005) contained seven content categories, which partly draw on the theoretical work of Bugental (2000), Fiske (1992), and Haidt and Joseph (2004). These content categories were coded independently of the respective offer. This makes it possible to investigate what kinds of reasons are brought forward for what kinds of offer.

We (Gummerum et al., 2005) differentiated between unconditional and conditional social heuristics. Unconditional social heuristics draw on simple allocation rules without giving any further justification as to why this particular allocation is important:

- *Egoism:* Includes offers or requests that are justified with reference to selfish desires or economic rationality (utility maximization). No further justification as to why egoism is important is given.

    Examples:
    "Because, we wanna have more."
    "We're greedy."
    "Because I wanted to keep the money for myself."
    "Everybody would give the minimum."
    "Yes, but, we want to make more profit."

- *Balancing:* Includes statements that indicate motivation to balance selfish desires with concerns for the members of the other group. No further justification is given.

    Examples:
    "I took five, because four was too little."
    "We can't take everything."
    "I don't want to give only one. That would be too little."
    "I think they should get a bit at least. A consolation at least."

- *Fairness:* Includes statements that explicitly mention fairness or democracy. No further reasons as to why fairness is important are given.

  Examples:
  "Because it is just."
  "We always want to be just."
  "Look, we have to be a bit fair."
  "Because it is required by our sense of justice."

Conditional social heuristics justify a particular allocation by drawing on further social information. This additional social information is equivalent to the social domains or relational models proposed by Bugental (2000) and Fiske (1992).

- *Group:* Includes statements that attribute a social category, trait, or characteristic to the other group. Can be used in a positive or negative sense. If used in a *positive* sense (*group positive*), participants attribute characteristics to the other group that bring it closer, make it more similar, or more likable to their own group. Statements that deal with the *neediness* of the other group and statements in which the *anonymity* of the other group is interpreted in a positive way were included in this category as well.

  Examples:
  "Look, maybe it's people like us. Just like us."
  "Look, imagine, the other group comes from Kenya and is hungry."
  "Or you know, that person needs the money."
  "Maybe, maybe F. is among them."

  If used in a *negative* sense (*group negative*), participants employ attributes or characteristics that make the other group more dissimilar to their own group or that create a (psychological) distance between the two groups. Statements in this category included those asserting that the other group does not need the money and those in which people deny that the other group actually exists (extreme case of dissimilarity and devaluation).

Examples:

"Because maybe there are unfair people in the other group. "

"Anyhow, I think there is no other group."

"Imagine, here is the enemy and we are here."

"Food isn't that expensive there, so they don't need so much money."

- *Reciprocity:* Includes statements that indicate participants put themselves in the position of the other group (role play) or imagine what the other group would do in their position. This also includes the possibility of future reciprocation of the other group. This category can also be used in a positive or negative sense. *Negative reciprocal* statements assert that the members in the other group would nor reciprocate or would act greedily as well. *Positive reciprocity* refers to statements in which group members believe the other group would reciprocate or that the other group members would also act in a generous way.

  Examples:

  "And then they say, it's all ours. Then we would be angry, too."

  "Because one could well imagine that the others would do it, too."

  "Look, that—they'll do that certainly as well."

  "I tell you why, because I think the others wouldn't give us anything either."

- *Hierarchy:* Includes statements that deal with status differences between the two groups. These differences can be created by various variables; for example, one group has more power, because it can determine the payoff; one group puts in more effort.

  Examples:

  "They can't say anything. That's the good point in it. They have to shut up and we can decide."

  "That means we say how much they get and how much we get. Therefore it is nasty to give only one coin."

  "Therefore you have to give them less, because they can only take it."

"If you can only win money, so you have to give something away to the others."

- *Social appearance and prestige:* Includes statements in which participants are concerned about how they would look in the eyes of others. They want to avoid leaving a bad impression.

  Examples:
  "Nobody knows me here, except you."
  "Looks nicer."
  "We have to appear generous."

Two independent coders coded seven complete discussion transcripts. Inter-rater reliability was 73%.

Results for the dictator game

In the following sections I present the results of the qualitative analysis of the discussions in the dictator game. I will first give an overview of how often the above-described categories were mentioned in each grade; then I will describe the relationship between certain offers and the reasons given for these offers. After that I will take into account the group decision-making process in each group. I will check whether groups in which the averaging model was the best-fitting model employed different or more reasons of a certain kind than groups in which the majority model was the best-fitting model. This analysis is a first test of Hypotheses 1 and 2. Finally, I will investigate which arguments prompted a change in other group members' offers. This analysis helps to test Hypotheses 3a and 3b.

The coded transcripts were transformed from an ATLAS.ti to an SPSS file. This procedures makes it possible to count how often categories were mentioned and to put them in relationship to other categories. If not otherwise stated, the following analyses are based on this SPSS file.

Descriptive analyses

Concerning perspective-taking levels, 48 statements could be coded in third grade, 146 in sixth grade, and 103 in eighth grade. Figure 3.2 displays the frequency of each level of perspective taking for each grade. The overall number of statements per grade was used as the basis for calculating the percentages. Concerning social heuristics, 64 statements could be coded in third grade, 175 in sixth grade, and 110 in eighth grade (see Figure 3.3). These numbers indicate also that discussions were longer is sixth and eighth grade than in third grade.

As can be seen from both figures, we did not obtain a strong developmental effect for either perspective-taking levels or social heuristics. Although sixth and eighth graders in contrast to children from third grade began to use Level 2 reasons, there was no difference between sixth and eighth graders. Concerning social heuristics, participants from all grades employed more unconditional (egoism, balancing, fairness) than conditional (group, hierarchy, reciprocity, prestige) heuristics. On the other hand, one can observe a slight increase in the use of unconditional heuristics with age, especially for the categories hierarchy and reciprocity.
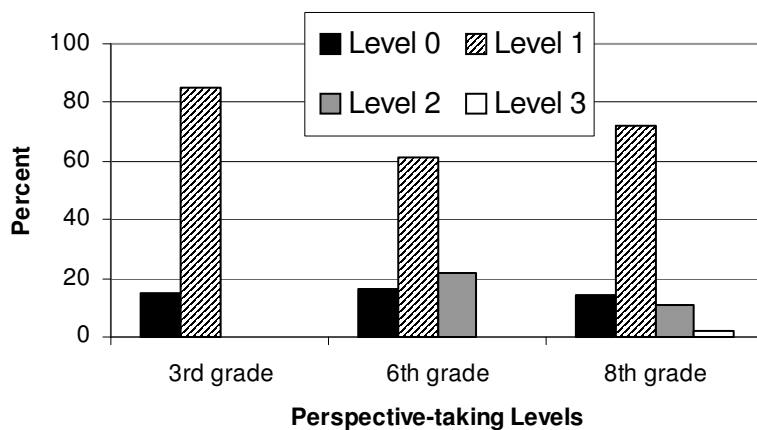

Figure 3.2. Frequencies (in %) of perspective-taking levels employed in each grade
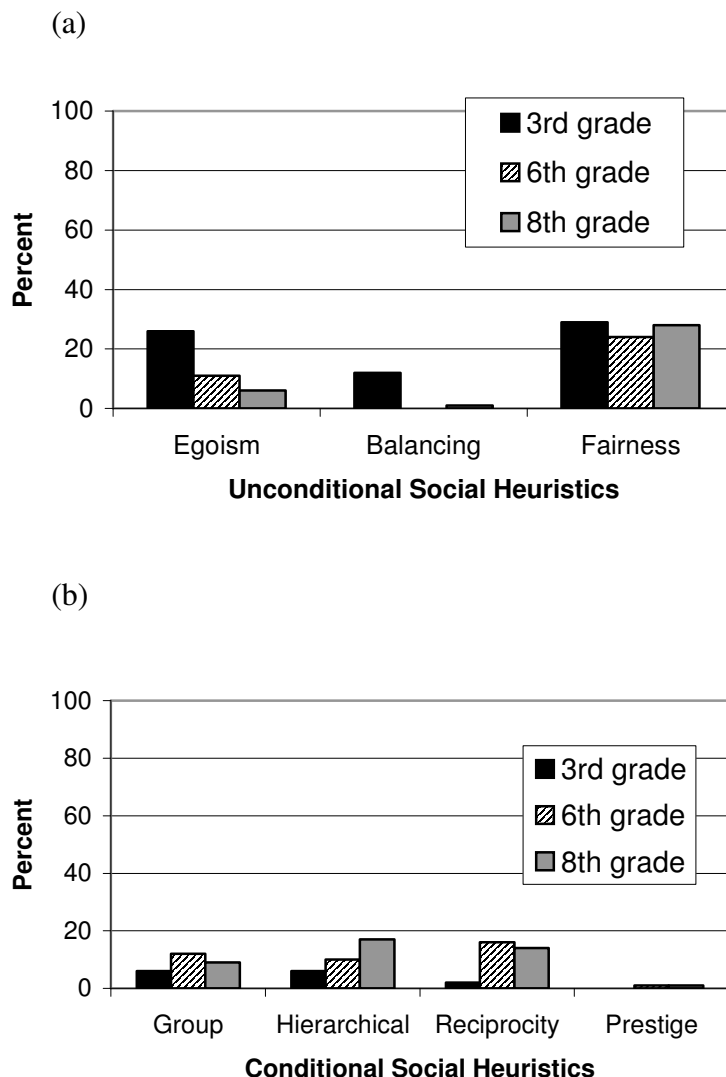
(a)

Unconditional Social Heuristics

(b)

Conditional Social Heuristics

Figure 3.3. Frequencies (in %) of unconditional (a) and conditional (b) social heuristics employed in each grade

Relationship between offers and reasons for offers

In this analysis I checked whether a particular offer was connected with a particular kind of reason for it. Offers were sorted into three categories: (1) selfish offers (0 to 4 coins); (2) moderate offers (5 to 9 coins); (3) fair offers (10 or more coins). The reason why offers were grouped into these three categories was first that an equal split was the modal offer for both individual and group choices in the dictator and ultimatum games. The reason for differentiating between selfish and moderate offers was to capture the variance within the unequal offers. I chose to label offers as selfish when they fell below 20% of the initial sum to be split. As discussed in Chapter 1, the average offer of adults in the dictator game is 20% of the initial pie. I therefore suspected that offers below this 20% (i.e. up to and including 4

coins in our study) would be regarded as especially selfish. Offers larger than the equal split were subsumed under the fair offer category, since they occurred quite rarely.

