MAARTEN J.J. WUBBEN

Social Functions of Emotions in Social Dilemmas

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Sociale Functies van Emoties in Sociale Dilemma's

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For those who regard optimism as a quest

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CHAPTER 1

1. GENERAL INTRODUCTION

Walking through a busy shopping street often pervades me with a sense of intense wonder. So many complete strangers crowd the street, yet somehow they all manage to co-exist in the overarching cooperative enterprise that we call society. And their cooperation is not limited to institutionally enforced behaviors such as paying taxes. Most of these people also dutifully vote during elections, separate their garbage, donate to charity and sign petitions, even when they could easily get away with not engaging in these time-, money- and energy-consuming deeds. And also on a smaller scale people cooperate. Friends and family readily help each other out, employees engage in extra-role activities to keep their company going, passengers in public transport voluntarily offer their seats to elderly people and some even risk their lives to rescue others in emergencies. *Cooperation*, then, appears a fundamental organizing principle of social interaction, not only in dyads, but also in groups and society as a whole.

In spite of these examples of good citizenship, generous deeds and helpful gestures, there are unfortunately also examples aplenty where people refrain from cooperation to the detriment of their peers, colleagues or even fellow world citizens. Non-cooperation, or *defection*, creates not just small scale problems such as unproductive meetings due to the ill preparation of the attendees, failed team-projects due to free-riders and interpersonal conflicts or accusations of loutish behavior when favors are not provided or reciprocated. Also large scale problems such as global warming, deforestation, overpopulation, pollution, overfishing, fuel shortage and, eventually, wars are the result of people pursuing, willfully or not, their own rather than the collective interest. Studying how and when people manage or fail to cooperate therefore not only provides insights in an innate human talent. Hopefully, it also helps to overcome many urgent and critical problems that contemporary society faces.

Portraying cooperation as an innate human talent when the world is plagued by so many problems that result exactly from a failure to cooperate may sound ironic. Yet humans are the champions of cooperation and, unlike other eusocial species such as bees, ants, termites, wasps and naked mole rats, cooperate not only with genetic relatives (i.e., kin selection, Hamilton, 1964) but even with complete strangers (Nowak, 2006). Incidentally, humans arguably also have the widest array of *emotions* at their disposal, or at least are able to master their emotions in ways that animals cannot (Panksepp, 1998). Of course, correlation does not imply causation, but a first clue to a strong connection between human emotion and cooperation is the now classic observation that defection elicits unusually strong emotional reactions in people:

> *One of the most significant aspects of this study, however, did not show up in the data analysis. It is the extreme seriousness with which subjects take the problems. Comments such as, "If you defect on the rest of us, you're going to have to live with it the rest of your life" were not at all uncommon. Nor was it unusual for people to wish to leave the experimental building by the back door, to claim that they did not wish to see the "sons of bitches" who doublecrossed them, to become extremely angry at other subjects, or to become tearful.*
>
> (Dawes, McTavish, & Shaklee, 1977, p.7).

In a way, this dissertation starts where the above quote ends. Experiencing strong emotions is one thing; the question of whether they actually help to rectify a fellow group member's defection is another. Such questions have long been alien to social psychology for two reasons. First, emotions have typically been studied as intrapersonal, rather than social, phenomena. And second, that emotions are functional has not always been recognized and has sometimes been outright denied. Modern accounts of emotion, however, have generally started to converge on the idea that whereas certainly not all emotions are always functional at every intensity and at every point in time, they generally fulfill clearly specifiable social functions and thus coordinate and lubricate social interactions (Fischer & Manstead, 2008; Keltner & Gross, 1999; Keltner & Haidt, 1999; Keltner & Kring, 1998; Oatley & Jenkins, 1992). It is therefore frequently assumed that the communication of emotion has an important function in establishing and maintaining cooperation (Buck, 1984; Fessler & Haley, 2003; Gintis & Bowles, 2003; Keltner, Haidt, & Shiota, 2006), but direct tests using game-theoretical derivatives of cooperative situations are, though encouraged, lacking. This dissertation is a first step to fill that empirical vacuum.

The four empirical chapters in this dissertation are not arranged chronologically, but according to the social complexity of the cooperative situations that are studied: from direct reciprocity between dyads, via indirect reciprocity between dyads in a larger group context, to public good dilemmas in groups. In this first chapter I will therefore start with introducing these specific cooperative situations and, in doing so, review many major developments during more than fifty years of research on cooperation. Subsequently, I will give a working definition of emotion and review how during the twentieth century scholars came to see emotions as social, even socially functional. Finally, I will review contemporary research to show how a social-functional approach to emotion can inform research on cooperation and I will provide an overview of the specific questions that will be answered in each individual chapter.

1.1 COOPERATION AND SOCIAL DILEMMAS

Cooperation is studied in many disciplines, varying from biology to economics and from game theory to social psychology. As a result, definitions of cooperation may, however subtly, differ. In this introduction I therefore prefer a widely applicable definition: *Cooperation is the act of forfeiting one's self-interest to benefit the common interest*. A few remarks are in place here. Although the preposition *co-* (or *com-*) means "together" or even "simultaneous" in Latin, the word *co*-operation is typically used to describe a unilateral act. Ergo, I can cooperate when the beneficiary is not around, does not know that I am cooperating, or is even defecting against me. Second, self-interest (or individual interest) is more routinely contrasted against *collective* rather than *common* interest. As long as one realizes that the number of individuals in a 'collective' can be as small as two, this should not be confusing. Third, the critical reader may object that what I defined as cooperation is, in fact, altruism. Such readers are in good company (e.g., Hamilton, 1964; Trivers, 2002) and I am sympathetic toward this view, as long as it is acknowledged that there are also different types of altruism (Sober & Wilson, 1998). Cooperation, however, is the more frequently used term in the traditions that are most relevant to this dissertation, including social psychology, and hence my preference (e.g., Dawes, 1980; Nowak, 2006; for more on this conceptual issue, see Krebs, 2008). Finally and most importantly, disciplines also differ markedly in how they describe situations in which actors have to choose between cooperation and defection. For example, biologists and evolutionary psychologists are predominantly theoretically interested in cooperation and how it can emerge from selfish replicators, which is why they speak of the (evolutionary) problem or puzzle of cooperation. Social scientists, on the other hand, are predominantly practically interested in cooperation and how to promote it, which is why they speak of *social dilemmas*. With these conceptual issues cleared up, let us proceed to a selective review of the vast literature on cooperation and social dilemmas.

1.1.1 Cooperation through direct and indirect reciprocity

Writings on the conflict between self-interest and the collective interest date back to at least as early as the founding father of modern political philosophy, Thomas Hobbes. In his work *Leviathan* (1651/2008) he elaborates on his view that the cooperative endeavor that is society requires an absolute sovereign, because what will otherwise ensue is regression to the 'natural condition of mankind', characterized by a pervasive insecurity that dooms cooperation. Still, cooperation started receiving widespread scholarly attention only halfway the previous century with the foundation of *game theory* (Von Neumann &

Morgenstern, 1944). Game theory captures the decision options and corresponding outcomes of agents by means of abstract formalizations of reality such as matrices or decision trees and subsequently provides a mathematical analysis of such games to determine which decision options or strategies lead to optimal outcomes. A famous example of a game, first formalized by Tucker (1950), is the *prisoner's dilemma* (Rapoport & Chammah, 1965), which is also a classic paradigm to study social dilemmas.

Table 1.1: The prisoner's dilemma

		Player 2: Cooperate	Player 2: Defect
Player 1	Cooperate	R (= 4) / R (= 4)	T (= 6) / S (= 0)
	Defect	S (= 0) / T (= 6)	P (= 2) / P (= 2)

T = Temptation to defect, R = Reward for mutual cooperation, P = Punishment for mutual defection and S = Sucker's payoff. A prisoner's dilemma requires that T > R > P > S and 2R > T.