Perspective-Taking Levels

Figure 3.4 shows the perspective-taking levels of statements arguing for the three kinds of offers (selfish, moderate, fair) for each of the three age groups. Participants from third grade gave 15 reasons for selfish offers, 15 reasons for moderate offers, and 18 for fair offers. In sixth grade, participants mentioned 36 reasons for selfish offers, 38 reasons for moderate offers, and 72 reasons for fair offers. Eighth-grade participants gave 12 reasons for selfish offers, 27 for moderate offers, and 64 for fair offers. Thus, in all three grades, more reasons were given for fair offers than for selfish or moderate offers, although this difference was particularly strong in sixth and eighth grade. These numbers are used as the basis for the percentages displayed in Figure 3.4.

A closer inspection of Figure 3.4 reveals that Level 1 perspective taking was the predominant kind of reasoning for all types of offers in all three grades. However, some further regularities appear: In third and eighth grade, the fairer the offer, the more participants used higher levels of perspective taking. In third grade, participants exclusively reasoned on Level 1 when arguing for fair offers, but they used more Level 0 perspective taking when arguing for selfish or moderate offers. The reason why third graders did not use any higher levels of perspective taking when arguing for fair offers might be a developmental effect. In eighth grade a similar picture emerges: Higher-level perspective taking (Levels 2 and 3) was more prevalent when participants argued for fair and also moderate offers. Selfish offers were mainly justified with Level 1 and Level 0 reasons. Thus, the results obtained in third and eighth grade are so far in line with what social-cognitive developmental theory would suggest: Higher levels of perspective taking go together with fairer offers and vice versa. The relationship between type of offer and level of perspective taking is somewhat different in sixth grade, though. The most notable difference is that sixth graders most frequently employ high levels of perspective taking (level 2) when they argue for selfish in contrast to moderate or fair offers.

However, these results should be interpreted in light of what we know about the group decision-making process in the three age groups. As our analyses in Chapter 2 has revealed, in sixth grade it is possible for a selfish minority to persuade a generous majority. Thus, the high frequency of Level 2 arguments used for selfish offers may be a reflection of this persuasion process: The minority child uses higher-level arguments to persuade the majority.
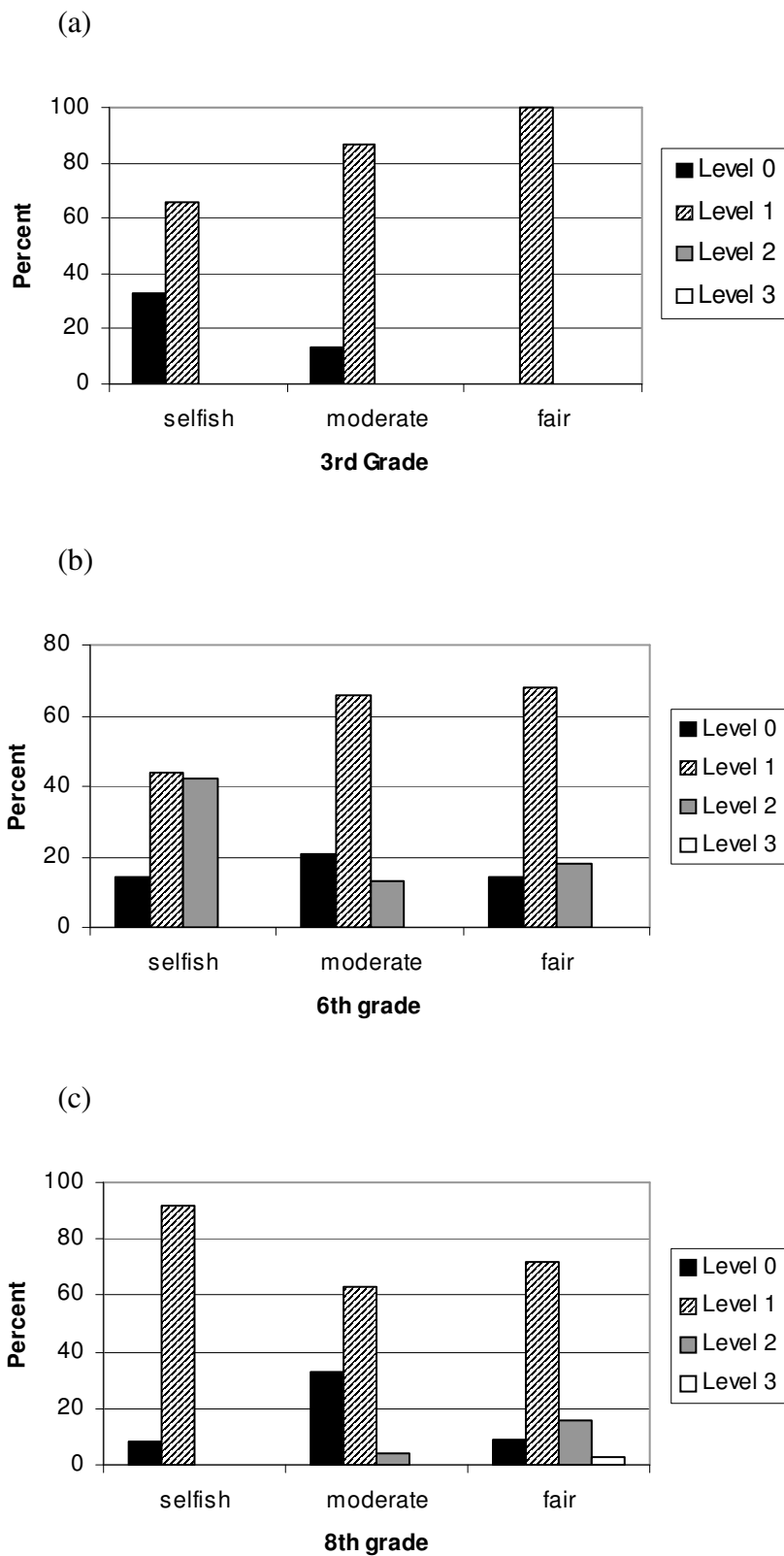
(a)

(b)

(c)

Figure 3.4. Perspective-taking levels (in %) used for arguing for selfish, moderate, and fair offers in (a) third grade, (b) sixth grade, and (c) eighth grade in the dictator game

This hypothesis, however, cannot be verified by the kind of analyses performed here. Therefore, after presenting the results for the social heuristics, the next section will focus on the relationship between arguments used and the type of decision-making process. This way it is possible to find out whether sixth graders use higher levels of perspective taking for selfish offers only when a minority member tries to persuade the majority, or whether this finding is a developmental effect.

Social Heuristics

Figure 3.5 displays which kinds of social heuristics arguments were employed in relation to the three types of offers in the three age groups. Altogether, participants from third grade mentioned 19 arguments supporting selfish offers, 22 arguments for moderate offers, and 33 arguments for fair offers. Participants from sixth grade gave 63 arguments for selfish offers, 49 arguments for moderate offers, and 53 arguments for fair offers. Participants from eighth grade produced 16 arguments for selfish offers, 26 arguments for moderate offers, and 68 arguments for fair offers. These numbers are used as basis for the percentages displayed in Figure 3.5.

As Figure 3.5 indicates, the relationship between social heuristics and offers is more complex than the relationship between perspective-taking levels and offers. In general, the unconditional heuristics—egoism, balancing, and fairness—were used appropriately by all participants. That is, egoism was used as a reason for selfish and moderate offers only, whereas fairness reasons were used almost exclusively for arguing for fair offers. Balancing was employed as a reason mainly for selfish and moderate offers, and in eighth grade also for arguing for fair offers. The frequency of conditional social heuristic—arguments involving group membership, hierarchy, reciprocity, and social prestige—also increased with age. Whereas third graders predominantly used unconditional heuristics, sixth and eighth graders supplemented their argumentation with conditional social heuristics. Nevertheless, the unconditional social heuristics egoism and fairness were still used most frequently. Concerning conditional social heuristics, an interesting effect can be observed. Whereas participants in sixth grade employed conditional social heuristics more often when they argued for selfish offers, eighth graders used them more often when they argued for moderate and fair offers. However, rather than attributing these findings to a developmental effect, I would again view this finding in relation to the differences in the group decision-making processes in sixth and eighth grade. Particularly the rather high frequency of conditional social heuristics connected to selfish offers in sixth grade might be related to the selfish
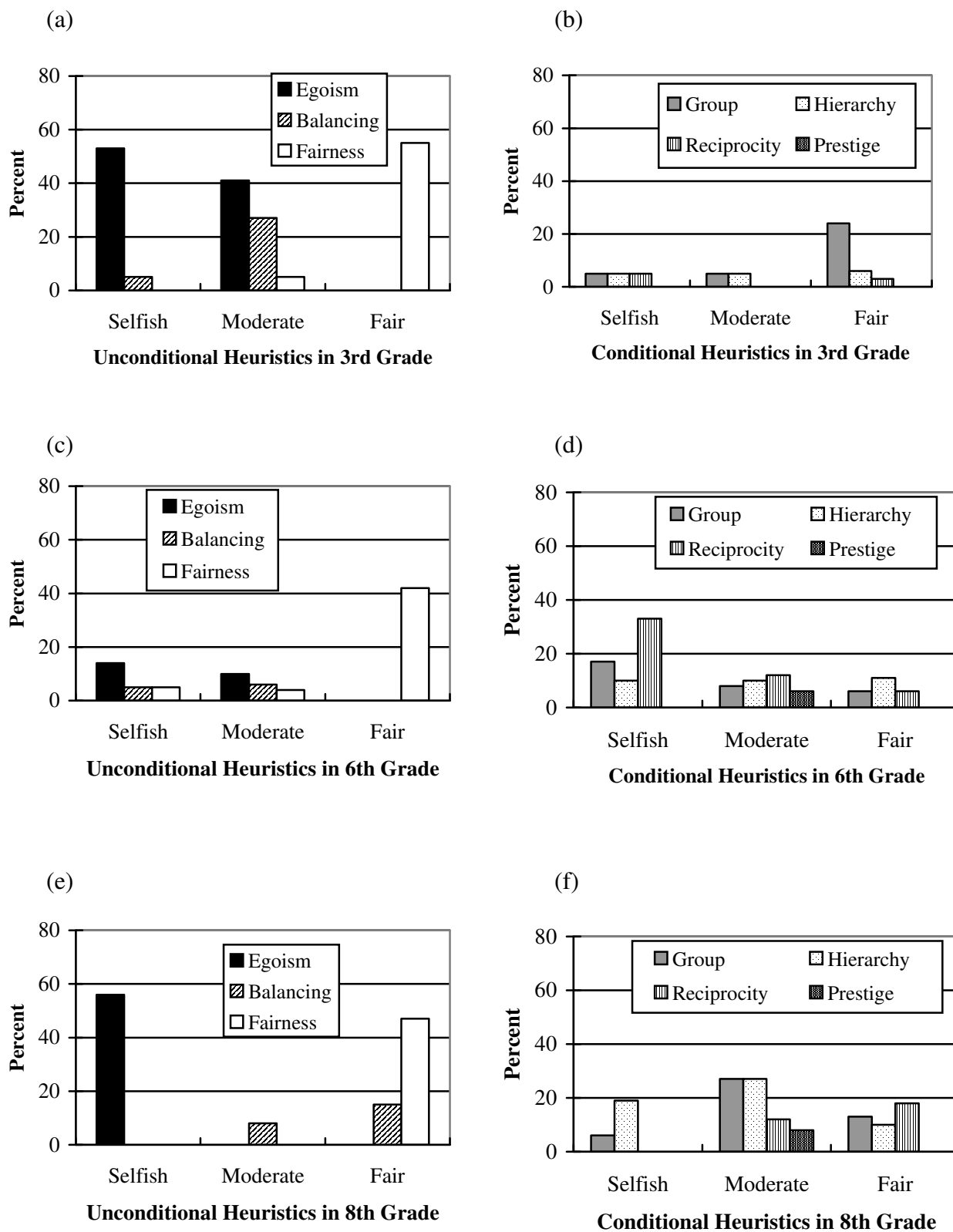
(a)

(b)

(c)

(d)

(e)

(f)

Figure 3.5. Unconditional and conditional social heuristics (in %) used in third grade (a, b), sixth grade (c, d), and eighth grade (e, f)

minority using more effective means of argumentation. As for perspective-taking levels, I will explore this hypothesis in the next section.

Group decision-making process and reasons for offers

In this section I will investigate the relationship between the type of decision-making process in each group and the number and type of arguments mentioned by the three group members. I will examine how many different types of arguments were brought up in each group and will identify which group member introduced novel reasoning. These analyses are a first test of Hypotheses 1 and 2. In these hypotheses, we predicted that in cases in which the group decision-making process is best modeled by a majority (social judgment scheme, or SJS) model, group members will produce similar kinds of arguments. On the other hand, if the group decision-making process is best modeled by an averaging process, then we expect groups to produce many different arguments. That is, compared to majority groups, averaging groups produce a higher number of different kinds of arguments.

In Chapter 2, I presented the analyses on the group decision-making process in the dictator game in third-, sixth-, and eighth-grade children. Overall, third and eighth graders followed a majority process and sixth graders followed an averaging process. However, as elaborated in the discussion of Chapter 2, this result holds only for the whole sample of groups from the respective grades, and not necessarily for any single group. In Chapter 2, individual groups from sixth and eighth grade were classified according to whether the decision-making process in these groups could be best modeled by the SJS or by an averaging model. We now extend this analysis to the groups from third grade. Table 3.2 displays the frequency of groups modeled best by a majority model (SJS), an averaging model, or when the two models made the same prediction. In addition, I present information about the size of the weights attached to the most generous and the most selfish group member. Remember that the weight attached to an individual member's offer is an exponential function of the distances between a given member's preference and all other group members' preferences (see also Davis, 1996). The weight attached to any member decreases exponentially as an increasing function of the discrepancy of that individual's offer from the other members of the group. Consequently, the weight of the individual in the middle position (which should be most similar to any of the other individuals in the group) is always the largest. If the most generous group member has a higher weight than the most selfish group members (depicted as G > S in Table 3.2), the group consists of a generous majority, and vice versa.

Table 3.2. Type of decision-making process in dictator game and influence of most generous and most selfish group member in third, sixth, and eighth grade

Third grade				
Majority		Averaging		Same prediction
G > S	G < S	G > S	G < S	G = S
$N = 2$	$N = 4$	$N = 1$	$N = 2$	$N = 3$
Sixth grade				
Majority		Averaging		Same prediction
G > S	G < S	G > S	G < S	G = S
$N = 1$	$N = 2$	$N = 8$	$N = 0$	$N = 6$
Eighth grade				
Majority		Averaging		Same prediction
G > S	G < S	G > S	G < S	G = S
$N = 8$	$N = 2$	$N = 1$	$N = 3$	$N = 2$

Note: G > S: higher weight for most generous than for most selfish group member; G = S: same weight for most generous and most selfish group member; G < S: higher weight for most selfish than for most generous group member

Table 3.2 shows that in third grade, there were 6 groups for which the majority (or SJS) model was the best-fitting model. Two of these 6 groups consisted of a generous majority, and 4 groups consisted of a selfish majority. These were 3 averaging groups in third grade, 2 of which consisted of a selfish majority and 1 of a generous majority. For 3 groups in third grade, the two models made the same prediction. In sixth grade, for 3 groups the group decision-making process could be best described by the majority model. One of these 3 majority groups consisted of a generous majority and 2 of a selfish majority. All 8 averaging groups in sixth grade consisted of a generous majority. For 6 groups, the two models made the same prediction. In eighth grade, 10 groups could be best modeled by a majority process. Eight of these 10 groups consisted of a generous majority, and 2 groups of a selfish majority. For 4 groups in eighth grade the averaging model could describe the group decision-making

process best. One of these 4 groups consisted of a generous majority and 3 of a selfish majority. For 2 groups in eighth grade, the two models made the same prediction.

Perspective-Taking Levels

For every group displayed in Table 3.2, I counted how many arguments employing different perspective-taking levels were used during the group discussion. In some groups no perspective-taking levels could be coded, especially if group members did not give reasons for their offers.

In third grade, 4 groups could be classified as following a majority process for group decision making. When there was a generous majority (G > S), in 2 out of 2 groups participants only used one perspective-taking level in their argumentation. When there was a selfish majority (G < S), in 2 out of 4 groups participants used arguments from one perspective-taking level and in 2 groups employed arguments from two different perspective-taking levels. When the averaging model was chosen as the best-fitting model and there was a selfish majority (G < S), 1 out of 2 groups used arguments from only one perspective-taking level and 1 group from two perspective-taking levels. When both models made the same prediction, 1 out of 3 groups argued using one perspective-taking level, and 2 groups employed two different perspective-taking levels (see Table 3.3).

In sixth grade, for 3 groups the majority model was the best-fitting model. As can be seen in Table 3.3, in the 1 group with a generous majority (G > S), participants referred to two different perspective-taking levels. For the 2 groups with a selfish majority (G < S), no data were available. Eight groups could be classified as following an averaging process and in all of these groups there was a generous majority (G > S). Three out of these 8 groups employed arguments from two different perspective-taking levels, and 2 used three different perspective-taking levels. For the remaining three groups, no data were available. For 6 groups both models made the same predictions. In 1 group, one level was used, in 1 group two different levels were used, and in 2 groups three different perspective-taking levels were used. There were no data for the remaining 2 groups.

In eighth grade, for 10 groups the majority model was the best-fitting model. Of the 8 groups with a generous majority (G > S), 3 groups employed only one level of perspective taking, 2 groups employed two levels, 1 group three levels, and 1 group four different levels of perspective taking. For 1 group, no data were obtained. Of the 2 groups with a selfish majority (G < S), 1 used only one perspective-taking level, and 1 used three. Four groups were classified as using an averaging procedure. In the 1 group with a generous majority

Table 3.3. Number of groups in which the same or different perspective-taking arguments were used during group discussion depending on the group decision-making process in the dictator game

		One level	Two levels	Three levels
Third grade				
		Number of perspective-taking levels used		
Majority	Generous (G > S)	2		
	Selfish (G > S)	2	2	
Averaging	Generous (G > S)			
	Selfish (G > S)	1	1	
Same prediction		1	2	
Sixth grade				
		Number of perspective-taking levels used		
Majority	Generous (G > S)		1	
	Selfish (G > S)			
Averaging	Generous (G > S)		3	2
	Selfish (G > S)			
Same prediction		1	1	2
Eighth grade				
		Number of perspective-taking levels used		
Majority	Generous (G > S)	3	1	1
	Selfish (G > S)	1		1
Averaging	Generous (G > S)		1	
	Selfish (G > S)			
Same prediction		1	1	

Note: G > S: higher weight for most generous than for most selfish group member; G = S: same weight for most generous and most selfish group member; G < S: higher weight for most selfish than for most generous group member

(G > S), two different perspective-taking levels were used. In the 2 groups with a selfish majority (G < S), three different types of arguments were used. For the other 2 groups, no data were available. For 2 groups the two models made the same predictions. In 1 group only one

perspective-taking level was used, in the other group two different levels were employed (see Table 3.3).

Social Heuristics

The same analysis was performed for arguments employing social heuristics. Please note that again, for some groups, no data were available, since the group member either did not engage in a discussion or did not give any reasons for his or her offers.

As indicated in Table 3.4, when the majority model was chosen as the best-fitting model in third grade and when there was a selfish majority (G < S), in 3 out of 4 groups only one kind of social heuristic was employed. For the last group in this condition, no data were available. When there was a generous majority (G > S), in 1 of 2 groups group members referred to one kind of social heuristic argument, and in 1 group to two social heuristic arguments. When the averaging model modeled the group decision-making process best and when there was a generous majority (G > S), in 1 of 1 groups participants used three different arguments in their group discussion. When there was a selfish majority (G < S), in 1 of 2 groups members employed two kinds of arguments and in 1 of 2 groups three kinds of arguments. In the three cases when both models made the same prediction, in 2 groups only one type of social heuristic argument was used and in 1 group two arguments was employed.

When the majority model predicted the group decision-making process best in sixth grade, the 1 group with the generous majority (G > S) employed only one type of argument. When there was a selfish majority (G < S), in 1 of 2 groups participants only employed one type of argument; no data were available for the second group in this condition. For the 8 cases in which the averaging model predicted the group decision-making process best and where there was a generous majority (G > S), in 4 groups group members employed more than three types of social heuristics arguments. In 2 groups participants used only one type of argument and for 2 groups no data were available. When the models made the same prediction, in 3 of 6 groups members used more than three types of arguments, in 1 case they used two types of arguments, and in 1 case only one type of argument. For the last group in this condition, no data were available (see Table 3.4).