The following situation constitutes a prisoner's dilemma. Imagine you and another player both have €2. Each of you has to decide anonymously to either keep these €2 (i.e., defect) or to donate these €2 to the other (i.e., cooperate). If you donate your €2, the other player receives €4 and vice versa. Both decision options from both players result in the matrix depicted in Table 1.1[1]. A quick glance at the matrix reveals that—regardless

[1] This situation perfectly fits widely used definitions of cooperation that can be paraphrased as the act of paying a cost (in this case €2), for another individual to receive a benefit (in this case €4), where the benefit is larger than the cost (cf. Nowak, 2006). This definition is more concrete than the one I provided, but seems less inclusive. If in Table 1.1 the Temptation to defect (T) would be 5 or 7 instead of 6, it would still be a prisoner's dilemma and cooperation would still be possible, but it would not longer be isomorphic to any situation where a specific cost is paid to provide a specific benefit (which only holds for prisoner's dilemmas where R + P = T + S). I therefore wonder if this alternative definition is also meant to encompass cooperative acts for which the required cost or provided benefit is dependent on whether one's recipient cooperates or defects, as is the case in many prisoner's dilemmas.

of the other person's choice—defecting always yields €2 more than cooperating. However, if both players then choose this individually rational option of defection, both players retain only their original €2 without accumulating the extra money that would result from mutual cooperation. This paradigm therefore neatly captures the central feature of social dilemmas: Individual rationality leads to collective irrationality.

One may counterargue that this matrix does not represent a real dilemma at all, at least not to people who perceive defection as unethical and who would rather obtain the Sucker's payoff (S) than violate their own moral standards by defecting. This is exactly where game theory and psychology are forced in separate directions. Luce and Raiffa (1957), both game theorists, would answer that "[s]uch an argument is inadmissible since the numerical utility values are supposed to reflect all such 'ethical' considerations" (*p*. 96, quotes in original). But this explaining away of such 'ethical' considerations is, in turn, inadmissible to social scientists or psychologists in particular. After all, these considerations—and how they reframe social dilemmas—is exactly what psychologists study, because it allows them to predict who will donate their €2 in which situation and why. Game theory thus focuses on situations that by definition are interpreted as social dilemmas by actors, but must concede that these actors are a simplification of real people. Psychology on the other hand, focuses by definition on real people, but must concede that these people may mentally transform any outcome matrix according to their own motives such that it may no longer represent a social dilemma (Kelley & Thibaut, 1978; Messick & McClintock, 1968).

Eventually, a hybrid of both approaches, engineered by Robert Axelrod (1984), showed how cooperation can be successfully established when the prisoner's dilemma is repeatedly played against the same opponent (i.e., the *iterated* prisoner's dilemma). He did this by organizing a computer tournament in which strategies for the iterated prisoner's dilemma, submitted by worldwide experts, took part. Creative—even professional—human input would thus compete in game theoretical format. Surprisingly, the simplest strategy emerged victorious: *tit-for-tat*. All tit-for-tat does is cooperate on the first move and then mirror its opponent's moves. Its success was repeatedly demonstrated, including in ecological simulations where strategies increased in the population if they did well (Axelrod, 1984). Evolutionary simulations even showed that reciprocal strategies can evolve from a population of completely random strategies (Axelrod, 1997). Axelrod's work may therefore be interpreted as a further foundation of Trivers' (1971) claim that cooperation can evolve through *direct reciprocity* (or reciprocal altruism). The principle of direct reciprocity is similar to that of tit-for-tat: to return helpful and harmful deeds in kind. The success of tit-for-tat has been criticized (Binmore, 1998) and some important boundary conditions of its success have been identified (Fudenberg & Maskin, 1990; Selten & Hammerstein, 1984), but it is nevertheless the strategy in dyadic interactions that

has received most attention from social psychologists (e.g., Komorita, Hilty, & Parks, 1991; Parks & Rumble, 2001; Sheldon, 1999; Van den Bergh, Dewitte, & De Cremer, 2006; Van Lange, Ouwerkerk, & Tazelaar, 2002; Van Lange & Visser, 1992).

Still, improving on the strategy of tit-for-tat is possible. It always starts with a cooperative move, even against opponents who never cooperate. Consequently, if one's opponent is infamous for defecting, it would still be wise to play tit-for-tat, but then with defection as a first move instead (Nowak & Sigmund, 1998; Pollock & Dugatkin, 1992). This improvement requires one to observe social interactions between other people as a third party and to remember who frequently cooperates and who does not. In this way reputations are created. Because people with a positive reputation are likely to reciprocate cooperation, third parties may find cooperating with them a worthwhile investment. The subsequent increase in reputation of these third parties may then encourage cooperation from other observers, who may subsequently be cooperated with by yet others. The result is *indirect reciprocity* (Alexander, 1987): a cooperation mechanism where cooperative acts are reciprocated by third parties, rather than by the recipient (as is the case with direct reciprocity).

Indirect reciprocity is particularly amenable to psychological study, because it requires morality, perspective-taking, advanced communication skills, lie detection and coping with ambiguity, while giving rise to gossip, social norms, information sharing networks, laws and, eventually, society. At the same time, it is a research area where theory and simulations have left empirical research far behind. Evolutionary game theory has already proven that cooperation through indirect reciprocity can be established when notorious defectors are defected against and when such retaliatory, justified defection does not damage one's reputation (Leimar & Hammerstein, 2001; Ohtsuki & Iwasa, 2004; Panchanathan & Boyd, 2003; Sugden, 1986). But empirical research has not been able to demonstrate that people indeed respond differently to such justified defection than to defection that is motivated by mere greed (Bolton, Katok, & Ockenfels, 2005; Milinski, Semmann, Bakker, & Krambeck, 2001). This is a central problem in the otherwise rapidly expanding field of indirect reciprocity (Nowak & Sigmund, 2005).

1.1.2 Public good dilemmas, resource dilemmas and coordination

Defection in social dilemmas causes problems not only in dyads, but also in small groups or even worldwide. The two-person prisoner's dilemma therefore seems but a very specific case of a social dilemma (Dawes, 1980). Indeed, during the seventies experimental research using this paradigm has been heavily criticized for its lack of external and especially ecological validity (Apfelbaum, 1974; Hamburger, 1979; Kelley & Thibaut,

1978; Nemeth, 1972; Pruitt & Kimmel, 1977; see also Colman, 1995; Van Lange, Liebrand, Messick, & Wilke, 1992). Criticisms included—besides the limited number of actors—the dichotomous nature of the decision options, the symmetric relationship between actors and, more broadly, the apparent discontinuity between real world situations on the one hand and the display of numerical utility values in highly abstract decision matrices on the other. Two ecologically more valid paradigms were therefore developed that have dominated modern social dilemma research ever since: the *resource dilemma*, also called *commons dilemma* or *take-some* game, and the *public good dilemma* or *give-some* game.

The resource dilemma was inspired by Hardin's (1968) 'tragedy of the commons', in which several herdsmen who share the same pasture follow their individual interests by continuously increasing their herd with extra cattle. Collective disaster results: an overgrazed pasture. Although previously studied in agricultural economics, such resource dilemmas became increasingly popular in psychology during the 1970s (Brechner, 1977; Jerdee & Rosen, 1974; Rubenstein, Watzke, Doktor & Dana, 1975). This paradigm allows a number of people to harvest resources from a common pool. The more they harvest, the slower the pool regenerates. Overharvesting may then result in a suboptimal replenishment rate or, in some variations, prevent one's requested harvest from being granted.

Public good dilemmas model problems such as the provision of community centers, clubs, bridges, streets without litter and clean air. Clean air, for example, requires costly individual investments such as paying extra for an environment-friendly car. But because nobody can be excluded from the benefits of clean air, not contributing to this public good is tempting. Again collective disaster may result: unbreathable smog. The public good dilemma is based largely on theoretical work by Samuelson (1954) and Olson (1965) and became popular during the 1970s as well (Marwell & Ames, 1979). In this experimental paradigm a number of people can contribute to a public good. All individual contributions are multiplied (by a factor > 1) and divided equally among all people, including those who did not contribute. The parameters in both resource and public good dilemmas can easily be varied. The number of group members can range from two to the number of people that can be accommodated or realistically simulated in the laboratory. People's ability to cooperate or benefit from collective success can be varied, such that asymmetric situations are created. But above all, contributing or refraining from harvesting a specific amount of resources is a more ecologically valid representation of cooperation than is choosing a decision option from a matrix with numerical utility values.

Whereas many social scientists have focused outright on putting forward practical solutions to public good and resource dilemmas, some have taken a more indirect, theoretical approach that is rooted in game theory. And although bridging game theory and

psychology has proven more difficult for resource and public dilemmas than for direct and indirect reciprocity, game theory has inspired some important psychological research which, eventually, can be used to promote cooperation. I will therefore proceed with reviewing some theoretical research before closing this section with some research on concrete solutions to social dilemmas.

At first sight, game theory offers little hope of cooperation in public good and resource dilemmas. After all, cooperation is costly and even when public good or resource dilemmas are iterated, playing tit-for-tat is less effective in groups than in dyads (Komorita, Parks, & Hulbert, 1992). The situation changes, however, under the realistic assumption that the production function of many common resource pools and public goods is not linear but *step-level*. A resource dilemma would be step-level if harvests only impair the regeneration rate of the pool after surpassing a critical *threshold*. An example of a step-level public good dilemma would be the construction of a bridge, because here financial contributions need to surpass a specific threshold, too, before the bridge can improve the infrastructure (Hardin, 1976). In public good dilemmas this threshold is called a *provision point* and most public goods arguably have one (Hampton, 1987; Hovi, 1986; Taylor, 1987; Taylor & Ward, 1982). Step-level production functions can make cooperation the dominant response option, even to the narrowly self-interested actor that game theory assumes. That is because when one's contribution is critical, which means that it makes the difference between reaching the provision point or not, cooperation serves one's self-interest (Van de Kragt, Orbell, & Dawes, 1983). Thus, perceptions of criticality may engender cooperation (Chen, Au, & Komorita, 1996; De Cremer & Van Dijk, 2002; Poppe & Utens, 1986; Rapoport, 1985; Suleiman & Rapoport, 1992).

Technically speaking, though, because a contribution to the public good that is critical serves both one's self-interest and the collective interest, it does not really qualify as cooperation. For that reason, step-level social dilemmas satisfy only less strict (but commonly-used) definitions of social dilemmas (Liebrand, 1983) and share many similarities with *coordination* games instead. In his seminal work 'The strategy of conflict', Schelling (1960) provides numerous examples of such games. Imagine, for instance, that you and your partner privately and anonymously have to pick either "heads" or "tails". If both of you pick the same option you both win a prize. What is characteristic of this game is that there is no *dominant* strategy: your choice to pick "heads" is "good" only if your partner did so too and the same is true for picking "tails". Interestingly, the lack of a dominant strategy does not prevent people from coordinating successfully: in the above example 36 out of 42 people chose "heads" (Schelling, 1980, p. 55), which is way above chance. Is this finding encouraging in view of successful coordination in step-level social dilemmas?

The answer is: partially. It is not necessarily true that in public good dilemmas step-level production functions induce more cooperation than do linear production functions, because the increased contributions due to perceptions of criticality may be cancelled out by the decreased contributions due to the fear of completely wasting one's contributed resources if the provision point is not reached (Rapoport & Eshed-Levi, 1989). But it is true that when group members are determined to reach the provision point, they can often—even without any communication—converge on a configuration of individual contributions that efficiently realizes the public good. Such *tacit coordination* is a remarkable achievement, because it often depends on factors that are extraneous to the formal, mathematical structure of the game. Consequently, people converge more often on "heads" instead of "tails" than game theory would predict, exactly because they coordinate on the basis of cues which game theory assumes to be trivial, including the order of the presented response options. Coordination in step-level social dilemmas, then, is inherently social psychological because "the player's objective is to make contact with the other player through some imaginative process of introspection, of searching for shared clues" (Schelling, 1980, p. 96).

Such shared clues need not be numerous to realize successful coordination. In fact, when only the threshold level and the number of group members is known, coordination in symmetric social dilemmas proves straightforward. People simply divide the threshold by the number of group members and contribute or harvest that amount of resources (Allison, McQueen, & Schaerfl, 1992; Allison & Messick, 1990; Van Dijk, De Kwaadsteniet, & De Cremer, 2009). Thus, each member of a five-person group should contribute 100 endowments to reach a provision point of 500. This decision heuristic is based on *equality* and is both fair and efficient (Stouten, De Cremer, & Van Dijk, 2005). In *a*symmetric social dilemmas, people often use a second decision heuristic instead: *proportionality*. For example, group members with twice as many endowments as others should also contribute twice as much to the public good. Interestingly, the framing of asymmetric social dilemmas (e.g., as games of giving versus of not giving endowments) largely determines, independently of their outcome structure, if people adhere either to equality or to proportionality (Van Dijk & Wilke, 2000). This sensitivity to framing may seem whimsical, but as long as all group members display the same sensitivity, successful coordination still results.

So far, decision heuristics may seem panaceas for problems of coordination. But, alas, their guidance is often more suggestive than strict. This is evidently so in situations of environmental uncertainty. Here, uncertainty about the task environment, including the number of fellow group members or the level of the provision point, can impair adherence to equality or proportionality (Biel & Gärling, 1995; De Kwaadsteniet, 2007; Suleiman & Budescu, 1999; Van Dijk, Wit, Wilke, & Budescu, 2004). But also in situations of social

uncertainty, characterized by uncertainty about the actual decisions that fellow group members will make, successful coordination may be difficult (Messick, Allison, & Samuelson, 1988; Suleiman & Rapoport, 1989; Wit & Wilke, 1998). When, for example, the provision point in public good dilemmas rises to more than 60% of all the endowments that group members can contribute, some confirmation of other people's willingness to also contribute is typically required for collective success (Poppe & Zwikker, 1996; Suleiman & Rapoport, 1992; Van de Kragt et al., 1983). Coordination, then, is not just about picking a decision heuristic to adhere to. It requires being open and responsive to *socially informative cues* that indicate to what extent which group members will follow or deviate from which decision heuristics so that one can subsequently estimate what course of action oneself should undertake.

The course of action that one should undertake need not be limited to the contribution of endowments or the harvest of resources. Especially when the prospects of successful coordination are bleak, one may also resort to or vote for the implementation of *structural solutions* to social dilemmas. These solutions eliminate or alter the pattern of incentives that characterize social dilemmas (Messick & Brewer, 1983; see also Foddy, Smithson, Schneider, & Hogg, 1999). The most obvious structural solution to social dilemmas is to change their payoff structure (Kelley & Grzelak, 1972; Komorita, Sweeney, & Kravitz, 1980; Stern, 1976), including by means of sanctions (Caldwell, 1976; De Cremer & Van Dijk, 2009; Mulder, Van Dijk, De Cremer, & Wilke, 2005; Tenbrunsel & Messick, 1999; Shinada & Yamagishi, 2007) and rewards (Komorita & Barth, 1985), but other examples include installing an autocratic leader (Hardin, 1968; Messick, 1984; Wilke, 1991) or a democratic leader (Van Vugt & De Cremer, 1999), reducing the group size (Brewer & Kramer, 1986; Hamburger, Guyer, & Fox, 1975; Liebrand, 1984) or introducing an option to exit the group (Boone & Macy, 1999; Hayashi & Yamagishi, 1998; Orbell, Schwartz-Shea, & Simmons, 1984). While many structural solutions are in some way costly, for example because installing a leader restricts the individual's freedom of choice, various studies indicate that such solutions are still preferred if collective failure would otherwise be a likely result (Messick et al. 1983; Rutte & Wilke, 1984).