When the majority model was the best-fitting model for the group decision-making process in eighth grade and when there was a generous majority (G > S), in 2 of 8 groups only one type of argument was used, in 2 groups two types of arguments were used, in 1 group the one case when the averaging model predicted the group decision-making process best and when there was a generous majority (G > S), more than three kinds of arguments were

Table 3.4 Number of groups in which the same or different types of social heuristic arguments were used during group discussion depending on the group decision-making process in the dictator game

| | **Third grade** | | | |
| | Number of different types of social heuristics used | | | |
	One	Two	Three	More than three
Majority Generous (G > S)	1	1		
Selfish (G < S)	3			
Averaging Generous (G < S)			1	
Selfish (G < S)		1	1	
Same	2	1		

| | **Sixth grade** | | | |
| | Number of different types of social heuristics used | | | |
	One	Two	Three	More than three
Majority Generous (G > S)	1			
Selfish (G < S)	1			
Averaging Generous (G < S)	2			4
Selfish (G < S)				
Same	1	1		3

| | **Eighth grade** | | | |
| | Number of different types of social heuristics used | | | |
	One	Two	Three	More than three
Majority Generous (G > S)	2	2	1	2
Selfish (G < S)		2		
Averaging Generous (G < S)				1
Selfish (G < S)			1	1
Same		1	1	

Note: G > S: higher weight for most generous than for most selfish group member; G = S: same weight for most generous and most selfish group member; G < S: higher weight for most selfish than for most generous group member

employed three arguments were used, and in 2 groups more than three types of arguments were employed. One group could not be analyzed because of missing data. When there was a selfish majority (G < S), in 2 of 2 groups participants used two types of social heuristics. In. For the three groups in which there was a selfish majority (G < S), in 1 group three types of

arguments were used, and in 1 group more than three types of arguments were used. When the two models made the same predictions, in 1 group two kinds of social heuristics were employed, and the other group three types of heuristics were used (see Table 3.4).

In sum, these results indicate that more varied reasoning is used in groups in which the group decision-making process is modeled by an averaging model than by a majority model. In averaging groups, participants employed two to three types of perspective-taking levels, whereas in majority groups members used only one to two types. This is especially true for the discussions in third and sixth grade. In eighth grade, however, 2 of 10 groups also used arguments from three or more perspective-taking levels. A similar picture emerged for the social heuristics. In third and sixth grade, predominantly one kind of argumentation was employed in majority groups, whereas in averaging groups two, three, or more than three types of arguments were used. Although also in eighth grade averaging groups produced three or more than three different social heuristic arguments, also in majority groups three or more than three types of arguments were used. Overall, the data indicate that indeed averaging groups produced more arguments in third and sixth grade than majority groups, but this finding was not as clear-cut in eighth grade.

An important assumption in Hypothesis 2 is that it is the minority member who is expected to introduce a new argument to the group discussion. To test this assumption more directly, in every grade I checked in the transcripts of all the averaging groups who introduced a new kind of argument—the generous child, the child in the middle position, or the selfish (minority) child.

For the 2 averaging groups in third grade that used perspective-taking arguments, in 1 group, the selfish member introduced the first perspective-taking arguments. The other group members, however, produced more arguments reacting to this member's suggestion. In 1 group, the middle child introduced the first argument and also produced more perspective-taking arguments during the discussion. Concerning social heuristics arguments, three group transcripts could be analyzed. In 1 of the 3 groups, the selfish group member introduced arguments into the discussion and also produced most arguments during the group discussion. In 2 of the 3 groups, the middle child introduced arguments and also employed more arguments during the group discussion.

In 4 of the 5 averaging groups in sixth grade in which perspective-taking arguments were exchanged, the most selfish child was first to introduce an argument. Although the other group members mostly reacted to this reasoning with counterarguments on the same perspective-taking level, the selfish minority child produced more arguments over the course

of the discussion. Only in 1 group was the child in the middle position more active than either the selfish child in introducing arguments. In 3 of the 6 averaging groups in sixth grade in which social heuristics were used, the selfish group member was first to introduce an argument and produced the majority of arguments during the group discussion. In 2 groups, the middle child introduced arguments and used more social heuristics during group discussion, to which the selfish child usually reacted. In 1 group, no arguments were exchanged.

In 3 of the 4 averaging groups in eighth grade, the selfish group member was first to introduce a perspective-taking argument, but in all but one of these groups, the generous member reacted to these arguments and produced more arguments during the group discussion. In 1 of the 4 groups, the generous member introduced the first argument and produced more perspective-taking statements during the group discussion.

In 3 of the 4 averaging groups in eighth grade who exchanged social heuristic arguments, the selfish child introduced the first argument. However, in most cases, this argument was reacted to by the generous child in a group, who also produced the most arguments in all but 1 group. In 1 of the 4 groups, the generous group member also started introducing arguments to the group discussion.

Taken together, the results of these qualitative analyses indicate that in groups in which the decision-making process follows a majority model participants tend to produce fewer arguments than in groups in which the decision-making process follows an averaging model. Furthermore, in the averaging groups the selfish (minority) child tended to introduce arguments and also produced more during the group discussion. Overall, these findings are therefore in line with Hypotheses 1 and 2. However, in Hypothesis 2 I also stated that the minority child not only introduces new but also valid arguments. The question concerning the validity of arguments and how they affect the group decision-making process is followed up in the next section.

The validity of persuasive arguments

In this section I want to investigate what kind of arguments brought forward by one group member changed the offers of the other group member(s). With this analysis, Hypotheses 3a and 3b are tested. I adopted the procedure of Wittig (2004) to examine whether there are certain arguments that change others' offers. Wittig (2004) defined that such a change occurred "if (1) [the other] group members changed their opinion after the argument was stated, (2) it was the only argument in the discussion, or (3) a group member picked up an

argument used by a group member with a different preference" (p. 29f). This procedure made it necessary to work with the transcripts of the group discussions. For each group it was determined which argument changed the opinion of the other(s) and which kind of perspective-taking level or social heuristic was used. Only the groups in which the group decision-making process was predicted by either the averaging or the majority model were included in this analysis. Please note that in averaging groups, "change" usually means that one of the majority group members decreased his offer. In selfish majority groups, a change usually occurred for the generous minority child, who decreased his offer. In generous majority groups, a change usually was observed for the selfish minority member, who increased his offer.

Perspective-Taking Levels

Averaging groups: In third grade, there were 3 averaging groups. In 2 of these 3 groups, a change according to the criteria of Wittig (2004) could be determined. In 1 group, offers changed because one group member provided arguments from the perspective-taking Levels 1 and 0. In another group, offers changed because the group members wanted to explicitly find a compromise in the middle of their individually stated offers. In 1 group, no change could be determined.

For 5 of 6 averaging groups in sixth grade a change could be observed. In 3 of these 5 groups, the argument that changed the opinion of the other group members could be coded on perspective-taking Level 1. In 1 group, the group members tried to find a compromise between their individual offers, and in 1 group just mentioning a specific offer introduced a change in the offer of another group member.

There were 3 averaging groups in eighth grade. In 2 of these 3 groups, a change in a member's opinion was brought about by a Level 1 argument. In 1 group, a participant changed his offer by just being confronted with the offer of another group member.

Majority groups: For 6 groups in third grade, the majority model was the best-fitting model for the group decision-making process. In 2 groups, there was a generous majority, and in both of these 2 groups the persuaders used Level 1 reasoning which lead to an increase in offers of the other group member. In 4 groups, there was a selfish majority. Similar to the generous majority groups, Level 1 arguments changed the opinion of other group members in 3 of these 4 groups. For 1 group, no change situation could be determined.

There were 3 majority groups in sixth grade. In the 1 group with a generous majority, a change in opinion occurred when the group member was confronted with a Level 1 argument. For the 2 groups with a selfish majority, no change data were available.

In eighth grade, there were 9 majority groups. In the 2 groups with a selfish majority, in 1 group a change in offers occurred when the persuading member used a Level 0 argument. In the other group, a group member changed his opinion when he was confronted with a Level 1 and a Level 2 argument. There were 7 groups with a generous majority. In 2 of these 7 groups, a change in opinion occurred when the persuader mentioned a Level 1 argument. In 2 other groups, a Level 3 argument led to a change in offers. In the remaining 3 groups, just the mere mention of offers led to a change of offers in the other group members.

In sum, when a change in offer of one group member could be detected, this change in most of the cases resulted from the participant being confronted with a Level 1 argument by another group member. This finding holds true in all age groups and for all groups independent of the kind of decision-making process they adopted. Higher-level arguments (Levels 2 and 3) that changed others' offers could only be observed very infrequently in eighth grade in groups in which the majority persuaded the minority. It is worth noting that across ages and groups, change in offers occurred when a group member was merely confronted with the numerical offer of another participant.

Social Heuristics

Averaging groups: In 1 of the 3 averaging groups in third grade, one group member persuaded another by referring to hierarchical power and egoism. The persuader pointed out that he himself was too greedy to give the other group an equal amount if he was allowed to decide how to share the money. In 1 group, a group decision was reached by explicitly applying an averaging procedure, that is, by finding a compromise between two offers. In 1 group, no persuasion could be observed.

For 5 of the 6 groups in sixth grade for which the averaging model was the best-fitting model, change according to the definitions of Wittig (2004) could be observed. My analysis shows that in 2 of these 5 groups, an argument referring to hierarchy was the most successful in persuading another group member. For example, the persuader referred to the power their own group had in determining how the money should be shared and that the members of the other group did not have anything to say. In 1 group, the persuasive group member changed another's opinion by employing a fairness argument. Interestingly, the persuader used this fairness to argue for a non-equal sharing of the money. In the remaining 2 averaging groups in

sixth grade, an explicit compromise or averaging procedure between the three group members was sought.

In 2 of the 3 averaging groups in eighth grade, a hierarchical power reasoning was the argument that changed the opinion of a fellow group member. Participants argued that the people in the other group did not have a say in how to split the money. However, even though their own group should get more money than the other, the responder group was still entitled to something. In the remaining group, a change was reached by explicit compromise.

Majority groups: For 6 groups in third grade, the SJS or majority model predicted the group decision-making process best. There were 2 groups with a generous majority and 4 groups with a selfish majority. In both groups with a generous majority, a generous member changed the opinion of another group member with a fairness argument. Additionally, in 1 group the persuader also referred to reciprocity. He pointed out that an equal split would be a fair solution and that the other group would do it as well. In 1 of the 4 groups with a selfish majority, the persuasive group member employed reciprocity by arguing that the other group would act selfishly if they were in their situation. In 1 other group, change occurred when one group member mentioned egoism as an argument for a selfish offer. In another group, a persuader changed the opinion of a hyper-fair (more than equal split) child by referring to fairness. For the last group in third grade, no change could be determined.