1.1.3 Summary

The study of cooperation has a rich history. Richer, in fact, than could possibly have been outlined here. Still, many major developments in the last 50 years have been discussed, ranging from the emergence of game theory and the success of the tit-for-tat strategy in situations of direct reciprocity to how direct reciprocity in the presence of interested observers can give rise to another underlying mechanism of cooperation:

indirect reciprocity. Another major development was the paradigm shift in social dilemma research in the 1970s which led to the introduction of resource and public good dilemmas, where collective success often depends on coordination and the implementation of structural solutions. In spite of all these developments, however, the finding that social dilemmas elicit remarkably strong emotions (Dawes et al., 1977) has remained relatively unexplored. Obviously, any attempt to start this exploration should be solidly founded on emotion theory, so this is where I will turn to now.

1.2 EMOTION

1.2.1 Toward a working definition

Nowadays, it almost seems mandatory for any scholarly essay on emotion to start with William James' (1884/1969) famous question "What is an emotion?" or to at least paraphrase his famous bear paragraph. Unfortunately, after more than a century, a conclusive answer to the famous question remains to be formulated and the famous paragraph appears widely misinterpreted (Ellsworth, 1994). James proposed, though in a somewhat ambiguous formulation that he later regretted (James, 1894), that when seeing a bear, the sensation of bodily changes, including trembling, sweating and an increased heartbeat, is an integral part of the subsequently arising emotion of fear. What he did *not* propose, is that an emotion is *identical to* the sensation of bodily changes or visceral feedback. Indeed, Cannon (1927) presented convincing arguments against this straw man, such as that dogs display emotional behavior even after visceral feedback is surgically disabled (Sherrington, 1906). Not until the 1960s, after the heyday of behaviorism, did scholarly interest in emotion recover from this theoretical blow and were a number of James' ideas that were implicit in his writings independently reinvented.

The last 50 years have seen much progress, but many conceptual issues still prevent a waterproof definition of emotion from being formulated (Frijda, 2008). For example, are emotions biologically basic, neatly specifiable, coherent modules (Ekman, 1992; Panksepp, 1992; Tooby & Cosmides, 1990), or are they mosaic instead—constructed from multiple, dissociable components that correspond only loosely to distinct emotion labels (Ortony & Turner, 1990; Scherer, 2001)? What is the nature of subjective emotion experience and what is its relation to consciousness (Charland, 2005; Barrett, Mesquita, Ochsner, & Gross, 2007)? And could it be that emotions cause behavior not directly, but only indirectly through reflection (Baumeister, Vohs, DeWall, & Zhang, 2007)? Such questions, however, are of peripheral importance in this dissertation. The focus here is not on what emotions *are*, but on what emotions *do*, in particular in the

interpersonal or intragroup context of social dilemmas where they, as noted before, surface so readily. It therefore seems wise to provide a pragmatic definition of emotion that focuses on the commonalities of most modern emotion theory so that a highly theoretical, though not highly relevant conceptual debate can be avoided.

Emotions are responses to specific stimuli, including events, people or objects. Consequently, emotions require—be they perceptual or cognitive, situationally induced or cognitively generated, sequential or not and recursive or not (Clore & Ortony, 2008)—evaluations or *appraisals* of this stimulus (Arnold, 1960; Lazarus, 1966; Ortony, Clore, & Collins, 1988; Roseman, 1984; Scherer, 1984; Smith & Ellsworth, 1985). Through appraisals of, for example, pleasantness or unpleasantness, the meaning of a stimulus for a person's well-being is construed. This activates relevant emotional components such as physiological changes (e.g., arousal), facial expression and posture, subjective experience (e.g., feeling mighty) and action tendencies (e.g., to aggress; Frijda, 1986). These components may recruit additional (e.g., cognitive) resources to appraise the stimulus or even directly affect the stimulus, which may influence the further unfolding of emotion. Emotions are more dynamic and episodic processes than *moods*, which are generally less intense (Mandler, 1983), longer lasting (Ekman, 1984) and not directed at specific stimuli (Parrott, 2001), although this distinction is more often made theoretically than empirically (Fredrickson, 2001). *Affect* is a broader term, encompassing both moods and emotions, and can be defined as a valenced evaluation in reference to the self (Baumeister et al., 2007). Put simply, affect indicates if something is good or bad for oneself. While this demarcation of the emotion concept provides no more than a working definition, it is adequate for the present purposes.

The study of emotion spans many disciplines, from biopsychology to anthropology, many traditions, from psychoanalytic to behaviorist, and many levels of analysis, from intrapersonal to cultural. I do not wish to debate the intrinsic superiority of one approach over another, which would be tiresome, not to say supercilious. However, this dissertation specifically examines if emotions have interpersonal effects in *social dilemmas*. It therefore seems obvious to focus on social accounts of emotion, which describe how emotions are expressed to others, how they may influence their behavior and if they fulfill any social functions.

1.2.2 Early social accounts of emotion

The basis for social accounts of emotion can be traced back as far as Darwin's (1872/2007) analysis of emotion expression. Although he remains relatively silent on its communicative potential, he does note, for example, that "[The movements of expression

in the face and body] serve as the first means of communication between the mother and her infant; she smiles approval, and thus encourages her child on the right path, or frowns disapproval" (p. 368). Perhaps not surprisingly then, developmental psychology was one of the first disciplines to theorize explicitly about social functions of emotions (Barrett & Campos, 1987; Bowlby, 1969; Campos & Stenberg, 1981). In fact, a classic study by Sorce, Emde, Campos and Klinnert (1985) provides quite literal a demonstration of Darwin's statement. These authors showed that infants who were confronted with the uncertain situation of having to cross a visual cliff to reach an attractive toy were more likely to do so when their mothers displayed joy or interest than fear or anger. Whereas such early demonstrations of social function only occurred more than a century after Darwin's analysis of emotion expression, there has been some other early work on emotion that stressed its social significance.

Much research and theory on emotion has focused on the universality of its facial expression (e.g., Ekman, 1972; 1989; Ekman & Friesen, 1971; Izard, 1994). The underlying idea is that if pan-human evidence can be found that each emotion has a distinct facial expression, (biologically) basic emotions may be identified. Moreover, to the extent that these facial expressions can be reliably recognized, emotions may be communicated non-verbally and, consequently, could have interpersonal effects. Research that let people from various cultures, even preliterate ones, match photographs of facial expressions with a list of emotions indeed found above-chance recognition accuracy for at least six emotions: happiness, surprise, sadness, fear, disgust and anger (e.g., Ekman, Sorenson, & Friesen, 1969). Whether this really means that these six emotions are universal has been questioned (Ortony & Turner, 1990; Russell, 1994), but it is fair to note that non-verbal displays provide fairly reliable cues of the emotion that the sender experiences (Keltner & Kring, 1998).

Some early, more theoretical work that regards emotions as inherently social is also available. Kemper (1978), for example, regards emotions as intrinsically connected to losses and gains in power ("involuntary compliance") or status ("voluntary compliance"). Gaining power may induce satisfaction and feelings of confidence and security, whereas losing power, especially when unexpected, would induce fear or anxiety. Loss of status may induce shame or embarrassment when oneself is to blame and anger when someone else is to blame. De Rivera (1977; 1984; de Rivera & Grinkis, 1986) also situates emotions *between*, rather than *inside* individuals, but offers a different taxonomy of emotions, along four dimensions. First, emotions can be directed toward either the self or the other and second, can be either positive or negative. Third, emotions differ along an 'extension-contraction' dimension. In the case of negative, other-directed emotions, extension emotions encourage pushing the other away (e.g., anger) whereas contraction emotions encourage pulling the self away (e.g., fear). In the case of positive, other-directed

emotions, extension emotions encourage wanting to give to the other (e.g., love), whereas contraction emotions encourage wanting to get from the other (e.g., desire). A final, fourth qualification, that of psychological space, specifies if the emotion appeals to belongingness, recognition or existential motives. Longing, admiration and wonder, for example, are all positive, other-directed contraction emotions, but are situated differently in psychological space. Longing refers to wanting to belong with others, admiration refers to wanting to be like others, and wonder refers to wanting to comprehend the being of the other. Although one may wonder to what extent emotions can be so neatly structured as Kemper and de Rivera suggest, their taxonomies do reflect something basic about emotions: they are intrinsically connected to the specific type of social relationships that people develop with each other.

Averill (1980) takes this argument a step further with his social-constructivist perspective on emotion. First, he argues that emotions are syndromes that occupy the entire person. With this he means that appraisals, physiological changes, expressions and action tendencies may all be typical of emotions but none of these characteristics, either single or combined, is a necessary or sufficient condition for an emotion to occur, nor can emotion be reduced to them. Subsequently, he claims that the composition of such syndromes has to be derived primarily from the social context, because it is in this social context that emotions have function and meaning. Thus, Averill claims not just that emotions are best regarded as social phenomena, but even that the meaning of emotions cannot be properly understood by studying only their constituent elements.

1.2.3 Modern social accounts of emotion

Modern work on emotion is to some extent congruent with Averill's bold statement on the social nature of emotion, though I should state explicitly that this does not mean that the *intra*personal functions of emotions have been ignored (Frijda, 1986; Levenson, 1994; 1999; Oatley & Johnson-Laird, 1987; Tooby & Cosmides, 1990). Indeed, in the prototypical example of an individual that is ambushed by a predator, fear is clearly functional without being social. It reprioritizes one's goals, in this case making safety the primary goal, narrows down one's thought-action repertoire and increases heartbeat and blood flow to the leg muscles to increase the chances of making one's escape. That emotions fulfill such intrapersonal functions is uncontroversial. But at the same time one may wonder if our ancestors were not better protected from such basic threats by their ability to live together in groups and defend collectively than by their ability to quickly activate their leg muscles. If so, then fear would remain functional, but in particular at the

interpersonal level where it warns against imminent exclusion from one's social group (Williams, Forgas, & Von Hippel, 2005).

But evolutionary arguments are not necessary to see that the functions of many emotions as well as their causes and consequences are predominantly social (Parkinson, 1996; Parkinson, Fischer, & Manstead, 2005). Shaver, Wu, and Schwartz (1992) provided a telling illustration. They reported that when 120 participants each described personal experiences of anger, love, joy, sadness and fear (see Shaver, Schwartz, Kirson, & O'Connor, 1987), more than 3 out of 4 of these written emotion episodes centered around their relationships with other people. Emotion theory also began to increasingly recognize the social nature of emotion. Manstead and Fischer (2001) introduced social appraisals in appraisal theory by noting that other people's reactions to an emotional event are often also instrumental to one's own appraisal process and subsequent emotion experience. For instance, your friend's admiration may make you feel proud of an achievement you would otherwise regard as not worth mentioning. Yet emotions are not only socially influential through their contextual meaning. When emotions are expressed in face-to-face settings, 'primitive emotional contagion' may occur, caused by people's tendency to "automatically mimic and synchronize expressions, vocalizations, postures, and movements with those of another person and, consequently, to converge emotionally" (Hatfield, Cacioppo, & Rapson, 1994, p. 5). But also in computer-mediated interaction, where mimicry is impossible, emotional contagion seems to occur (Friedman et al., 2004; Thompson & Nadler, 2002; Van Kleef et al., 2004), suggesting that the emotional connotation of typewritten language is sufficient for people to unintentionally catch other people's emotions (see also Derks, Fischer & Bos, 2008).

While the emotion literature became more social, scholars also started to speculate more about how specific emotions were socially functional. There is now considerable consensus about these social functions. For example, anger signals retaliation or opposition, rectifies injustice and socially corrects wrongdoings (Averill, 1982; De Cremer, Van Kleef, & Wubben, 2007; Frijda & Mesquita, 1994). Guilt motivates corrective and reparative behaviors like making amends and rectifying transgressions (Baumeister, Stillwell, & Heatherton, 1994; Frijda & Mesquita, 1994; Lewis, 2008). Love strengthens social bonds and attachment (Fredrickson, 1999). This increasing emphasis in the 1990s on the social functions of emotion is perhaps most evident, though, from a special issue in the journal Cognition & Emotion (1999, issue 5) specifically dedicated to functional accounts of emotion.

Functional accounts focus on *why* people have emotions and *why* emotions are structured as they are (Keltner & Gross, 1999). Consequently, they are concerned with what beneficial social consequences emotions have. It should be noted, however, that such consequences are not equivalent to the social function of emotion. Empathy, for example,

may be a beneficial social consequence of arachnophobia, but the function of arachnophobia is clearly not to elicit empathy. Instead, those beneficial social consequences that emotions are specifically designed to bring about are indicative of their social function. Functional accounts thus specify what type of goal-directed action is implied in the origin and development of the emotion and its communication (Keltner & Gross, 1999).

Emotions can be socially functional at four different levels of analysis: the individual, dyadic (or interpersonal; Fischer & Manstead, 2008), group and cultural level (Keltner & Haidt, 1999). At the individual level, emotions inform the individual about social events and conditions that require attention or action and also prepare the individual for such social action, be it through physiological change or an increased sensitivity to emotion-relevant stimuli. At the dyadic or interpersonal level, emotions are informative not only of the affective state that one's interaction partner is experiencing, but also of his or her beliefs and intentions. Moreover, emotions evoke affective states in the other, as when an embarrassed individual evokes amusement in others (Keltner, Young, & Buswell, 1997) but also as when anger spreads through contagion (Hatfield et al., 1994). Finally, as is illustrated by parent-child interactions, the communication of emotion may be a deterrent or incentive for social behavior. At the group level, emotions define group boundaries and identify group members, as is apparent when supporters cheer for their favorite team (Keltner & Haidt, 1999). Emotions also help individuals to assume certain roles within the group and to negotiate their status. Higher status is typically attributed, for instance, to angry than to sad men (Brescoll & Uhlmann, 2008; Tiedens, 2001). Furthermore, emotions may defuse certain group challenges, such as resource allocation, for example by solidifying the group bonds and thereby preventing discord. At the cultural level, finally, emotions allow people to shape their cultural identity, to teach cultural norms and values to their children and to preserve their cultural inheritance. Although all levels of analysis are to some extent relevant to social dilemmas, this dissertation focuses in particular on how the communication of emotions helps people to coordinate their individual actions in a social dilemma, which is why the interpersonal level of analysis is of primary importance.

A social-functional account of emotion is a powerful theoretical framework to embed empirical research in, but it must be used carefully. First, it would be overzealous to impute functionality to any emotion episode. Or as Aristotle (trans. 2004) famously put it: "(…) it is easy to get angry—anyone can do that—(…); but to feel or act towards the right person to the right extent at the right time for the right reason in the right way—that is not easy, and it is not everyone that can do it" (p. 48). In fact, psychopathology offers ample examples of the apparent dysfunctionality of emotion (Keltner & Kring, 1998). Functionality, then, seems a matter of degree. Moreover, empirically demarcating when a

beneficial consequence of an emotion can be equated with its function is difficult. This complicates empirical tests. For example, empirical evidence that a coffee maker can be used to prepare soup is easily delivered, but such evidence unveils at best only the functionality of certain subcomponents of a coffee maker. With highly abstract emotions this difficulty is even more pronounced. Applying a milder form of social functionalism therefore seems wise (Keltner & Haidt, 1999). My focus, then, will not be to make grandiose claims about the universal virtues of emotions, but instead to examine if the communication of emotion brings a solution to specific social problems closer.