In sixth grade, there were 3 majority groups, 1 with a generous majority, 2 with a selfish majority. In the 1 group with a generous majority, the argument that convinced the other group member was a fairness coupled with a hierarchical power argument. The persuader suggested an equal split, because he considered it as fair, and because the other group could only accept this offer. For the two groups with a selfish majority, no data were available.

In eighth grade, there were 2 groups with a selfish majority and 7 groups with a generous majority for which data were available. In 1 group with a selfish majority, the persuasive child used a fairness coupled with a reciprocity argument to decrease a hyper-fair offer. In the other group, the persuader employed an egoism argument. Of the 7 groups with a generous majority, the arguments that brought about a change in offers were reciprocity arguments, pointing out that the other group would behave the same if it were in their position. In 1 group, the persuader additionally used a fairness argument, and in another, a change in offers occurred when one group member additionally reasoned along hierarchical power.

In sum, arguments that changed offers in averaging groups predominantly employed hierarchy, pointing out that their own group had more power in determining the offer. This was true for all averaging groups across the three age groups. Positive reciprocity and fairness led to a change in offers in majority groups with a generous majority, whereas negative reciprocity, egoism, and fairness led to a change in offers in groups with a selfish majority. However, in some groups, the group offer was explicitly determined by taking the average between the individual members' offers.

Results for the ultimatum game

Similar to the procedures in the dictator game, the coded transcripts were transformed from an ATLAS.ti file to an SPSS file. If not otherwise stated, all the analyses are based on procedures run in SPSS.

In the following sections, I will first give an overview of how often the different perspective-taking levels and social heuristics were mentioned in each grade. Then, I will describe how often each type of reason (perspective-taking or social heuristic) was used for arguing for a certain offer. Finally, I will give a descriptive overview about what kind of reasoning changed offers in the ultimatum game. Because we did not find any significant age difference for the group decision-making process in the ultimatum game (see Chapter 2), no results concerning the group decision-making process will be reported.

Descriptive analyses

In third grade, 68 statements could be coded as perspective-taking levels, and 92 statements were coded as social heuristics. In sixth grade, 168 statements could be coded as perspective-taking levels, and 151 statements as social heuristics. In eighth grade, 170 statements were coded as perspective-taking levels and 141 statements were coded as social heuristics. Figure 3.6 shows the frequency of each level of perspective-taking for each grade. Figure 3.7 displays the frequency of conditional and unconditional social heuristics for each grade. The overall number of statements per grade was used as the basis for calculating the percentages.

As indicated in Figure 3.6, there was basically no developmental effect for the use of perspective-taking levels. Participants from all grades predominantly reasoned on Level 1. However, compared to the use of perspective-taking levels in dictator game discussions (see
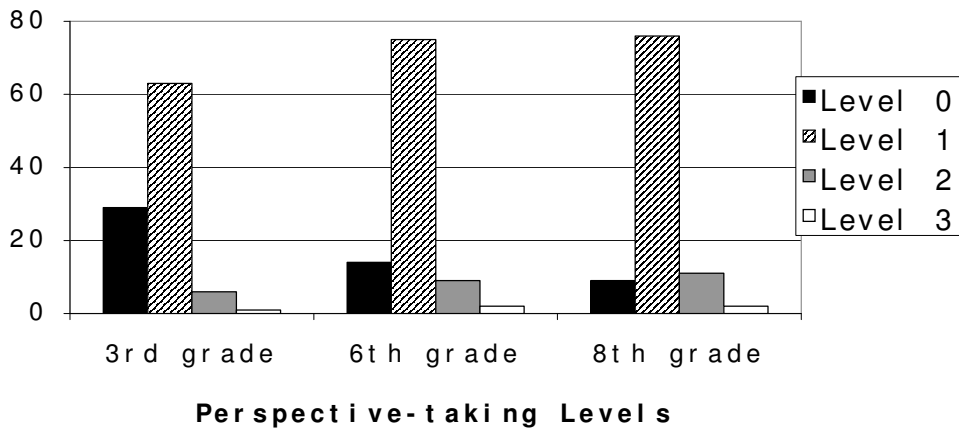
Figure 3.6. Frequencies (in %) of perspective-taking levels used in the ultimatum game in third, sixth, and eighth grade
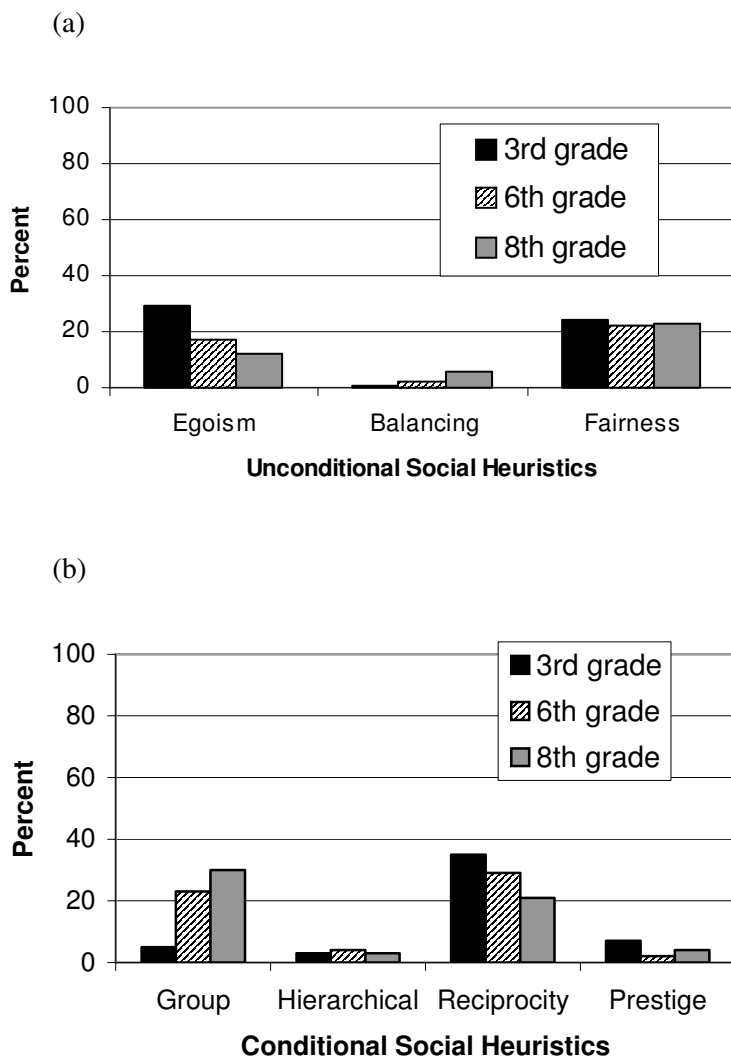
(a)

(b)

Figure 3.7. Frequencies (in %) of unconditional (a) and conditional (b) social heuristics used in the ultimatum game in third, sixth, and eighth grade

Figure 3.2), children from third grade now employed slightly more Level 2 and even Level 3 arguments.

Concerning the use of social heuristics across grades (Figure 3.7), we can observe a few developmental trends. With increasing age, participants seem to have employed fewer arguments referring to egoism and reciprocity, but more statements referring to group. Compared to the dictator game (see Figure 3.3), participants seem to have used more conditional social heuristics.

Relationship between offers and reasons for offers

The offers made during the ultimatum game group discussions were markedly different from the offers made in the dictator game. Whereas in the dictator game, the majority of offers ranged between 0 and 10 coins with very few offers for more than 10, in the ultimatum game, such hyper-fair offers were very prevalent; around 78% of all offers mentioned in the ultimatum game discussions were offers of more than 10 coins. Therefore, for the following analyses offers were sorted into the categories (1) selfish offers (0 to 9 coins); (2) fair offers (10 coins); (3) hyper-fair offers (11 to 20 coins).

Perspective-Taking Levels

In Figure 3.8 the perspective-taking levels used for the three kinds of offers (selfish, fair, hyper-fair) are displayed for each grade. In third grade, 7 arguments were used in connection with selfish offers, 27 arguments in connection with fair offers, and 32 arguments supporting hyper-fair offers. Participants in sixth grade used 17 arguments related to selfish offers, 64 arguments referring to fair offers, and 21 arguments in connection with hyper-fair offers. In eighth grade, participants used 16 statements arguing for selfish offers, 52 arguing for fair offers, and 24 arguing for hyper-fair offers. These numbers were used as the basis for calculating the percentages in Figure 3.8.