With such social problems I mean, of course, problems of cooperation. That emotions are functional in this domain should at least have some intuitive appeal by now, I hope. Nevertheless, an explicit integration of both literatures and an examination of relevant empirical evidence is necessary to show that emotions are not just another variable that sorts effects in social dilemmas, but instead are intrinsically connected to people's potential to cooperate.

1.3 INTERPERSONAL EFFECTS OF EMOTIONS IN SOCIAL DILEMMAS

That emotion communication helps to establish cooperation in social dilemmas has been proposed before, by various authors even (e.g., Boone & Buck, 2003; Bowles & Gintis, 2003; Fessler & Haley, 2003; Frank, 1988; Keltner et al., 2006; Nesse, 1990). Their arguments are typically based on evolutionary game theory. For example, Frank (1988; 2004) proposes that emotions work as a commitment device. Cooperation in a prisoner's dilemma may result if, once the time has arrived to make a decision, both players have developed enough mutual trust to not yield to the temptation of defection. Thus, both players need not only be committed to cooperate, but, importantly, also *communicate* to the other player that they are committed to cooperate. This requires a trustworthy, relatively foolproof signal, because otherwise defectors will simply imitate it to mislead and subsequently exploit cooperators. Emotions, and in particular love, gratitude and pride or feelings of friendship and obligation, (Nesse, 1990, Trivers, 1971) may have evolved to meet this demand, especially because emotion display is at least partly involuntary and high levels of emotional expressivity are difficult to imitate (Boone & Buck, 2003; see also Schug, Yamagishi, Matsumoto and Horita, 2009). To the extent, then, that players can reliably send and decode these emotions, it is possible to signal when one can be trusted to cooperate. This enables cooperators to not defect against each other.

Other emotions, too, may be socially functional in social dilemmas. Retaliation against defectors, as motivated by anger, may be costly in the short-term but pay off in the long-term if it leads defectors to repent (Fessler & Haley, 2003). Studies on altruistic or

costly punishment indeed show that this mechanism is plausible (Fehr & Gächter, 2002). The communication of anger, then, can become a powerful way of averting defection. Conversely, defection against a cooperator may induce guilt. Others may interpret the communication of guilt as an intention to establish cooperation in the future and therefore respond leniently (Baumeister et al., 1994, Nesse 1990). Thus, emotions may communicate implicit promises for future actions, thereby removing social uncertainty or drastically changing the outcome structure of the social dilemma, possibly even to the extent that it is no longer perceived as a social dilemma. If that proves true, then emotions would function as indispensable and ubiquitous socially informative cues in social dilemmas.

That emotions have become to fulfill these social functions in social dilemmas seems plausible. Words, after all, are cheap if they do not reflect any underlying—and more difficult to fake (Boone & Buck, 2003; Buck, 1985)—emotional commitment. Emotions may therefore provide reasonably reliable and useful information (Keltner & Kring, 1998) about one's intentions to forgive, compensate, reciprocate, retaliate against, profit from, leave or exclude other group members in a social dilemma. But, as theoretically plausible as it may be that, in general, emotions have beneficial interpersonal effects in social dilemmas, direct empirical tests of such effects are undoubtedly subject to many moderating variables and boundary conditions. That is all the more reason, then, to ask if any empirical evidence is available for interpersonal effects of discrete emotions in social dilemmas.

1.3.1 Empirical evidence

I have found little, if any, direct investigations of the communication of emotion in social dilemmas (and after four years of investigation the chances are slim, or so I hope, that any major evidence has eluded me). *Indirect* investigations, however, are readily available, so that is what I will appeal to now, starting with some additional anecdotal evidence from the study by Dawes et al. (1977) that I cited in the beginning. They observed that after participants had played a social dilemma that was preceded by a group discussion, strong emotions frequently surfaced:

> *In pretesting we did run one group in which choices were made public. The three defectors were the target of a great deal of hostility ("You have no idea how much you alienate me!" one cooperator shouted before storming out of the room); they remained after the experiment until all the cooperators were presumably long gone.*
>
> (Dawes et al., 1977, p.7)

Studies examining what effects such emotional expressions in social dilemmas had on the defector did not follow, however. In fact, the few available studies on affect in social dilemmas focus either on mood (Hertel, 1999; Hertel, Neuhof, Theuer, & Kerr, 2001; Knapp & Clark, 1991; Sanna, Parks, & Chang, 2003; Vollmeyer, 1994), on the antecedents of emotions (e.g., equality violations, Stouten et al., 2005; Stouten, De Cremer & Van Dijk, 2006) or on their *intra*personal effects. An example of the latter is the finding that participants who recalled an episode of guilt as opposed to a neutral event cooperated more in an iterated prisoner's dilemma (Ketelaar & Au, 2003). Nelissen, Dijker, and De Vries (2007) replicated this effect in a one-shot give-some game and showed that it only occurred for pro-selfs (i.e., people with a disposition to maximize their own outcomes or their relative advantage over others, see Van Lange, 1999). Moreover they showed that fear reduced cooperation, but only for pro-socials (i.e., people with a disposition to maximize joint outcomes and strive for equality). De Hooge, Zeelenberg and Breugelmans (2007) also demonstrated that guilt motivates pro-selfs, but not pro-socials, to cooperate more. Moreover, shame did not have this specific effect, unless, as these authors later showed, the people toward whom one felt ashamed were also those who would benefit from one's cooperation (De Hooge, Breugelmans, & Zeelenberg, 2008). Perhaps closest to an early demonstration[2] of interpersonal effects of emotions in social dilemmas is a study by Frank, Gilovich and Regan (1993). In line with the above-mentioned idea of emotions as a commitment device (Frank, 1988), they showed that after half an hour of social interaction with the other player in a one-shot prisoner's dilemma participants were able to predict with above-chance accuracy if the other would cooperate or defect. However, the role of emotion communication in this process is only implicit and neither measured, nor manipulated. All in all, then, social dilemma research shows that some discrete emotions,

[2] Some research on the communication of emotion in social dilemmas appeared (or is still in progress) only after most empirical chapters of this dissertation had already been published. Although it was therefore not used for the theoretical framework of the present research, it is still interesting to briefly summarize the findings of these studies. Kerr (2009) found that affective feedback in the form of happy and unhappy faces increased cooperation in an iterated, dyadic public good game, particularly among pro-selfs. Unhappy faces were less effective when sent to players who cooperated more than the person sending them. In a set of studies that also used facial feedback, Stouten and De Cremer (in press) found that sending happy and angry pictures moderated the effect of communicated intentions to cooperate or defect. Happiness led people to respond in a way that was more consistent with the verbally communicated intentions than anger did. Finally, Tanghe, Wisse, and Van der Flier (in press) showed that emotions with a high activation level (e.g., anger and enthusiasm) signal intentions to cooperate more than emotions with a low activation level (e.g., relaxation and boredom) do and therefore induce more cooperation in people, especially when they are low in trust and therefore presumably most attentive to such cues. This research underscores the idea that emotions affect cooperation rates by providing social information.

like guilt, affect one's own cooperation rate, but there is little or no direct evidence that the *communication* of such emotions influences the decisions of other group members.

It may therefore be advisable to look at other situations where one's own outcomes depend on one's own decisions and those of others. Bargaining games are an important example of such *interdependent* situations (Pruitt & Carnevale, 1993). Typically (e.g., De Dreu & Van Kleef, 2004), two participants are assigned to the role of either buyer or seller and each receives a different chart that denotes one's payoff for each possible agreement. The payoff chart of one's negotiation opponent is unknown—in fact, this person is often simulated by a computer. The buyer and the seller then alternately make offers until an agreement is reached, in which case the negotiations end. Small monetary incentives are often awarded to further motivate participants to negotiate the best possible deal. For future reference, I will call this the negotiation paradigm. A related paradigm is the ultimatum bargaining game (Güth, Schmittberger, & Schwarze, 1982). Here, participants are assigned to the role of allocator or recipient and have to divide a sum of money. The allocator first proposes how the money should be distributed over both players. The recipient subsequently accepts or rejects. If the recipient accepts, the money is divided as proposed. If the recipient rejects, neither gets anything.