A closer inspection of Figure 3.8 reveals that, similar to the dictator game, higher offers were connected to higher-level reasoning. When children argued for fair and hyper-fair offers in third grade, they began to employ, although rarely, Level 2 and even Level 3 reasoning. We attribute this to the strategic structure of the ultimatum game in contrast to the dictator game: Because the payoff of the proposer group is also determined by the responder group, children have to take the perspective of this responder group into account. Still, higher-level reasoning appeared quite rarely in third graders, indicating a possible developmental ceiling effect. When arguing for selfish offers third graders predominantly used Level 0
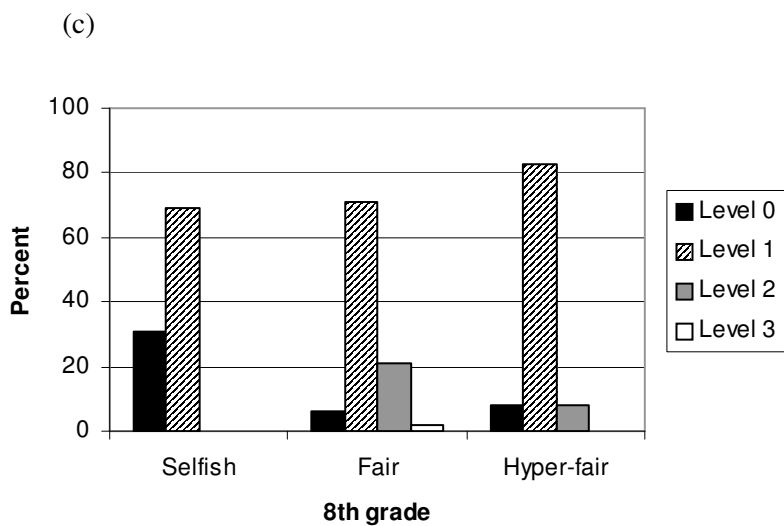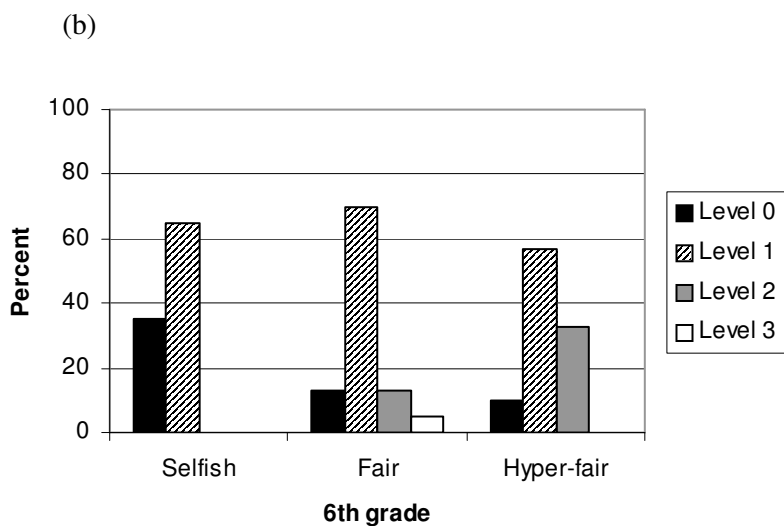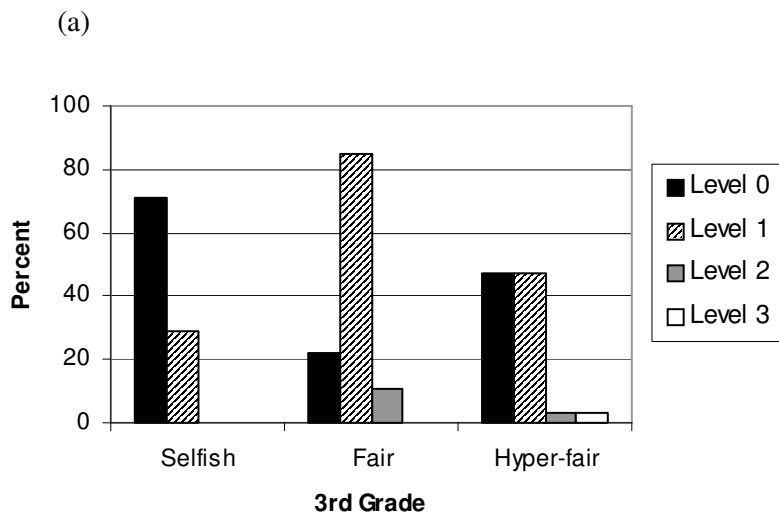
(a)

3rd Grade

(b)

6th grade

(c)

8th grade

Figure 3.8. Perspective-taking levels (in %) used in the ultimatum game in relation to selfish, fair, and hyper-fair offers in third grade (a), sixth grade (b), and eighth grade (c)

reasoning. However, Level 0 reasoning was also quite common when third graders argued for hyper-fair offers. This finding also reflects the strategic character of the ultimatum game in comparison to the dictator game. Examination of the transcripts revealed that children who used Level 0 reasoning for hyper-fair offers were mainly concerned with their own payoff; they did not want to take a risk and therefore argued to give the responder group more than half just to be on the safe side.

In sixth grade, participants predominantly reasoned on Level 1 independent of the type of offer. But also in this age group, we observed that the more participants wanted to give to the other group, the more likely they were also to employ higher levels of perspective taking. For selfish offers, participants in sixth grade used arguments from perspective-taking Levels 0 and 1. For fair offers they employed arguments form perspective-taking Levels 0, 1, 2, and 3, and when arguing for hyper-fair offers, participants used perspective-taking Levels 0, 1, and 2. We particularly witnessed an increase in Level 2 perspective taking when participants argued for hyper-fair offers. Nevertheless, Level 0 arguments still appeared for fair and hyper-fair offers. Inspection of the transcripts revealed that, similar to third grade, Level 0 arguments reflected the strategic considerations of participants in the ultimatum game: A higher offer is less likely to be rejected by the responder group, and therefore the proposer group could make sure to earn at least some money in this game.

As in sixth grade, participants in eighth grade predominantly employed Level 1 reasoning independent of offer. But also in eighth grade the positive relationship between amount of offer and perspective-taking level appeared: Whereas participants employed mainly Level 0 and Level 1 reasoning when they argued for selfish offers, when arguing for fair and hyper-fair offers, eighth graders also used Level 2 and Level 3 reasoning. However, participants from eighth grade appeared to use less Level 2 reasoning when arguing for hyper-fair offers than did participants from sixth grade.

Social Heuristics

Figure 3.9 shows which social heuristics were used in connection with the three kinds of offers in each grade. Participants from third grade mentioned 7 arguments supporting selfish offers, 24 arguments in relation to fair offers, and 31 arguments supporting hyper-fair offers. In sixth grade, participants used 13 arguments in relation to selfish offers, 66 arguments for fair offers, and 17 arguments for hyper-fair offers. These numbers are used as the basis for the percentages displayed in Figure 3.9.
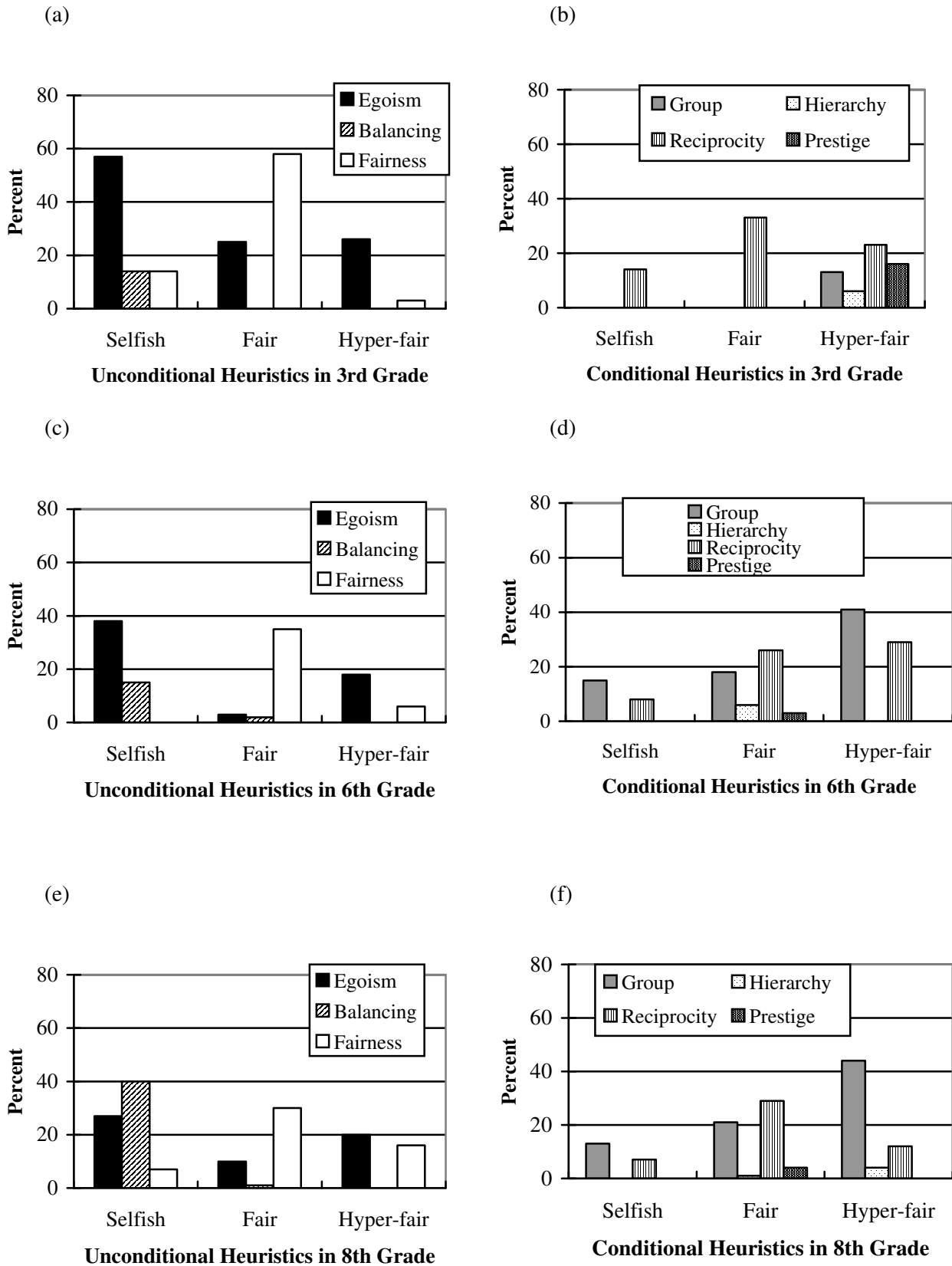
(a)

(b)

(c)

(d)

(e)

(f)

Figure 3.9. Unconditional and conditional social heuristics (in %) used in the ultimatum game in relation to selfish, fair, and hyper-fair offers in third grade (a, b), sixth grade (c, d), and eighth grade (e, f)

As can be seen in Figure 3.9a, participants from third grade used the unconditional social heuristics egoism, balancing, and fairness, predominantly appropriately for the three types of offers. For selfish offers, participants mainly argued with egoism, whereas for fair offers, participants largely employed fairness arguments. The hyper-fair offers, again, represent an interesting case: Third graders used egoistic arguments much more than statements arguing for fairness. When examining the transcripts, this rather high occurrence of egoistic arguments for hyper-fair offers can be explained by the strategic character of the ultimatum game: Participants wanted to make sure that they would get at least some money from the game, therefore they offered more than half to the responder group. With the exception of reciprocity, conditional social heuristics were only employed when arguing for hyper-fair offers. Obviously, such offers, which give an advantage to the other compared to one's own group need much more discussion than fair or selfish offers. Inspection of the transcripts revealed that participants who used the category group when arguing for hyper-fair offers regarded the responder group as greedy and selfish. Therefore, an offer larger than the equal split is again a strategy to reduce the risk of losing money in this game. The relatively high use of reciprocity reflects that participants reason about the actions and needs of the other group and how these needs can be coordinated with their own desires.

Similar to third grade, participants from sixth grade used unconditional social heuristics rather appropriately: Egoism was used when arguing for selfish offers, and fairness when arguing for fair offers. Again, the hyper-fair offers are an exception: The rather high prevalence of egoistic arguments is connected to strategic reasoning on the side of the participants. Concerning conditional social heuristics, the main categories referred to in sixth grade were the categories group and reciprocity. Examination of the transcripts revealed that for selfish and hyper-fair offers, group was mainly used in a negative way: Because the other group was greedy, it was justified to give them less than an equal share (selfish offers) or to give them more than the equal split to make sure to get some money from the game. Reciprocal arguments predominantly dealt with the needs and wants of the people in the other group and how to coordinate these with the proposer group's desires.

Concerning the use of unconditional social heuristics in eighth grade, similar trends appeared. For selfish offers, participants mainly employed egoistic and balancing reasons. Participants from eighth grade were the only ones who used a high number of balancing reasons for selfish offers, trying to balance their own selfish desires with the norms of fairness and equal sharing. For fair offers, participants mainly used reasons referring to the fairness norm of an equal split. As was the case in third and sixth grade, eighth graders also used a

high amount of egoistic reasons when arguing for hyper-fair offers. This reflects the strategic character of the ultimatum game. Concerning conditional social heuristics, eighth graders particularly referred to the categories of group and reciprocity. The use of the category group increased with the amount of offer. But whereas group was employed in a positive way for fair offers, emphasizing the positive characteristics of the responder group, for hyper-fair offers, group was used in a negative way: The other group members were mainly seen as greedy; A large offer would therefore reduce the risk of rejection and losing the money.

Change of offers in ultimatum game

As summarized in Chapter 2, we (Takezawa et al., in press) did not find age differences for the group decision-making process in the ultimatum game. In each grade, both of the two models, majority and averaging, either fit the data or did not fit. Thus, in contrast to the analyses for the dictator game, there will be no examination of the relationship between the group decision-making process and the reasoning of group members. Still, because we were interested what kind of arguments changed offers of group members in the ultimatum game, we performed an explorative analyses of these changes, which I present in the next section. Such changes will be classified as upward changes (i.e. changes in which a group member increased his offers after an argument by another participant) or downward changes (i.e. changes in which a group member decreased his offer.).

Perspective-Taking Levels

Changes were determined as for changes in the dictator game (see above). In contrast to discussions in the dictator game, in many group discussions in the ultimatum game, more than one change in offer or opinion emerged. Here, I will report only the overall finding for changes across groups.

Upward changes: In third grade, 13 upward changes were observed. Of these 13 cases, 2 followed reasons arguing on a perspective-taking level of 0, 5 followed Level 1 arguments, 3 followed Level 2 arguments, and in 3 cases, just mentioning a numerical offer was enough for another group member to change his or her offer. In sixth grade, 27 upward changes were observed. These participants predominantly changed their offers after a Level 1 argument (14 cases), but also after Level 0 (5 cases) and Level 2 (5 cases) arguments. In 3 cases, upward change occurred after being exposed to the offers of another group member. In eighth grade, 10 upward changes occurred. Mostly, group members increased their offers after a Level 1 argument of another participant (5 cases). In 2 cases, upward change followed a Level 0

argument, and in another 2 cases, a Level 2 argument. In 1 case, an increase in offers occurred after participants were exposed to the offer of another group member.

Downward changes: In third grade, 8 cases in which group members lowered their offers after being exposed to a statement by a fellow group member were observed. In one of these cases, a downward change in offers followed a perspective-taking argument on Level 0, in 3 cases a perspective-taking argument on Level 1, in 2 cases an argument on level 2, and in another 2 cases, just the offer of another group member changed offers. In sixth grade, 4 downward changes occurred. In 1 case, a group member changed her offer after listening to a Level 0 argument, and in 3 cases, changes occurred after a Level 1 argument. In eighth grade, 8 downward changes were observed. A decrease in offers predominantly occurred after a Level 1 argument (6 cases). In 1 case, change occurred after a Level 2 argument, and in 1 case, after another group member mentioned a numerical offer.

In sum, although reasons that increased or decreased offers of other group members could be found on a larger spectrum (from Level 0 to Level 2 reasoning) in the ultimatum compared to the dictator game, in the majority of cases, Level 1 reasons changed others' offers. This was true for all three grades and both for upward and downward changes. As for the dictator game, in some cases just being exposed to another group member's offer was enough to change offers.

Social Heuristics

Upward changes: in third grade, 13 upward changes could be observed. In 2 cases, these increases in offers followed an egoistic argument of another group member, and in another 2 cases, a balancing argument. In 1 case, change occurred after a fairness argument. In 2 cases, a group member changed her opinion after a group membership argument, in which the other group was said to have negative attributes, and in 3 cases, upward change occurred after a reciprocity statement. In 3 cases, the mere mentioning of a numerical offer led to change in offers of another group member. In sixth grade, 21 upward changes could be observed. The majority of these changes followed either an egoistic argument of another group member (5 cases) or a reciprocity argument (5 cases). In 3 cases, an increase in offers occurred after a fairness argument. In 3 cases, group members increased their offers after a group argument in which the other group was portrayed negatively, and in 2 cases, where the other group was portrayed positively. In 3 cases, upward change occurred after just mentioning a numerical offer. In eighth grade, 14 upward changes occurred. In most of these cases, an increase in offers occurred after a reciprocity argument (5 cases). In 2 cases, upward change in offers

occurred after an egoistic argument, and in 1 case after a balancing argument. In 2 cases, a group member increased his or her offer after a fairness argument. In 2 cases, upward change was observed after the other group was portrayed negatively, and in 1 case after the other group was portrayed positively. Once, a participant increased his offer after he heard the numerical offer of another group member.

Downward changes: In third grade, 9 downward changes occurred after participants were exposed to a particular argument. In 2 cases, the arguments referred to egoism, and in 1 case to hierarchy. In 4 cases, a downward change in offers occurred after a reciprocity argument, and in 2 cases, after the mere mentioning of a numerical offer. In sixth grade, 6 downward changes occurred. In 5 cases, a decrease in offers followed a fairness argument. In all of these instances, a hyper-fair offer of a group member was changed to a fair offer. In 1 case, a hierarchy argument decreased an offer of another group member, and in 1 case a social prestige argument. In 1 case, change occurred after another group member just mentioned an offer. In eighth grade, 9 downward changes could be observed, once after a balancing argument, and once after a fairness argument. In 3 cases, downward change occurred after a negative evaluation of the other group, and in 1 case after a positive evaluation of the other group. In 2 cases, a participant decreased her offer after a reciprocity argument, and in 1 case after a numerical offer of another group member.

In sum, the whole range of social heuristics were employed and were successful in changing others' offers. It is noteworthy that in all three grades, increases in offers followed arguments that dealt with egoism or that evaluated the other group negatively. This finding again points to the strategic nature of the ultimatum game: When the members of the other group are thought to be needy, one better give them a higher amount, just to earn some money in this game. On the other hand, a decrease in offers often resulted from another participant mentioning fairness arguments. As pointed out above, in most of the cases such fairness arguments decreased hyper-fair to fair offers. Interestingly, across all age groups, changes in offers more often occurred after conditional than after unconditional heuristics. However, a substantial number of children in all grades changed their offers after they heard the offers of their fellow group members.

Discussion

In this study we qualitatively analyzed the processes by which children and adolescents persuade each other during a group discussion in order to come to a unanimous group decision. This investigation drew on research on persuasion from social psychology, moral reasoning and action from developmental psychology, research in cognitive psychology on decision heuristics, and relational models inspired by evolutionary psychology and anthropology. To my knowledge, this study is the first that investigates the predictions of the persuasive argument theory (Burnstein, 1982; Vinokur & Burnstein, 1974) in a developmental and game theoretical context. In line with persuasive arguments theory, we proposed that during dictator game discussions a minority group member could change the offers of a majority, if she produces novel and valid arguments. More specifically, we hypothesized that in groups whose decision-making process can be described by an averaging model the minority members would produce novel arguments. In such averaging groups more and different arguments should be produced than in groups whose decision-making process can be described by a majority model. We investigated these hypotheses by qualitatively analyzing the transcribed group discussions and not by an experimental investigation. Since the group and not the individual statement was the unit of analysis, and because the number of groups was rather small in our investigation, our hypotheses could only be investigated exploratively. Thus, we can only present some first tentative results, which should be validated in further studies.

Our results on the relation between the group decision-making process and the number of arguments produced in each group give an indication that in averaging groups participants tended to mention a higher number of different arguments to justify offers in dictator game than majority groups. This is true both when these reasons were coded as perspective-taking levels and social heuristics. However, as pointed out above, this conclusion should be met with some caution, since we could not perform any statistical tests due to small sample size. Our results also show that this relationship especially holds for groups in third and sixth grade, whereas in eighth grade participants mention a vide variety of reasons for offers independent of the type of group decision-making process. We attribute this to a developmental effect: With increasing age group members can view an issue from many different perspectives and therefore also produce more arguments.

An important assumption of Hypotheses 2 was that in averaging groups, the selfish minority member introduces new arguments. Our analyses demonstrated that in sixth and

eighth grade, indeed the selfish minority child was the one who introduced new kinds of arguments to the group discussion in the majority of averaging groups. In some cases, especially the child in the middle position brought up a new kind of reasoning. In third grade, on the other hand, no such clear trend could be observed, mainly because of small sample size. We can therefore tentatively conclude that our results are in tune with the predictions of Hypothesis 2 in sixth and eighth grade but not in third grade. To test the robustness of our findings we would either have to increase the number of groups discussing about allocation decisions or investigate our prediction in an experimental setting.

Perspective-taking

A further innovation of this study was to test perspective-taking ability "in action". Previous studies on the development of persuasive skills in children (e.g. Clark & Delia, 1976, 1977; Delia et al., 1979; Yeates & Selman, 1989) have suggested that perspective- taking is a critical social-cognitive ability to produce effective persuasive messages. Since perspective-taking ability has been shown to develop with age (e.g. Keller, 1976; Selman, 1980), older children are thought to develop more effective persuasive messages. So far, this line of research has not investigated the persuasive processes during a group discussion but rather had children produce or react to persuasive messages individually.