In the ultimatum bargaining game, too, *intra*personal effects of emotion have been obtained. For example, Pillutla and Murnighan (1996) found that anger over an allocator's offer correlated strongly—even stronger than perceived unfairness—with whether recipients would accept or reject the offer. Such emotional rejections are not less likely to occur when, before making their decision, participants get one hour off to cool down (Bosman, Sonnemans, & Zeelenberg, 2001). Even more relevant to this dissertation, Xiao and Houser (2005) obtained preliminary evidence that the communication of emotion affects recipients' decisions in an ultimatum bargaining game. When recipients could send messages to allocators and could thus, if they wished, express their discontent over an unfair offer, they were more likely to accept the offer than when they did not have this opportunity. Although this dissertation is concerned more with what happens when participants receive, instead of send, emotional information, the possible implications of this finding are interesting. It suggests that emotion communication itself can function to punish others, be assertive and maintain credibility without actually engaging in retaliatory behavior. Follow-up research has refined this claim by showing that this effect occurs only for pro-socials and that pro-selfs actually punish *more* when given the opportunity to communicate their emotions, presumably because for them this only makes the inequality more salient (Hibner, Samid, & Suleiman, 2009).

The empirical findings most relevant to this dissertation, however, come from an extensive line of research conducted mainly by Van Kleef and colleagues, who investigated how the behavior of negotiators is influenced by the emotions of their

negotiation opponent. For example, should negotiators keep their anger to themselves, or can the very communication of anger actually elicit concessions in the other? An impressive set of studies using the negotiation paradigm (reviewed in Van Kleef, Van Dijk, Steinel, Harinck, & Van Beest, 2008; for later studies, see Pietroni, Van Kleef, De Dreu, & Pagliaro, 2008; Van Kleef & Van Lange, 2008; Van Kleef & De Dreu, 2009) showed that the communication of anger is a double-edged sword. On the one hand it may have little effect or even, through emotional contagion, induce anger in one's opponent, who is then likely to behave competitively and make few concessions (Friedman et al., 2004). On the other hand, communicating anger conveys the impression that one is a tough negotiator, leading one's opponent to concede because the negotiations might otherwise end in a stalemate (Sinaceur & Tiedens, 2006; Van Kleef et al., 2004a). Thus a search for moderators ensued and many were found. Negotiation opponents are unlikely to concede if they are not motivated to consider the strategic implications of the communicated anger in the first place, for example due to time pressure or personality (Van Kleef, De Dreu, & Manstead, 2004b), or because they are high in power or, relatedly, have several alternatives available (Sinaceur & Tiedens, 2006; Van Kleef, De Dreu, Pietroni, & Manstead, 2006; see also Van Beest, Van Kleef, & Van Dijk, 2008). Moreover, anger is only likely to elicit concessions when it is perceived as justifiable (Van Kleef & Côté, 2007) and is directed toward a negotiator's offer rather than to the negotiator as a person (Steinel, Van Kleef, & Harinck, 2008). Van Dijk, Van Kleef, Steinel and Van Beest (2008) obtained compatible findings for ultimatum bargaining, showing that allocators were more likely to turn down offers from angry recipients when they had little to lose or could deceive the recipient. Thus, being angry may pay off, but often it also backfires.

It is therefore worthwhile to investigate if there are other emotions that signal dissatisfaction with one's current outcomes in a negotiation, but then without risking escalation. Disappointment may be such an emotion, because it signals that one's positive expectations are not met (Van Dijk & Van Harreveld, 2008). Indeed, Van Kleef, De Dreu and Manstead (2006) found that a disappointed negotiation opponent elicited more concessions than a non-emotional opponent, particularly if the opponent was seen as trustworthy. Compared to studies on communicated anger, however, this encouraging finding has inspired decidedly less research, even though Van Kleef and Van Lange (2008) reported that disappointment elicited more concessions in pro-selfs than anger did. Work in progress on ultimatum bargaining (Lelieveld, Van Dijk, Van Beest, & Van Kleef, 2009) similarly shows that expressing disappointment toward the allocator is more effective than expressing anger, in particular when the recipient has little power.

The communication of two other emotions has received moderate empirical attention in negotiations: happiness and guilt. Happiness may signal that there is no threat to reaching an agreement. One's negotiation opponent may therefore respond by make few

concessions (Van Kleef et al., 2004a). Kopelman, Rosette and Thompson (2006), in contrast, found that the display of positive instead of negative or no affect during negotiations led participants to close better deals. In line with a clear, though non-significant, trend obtained by Steinel et al. (2008), this difference, too, may partly be explained by whether happiness was expressed over the negotiation opponent's offers or more over the negotiation opponent as a person. The findings on guilt are less ambiguous. Guilt signals that one has been too tough a negotiator and that one wants to make up for it. It therefore elicits fewer concessions, though not a more positive impression, than when no emotion is communicated (Van Kleef et al., 2006). This seems to be particularly so when one's negotiation opponent is perceived as trustworthy.

1.3.2 Implications for emotions in social dilemmas

All in all, the studies on negotiations have many appreciable aspects. First, it was made clear that the emotions that were communicated were also elicited in the same negotiation context. Participants did not simply receive messages reading: "I feel angry, so I will offer X". Instead, anger was specifically expressed over the unfolding negotiation itself. Admittedly, emotions that carry over from unrelated situations are interesting too—for one, they offer important insights about the boundary conditions of emotion regulation—but this research starts from the observation that social dilemmas are situations that elicit remarkably strong emotions. Thus I should clearly embed the communicated emotions in a social dilemma context, and build upon research that has taken a similar approach.

A second advantage of the line of research reviewed above is that it shows effects of emotion that are truly interpersonal. The point of the research is not that emotions have intrapersonal effects on one's own demands which may, in turn, influence the opponent's demands (although this may certainly happen). Instead, it shows that the mere emotion communication itself is often sufficient to influence the opponent's demands directly. Of course, negotiators may adjust their demands because they *infer* that an emotional opponent will make certain demands in the future. But the effects are not driven by the actual demands of the emotional opponent—indeed, these were kept constant—so this research shows that emotions fulfil functions that are truly social.

A final virtue of the abovementioned research is that its findings are in line with a social-functional account of emotion, yet at the same time show that further sophistication is needed to accurately predict actual behavior. Anger, for instance, may indeed function to induce corrective behavior, but only within certain boundary conditions and under specific circumstances. There is no *a priori* reason to assume that interpersonal emotion effects in

social dilemmas are not subject to similar moderators. Some of the studies that I will report, in fact, are inspired by this very notion. Moreover, as Van Kleef et al. (2008) also note, the exact structure of the relevant interdependence situation, too, determines what effects communicated emotions will have. This is particularly important because resource, public good and prisoner's dilemmas come in many different forms, and all of them, in turn, differ notably from negotiation and ultimatum bargaining paradigms.

Compare the negotiation paradigm and the iterated prisoner's dilemma, for example. Both are dyadic, interdependent games with repeated interaction, yet not only their framing but also their underlying outcome structures differ markedly. The negotiation paradigm is basically a game of mutual convergence through concessions. Moreover, convergence yields higher payoffs than no convergence, which means that sizable concessions need not be made as long as one's opponent can be expected to keep making them. Conversely, if one's opponent refuses to concede, making concessions oneself is the only way to prevent the highly undesirable outcome of a stalemate. Such a strategy of *mismatching* (Pruitt & Carnevale, 1993) is opposite to successful strategies in the iterated prisoner's dilemma, such as tit-for-tat, which are based on reciprocity. They respond to cooperation with cooperation and to defection with defection. This also means that anger, for example, may be interpreted differently in both situations, even when both interpretations are in line with its social function of correcting social wrongdoings. In the negotiation paradigm, anger may mean "You'd better start cooperating, because I am not going to" whereas in the iterated prisoner's dilemma anger may mean "You'd better start cooperating, because only then will I do so too."