In our study we first examined whether children's statements in dictator game could be captured by different perspective-taking levels, and whether for particular offers a particular level of perspective- taking would be employed. We found that indeed participants' reasoning when arguing for a certain offer can be coded according to perspective-taking levels. However, there was not so much developmental variance in the perspective-taking levels participants produced as would be expected from developmental theories. In all grades, participants mainly reasoned on level 1. Although participants from sixth and eighth grade started to use arguments on perspective-taking levels 2 and even 3, they did this rarely. Rather than viewing this as a developmental effect, we believe that especially older participants might have had the *competence* to reason on higher perspective-taking levels, but that in the dictator game setting in our study it was not necessary to employ it. An indication that this conclusion might be correct comes from the comparison of the perspective-taking levels participants used in ultimatum game discussions. Here, a higher proportion of statements could be coded on higher perspective-taking levels, probably because the set-up of the game (the perspective of the responder group has to be included into the decisions, because they can veto an offer by the proposer group) calls for higher perspective-taking ability. Traditional

research on the development of perspective-taking or moral reasoning (e.g. Keller, 1976, 1996; Kohlberg, 1969; Selman, 1980) usually tries to capture children's competence levels and not their actual performances: In an individual interview participants are asked about a specific topic (e.g. a moral dilemma, a friendship scenario). Probe questions and reformulations ensure that a child's highest competence in perspective-taking or moral reasoning is captured. This technique is of course different from the one employed in this study where much less effort could be put into eliciting a participant's highest possible level of perspective-taking.

In Hypothesis 3a we assumed that arguments, which employ a higher level of perspective- taking, would be perceived as more valid and therefore more persuasive during the group discussion. This is because higher levels of perspective- taking are thought to be more equilibrated, that is they integrate new information better than lower perspective-taking levels. But our results indicate that an argument on perspective-taking level 1 was in most cases enough to change the offer of a fellow group member. In only very few cases in eighth grade did a higher-level argument change offers towards what was proposed by the generous majority. Knowing that the majority of statements in dictator game discussions could only be coded on level 1 perspective- taking, this finding is hardly surprising. However, from a theoretical point of view it is unexpected. One reason for this could be that our coding system for perspective-taking levels focused on capturing the structural changes in perspective taking (i.e. undifferentiated-differentiated-coordinated-complex; see also Selman, 1980) and was largely ignoring the content of this reasoning. Studies on the development of persuasive skills in children and adolescents (Clark & Delia, 1976, 1977; Burleson & Fennelly, 1981) demonstrated that with increasing age, participants used higher-level reasoning when formulating persuasive messages, and that these higher-level messages are more effective in persuading others. However, in these studies, two kinds of messages were differentiated: Requests and support for requests. It could be that a differentiation of the statements in our study into these two subcategories would have lead to more encouraging results concerning the relationship between perspective- taking and persuasion. On the other hand, it should be noted that the persuasive situation in our study was markedly different from the research on the development of persuasion mentioned above and also from research connecting moral reasoning and action (e.g. Blasi, 1980) which mostly showed a positive but moderate relationship between these two variables. In our study, individual children were not confronted with a hypothetical story and they did not have to produce or listen to messages individually, but were interacting as a group of three. In moral developmental research, (non-)

moral behavior (e.g. deviant behavior or prosocial behavior measured experimentally) is usually correlated with measures of moral reasoning. It could be that the different experimental set-up and other variables such as social influence, group dynamics we did not control for, influenced the relationship between perspective taking and persuasion. Since our experiment is probably a more valid description of persuasive situations in real-life, we have to doubt/question whether perspective- taking matters at all when we try to persuade others in our daily life.

Social heuristics

This is the first study to investigate candidates for social heuristics in a prosocial decision situation. We studied the use of these heuristics in children and adolescents, and investigated whether these social heuristics are used for persuading others during a group discussion. We hypothesized that the persuasive power of social heuristics results from their social rationality. Various theories (e.g. Bugental, 2000; Fiske, 1992, 2004) have proposed that human social interaction can be organized along a small set of social algorithms or relational models, which can be found cross-culturally and correspond to re- occurring problems humans had and still have to face during their evolutionary and ontogenetic development. Haidt & Joseph (2004) have demonstrated that some of these social algorithms also play a role for moral judgment. The social heuristics that have been advocated by all of these authors – reciprocity, hierarchy, and group membership – also featured as conditional social heuristics in our study. In line with Gigerenzer's (2004) suggestion, these social heuristics could both be combined with a prosocial (i.e. moral) offer in dictator game when used in a positive sense, and with a selfish offer when used in a negative sense. When used in a negative sense, these social heuristics resemble moral justifications used for rationalizing transgressional behavior or refraining from moral behavior as they were for example studied by Bandura and colleagues (Bandura, 1999; Bandura, Caprara, Barbaranelli, Pastorelli, & Regalia, 2001) and Keller (1984). In addition to these conditional heuristics we also proposed unconditional social heuristics – egoism, fairness, balancing between those two - simple rules of sharing which need no further justification.

Our study showed that children and adolescents do indeed use social heuristics when arguing for offers in dictator and ultimatum game. Furthermore, participants employ social heuristics appropriately when they argue for certain offers in dictator game. That is, in the majority of cases, they mentioned egoistic statements when arguing for a selfish offer, and fairness when arguing for a fair offer. With respect to conditional social heuristics used in

dictator game, group membership and reciprocity are used in a negative way when arguing for selfish offers, and positively when arguing for a fair offer. But as for perspective-taking levels, we found only very small developmental changes in the use of these heuristics. In dictator game, unconditional social heuristics were generally used more frequently than conditional social heuristics, although participants from eighth grade seemed to employ conditional social heuristics more often than the younger age groups. In ultimatum game, unconditional social heuristics were mentioned more frequently than in dictator game. Although Bugental (2000) and Fiske (2004) tentatively proposed a developmental sequence for the acquisition of social algorithms or relational models which our conditional social heuristics are based on, we were not able to detect any developmental effect in our study. A more systematic investigation on how two of these social heuristics – reciprocity and group membership – are acquired ontogenetically is presented in chapter 4.

On the other hand, conditional social heuristics are very successful when persuading others to either increase or decrease their offers. In the averaging groups in dictator game, in which the minority group member was relatively more influential than in majority groups, changes in offers mostly occurred after a hierarchy argument, which pointed to the decision power of the proposer group. Conditional social heuristics that changed offers in majority groups were reciprocity and hierarchical power. Both were used in a negative way when arguing for selfish offers and in a positive way when arguing for fair offers. Although these conditional social heuristics were often complemented with a fairness or egoism argument, this result nicely supports Hypothesis 3b: Arguments that persuade other group members to change their offers draw on simple social knowledge, such as that one should reciprocate a certain behavior or that the person or group with more power is also entitled to more resources. In a replication of this study with participants from 11th grade (17 years old), Wittig (2004) demonstrated that reciprocity and group membership arguments changed offers in this age group. In sum, all these results indicate that social heuristics indeed are successful tools to persuade others during a group discussion. However, since there were only a small number of groups in our analysis, we don't know whether this is a robust finding. Future studies should therefore address this question again, preferably within an experimental setting.

Comparison between dictator and ultimatum game

Because the quantitative analyses on the group decision-making process in ultimatum game did not yield any significant results (see Chapter 2), we investigated the ultimatum game discussion exploratively. Similar to findings in Chapter 2, these qualitative analyses imply

that our participants understand the structural difference between the dictator and ultimatum game. First, the use of higher-level perspective-taking statements also slightly increased in ultimatum game for the children in the youngest age group: In ultimatum game, the perspective of the responder group matters since their influence on whether the two groups get any money is almost as strong as the influence of the proposer group. Second, the prevalence of hyper-fair offers during the group discussion, i.e. offers larger than the equal split, was much higher in ultimatum than in dictator game. These offers were often justified by reasons, which were mostly related to selfish or moderate offers in dictator game, namely egoism, negative reciprocity, or negative attributions to the other group. These findings reveal that hyper-fair offers were predominantly used strategically in order to earn some money in this game. Interestingly, participants only rarely thought that the responder group in ultimatum game would behave according to the game theoretically correct assumption and be content with a minimal offer of 1 coin. Rather, proposer groups thought that the responders would want offers around the equal split.

The strategic nature of the ultimatum game when compared to dictator game was also observable in the arguments that changed offers. In all grades, a large proportion of increases in offers resulted from egoistic, negative reciprocity, or negative group stereotype arguments, which in dictator game would have rather caused a decrease in offers. On the other hand, a group member often reduced a hyper-fair to a fair offer in the ultimatum game after a fairness argument from another participant. This result again indicates that the same social heuristic can be connected to a different kind of action ("moral" or "immoral") depending on the situational arrangements (see also Gigerenzer, 2004).

Open questions

In this study we investigated the role of perspective-taking and social heuristics for persuasion in a group discussion. Theoretically, we located this investigation in the research tradition of persuasive arguments theory: Proponents from this paradigm (e.g. Burnstein, 1982; Vinokur & Burnstein, 1974) suggested that persuasion in a group occurs as a result of group members bringing up novel and valid arguments for a certain choice option. In contrast, social comparison theory (e.g. Festinger, 1954; Blascovich et al., 1975) assumes that the mere exposure to the decisions of others would lead to a change in one's own judgment. Although in our study we observed evidence in favor of persuasive arguments theory, particularly when social heuristics are employed for justifying certain offers, some instances of our data also point to the validity of social comparison theory: In some groups, none or only few arguments

for offers were exchanged, and a group decision was sometimes reached by the group members sharing their numerical offers. Interestingly, in a group polarization study with adults who also played the dictator game, Cason & Mui (1997) report results that are more consistent with social comparison theory than with persuasive arguments theory. However, their study differed from our investigations in several important aspects besides the different age groups studied. First, Cason & Mui (1997) formed groups of two instead of three members. Second and most importantly, they did not analyze the group discussions. Instead they predicted that if persuasive arguments theory is correct groups with initially selfish individuals would decide even more selfishly as a group and vice versa. But if social comparison theory is correct, both groups with initially selfish and initially fair individuals will shift towards a fairer offer as a group, because a fair offer is supposed to represent the more socially desirable and therefore normative offer. As indicated above, their results are more in line with the predictions of social comparison theory, since a majority of groups made a fair offer. However, from our perspective, the assumption that a more other-regarding offer is deemed as more socially desirable is not necessarily given and does not follow from previous research (see e.g. Wolosin, Sherman, & Mynatt, 1975). Yet, for future studies a combination of an experimental paradigm (as employed by Cason & Mui, 1997) and an additional qualitative analysis of group discussions (as performed in the present study) seems a fruitful way to investigate and tease apart the influence of social comparison and persuasive arguments in a group decision-making context.