Resource dilemmas, public good dilemmas and cooperation through indirect reciprocity are even further removed from typical negotiation and ultimatum bargaining paradigms because these are situations that concern more than two persons. This adds a whole new layer of complexity, because the communication of emotion may now not only influence dyadic relationships within a group, but also intragroup dynamics more broadly. Whereas in dyads it is typically clear from one's own outcomes if the other person has defected or cooperated, in groups one's own outcomes are only an indication of the total amount of cooperation, not of exactly which group members have cooperated or defected. Due to such increased social uncertainty, Person A may be very interested to know what information Person B has about Person C. This is particularly true in step-level social dilemmas where coordination becomes an issue, because successful coordination requires having a fairly accurate estimation of how cooperative all other group members will be. Again, emotions may communicate such information. Person C's behavior may elicit an emotional reaction in Person B which may inform Person A of the behaviors and intentions of both and subsequently influence Person A's actions. Such actions of course include

cooperation and defection, but also preferences to install structural solutions in social dilemmas.

To summarize, regardless of whether emotions are communicated in social dilemmas, negotiations or ultimate bargaining, they can be expected to signal one's future intentions, expectations about others and satisfaction or dissatisfaction over the current situation or over other players. Thus, like in other interdependent situations, emotions in social dilemmas will function as socially informative cues. For two reasons, however, emotions can also be expected to have effects in social dilemmas that are unique to the findings reviewed above. First, social dilemmas have unique outcome structures that differ from negotiations and ultimatum bargaining. And second, research on negotiation and ultimatum bargaining has focused almost exclusively on emotions in strictly dyadic situations, whereas I will also study social dilemmas in which more than two people are involved. Emotions in social dilemmas, then, can be expected to assist in solving problems that pertain to coordination, reputation formation and structural change—all of which are unlikely to arise in other interdependent situations.

1.4 OVERVIEW OF THE PRESENT DISSERTATION

The research area of emotion communication in social dilemmas is as wide as it is unexplored. With this introduction, four empirical chapters and a discussion section that integrates all findings I hope to advance this exploration considerably. As noted before, the empirical chapters are not arranged chronologically, but in order of social complexity, starting with direct reciprocity, via indirect reciprocity to step-level public good dilemmas. That does not mean that the later chapters are somehow more difficult to read or comprehend. Rather, direct reciprocity involves, similar to research on negotiations, only dyadic social interactions, whereas indirect reciprocity adds third party observers to this and in step-level public good dilemmas intragroup dynamics even need to be studied.

Thus, in Chapter 2 the focus is on direct reciprocity. It has been known since Axelrod's (1984) famous computer tournaments that reciprocal strategies such as tit-for-tat are successful behavioral strategies that can establish cooperation while being unexploitable to defectors. But does the communication of emotions guide this process and, if so, how? Can emotion communication improve reciprocal strategies like tit-for-tat? While defection may indeed be discouraged by responding in kind with defection, the communication of emotion may assist in escaping from mutual defection so that mutual cooperation can be established. Which emotion, then, should best be communicated? Is it better to be angry or disappointed over the other person's ongoing unwillingness to cooperate? Chapter 2 thus not only tests a possible improvement on one of the most

effective and famous strategies to induce cooperation—tit-for-tat—but is also a comment on the often heard phrase "I'm not angry, I'm disappointed".

In Chapter 3 I take a closer look at the dynamics of indirect reciprocity. As noted before, there is elegant game-theoretical evidence that cooperation through indirect reciprocity is possible. This requires that defectors should be defected against and second, that such retaliatory defection should not increase one's chances of being defected against. However, empirical studies have been unable to demonstrate that people do indeed distinguish such justified, retaliatory defection from unjustified, selfish defection. In Chapter 3 I investigate if such a distinction can be made through the communication of emotion. Does unjustified defection elicit more anger and disappointment than justified defection does? And do people therefore also infer that defection was justified when anger or disappointment is communicated? Do they then respond more leniently than when defection was unjustified? Moreover, paradigms with which indirect reciprocity can be studied are also very suited to study whether certain emotions can be classified as moral. I will therefore show whether anger can be truly moral and if something like moral disappointment actually exists. Chapter 3 thus is an attempt to reconcile game theory and empirical findings regarding indirect reciprocity and at the same time a test of the virtues of moral emotions—if they exist in the first place.

In Chapter 4 I investigate the coordination potential of anger and guilt in asymmetric step-level public good dilemmas. What can be inferred from these emotions? Whether or not the group has been successful in the past? Whether or not many resources will be contributed in the upcoming trial? What the prospects are of reaching the provision point? Depending on one's answers, one may want to implement structural changes in the social dilemma: install a leader, or perhaps leave the group altogether. But how much do these inferences actually matter in asymmetric social dilemmas when the group member that feels angry or guilty is hardly instrumental in realizing the public good anyway? And what other boundary conditions to the interpersonal effects of emotion can be identified? Chapter 4 describes the complexities of asymmetric social dilemmas from the perspective of a newcomer who has only the emotions from his or her fellow group members to make sense of what will happen in the future—and how to respond.

Armed with the insights obtained in Chapter 4, I will study in Chapter 5 how guilt affects cooperation in step-level public good dilemmas. When is it helpful to know that a fellow group member feels guilty in the first place? I will measure what participants believe that the communication of guilt means for how much each fellow group member has contributed and will contribute in the future. But the crucial question, then, is if this convinces participants to donate the remaining amount of resources that they believe is necessary to reach the provision point—even if the provision point is quite high. Chapter 5

documents how in a situation of interpersonal guilt people try to coordinate their contributions to reach a provision point that is typically too high reach.

Finally, Chapter 6 provides an integration of all the previous chapters, discusses implications and contributions, suggests practical applications and outlines several possible limitations and avenues for future research. All chapters can be read separately, but this also means there is some overlap between them. May you enjoy reading this dissertation as much as I appreciate you having read not just the word of thanks but also this introduction!

CHAPTER 2

2. HOW EMOTION COMMUNICATION GUIDES RECIPROCITY: ESTABLISHING COOPERATION THROUGH DISAPPOINTMENT AND ANGER[3]

2.1 INTRODUCTION

Developmental, cultural, evolutionary and social psychologists alike have started to recognize that obtaining an adequate understanding of emotions requires taking into account the social environment in which emotions are elicited (Campos, Campos, & Barrett, 1989; Markus & Kitayama, 1991; Morris & Keltner, 2000; Tooby & Cosmides, 1990). Accordingly, scholars have shifted their focus to the important social functions that emotions fulfill by coordinating interpersonal relations (Frijda & Mesquita, 1994; Keltner & Haidt, 1999; Oatley & Jenkins, 1992). In this view, emotions communicate specific intentions to interaction partners, which may help in overcoming interpersonal challenges—perhaps most notably the problem of *cooperation* (Bowles & Gintis, 2003; Keltner et al., 2006).

Cooperation is a decisive organizing principle of society, be it in hunter-gatherer tribes or complex nation-states (Nowak, 2006). Yet establishing and maintaining cooperation is problematic, because unconditional cooperators who invest costly time, effort or resources in others are vulnerable to exploitation by defectors. *Reciprocity*, or returning helpful and harmful actions in kind, represents a behavioral adaptation to this problem because it promotes cooperation by having cooperators retaliate against defectors (Parks & Rumble, 2001; Sheldon, 1999; Trivers, 1971). But because misunderstandings, ambiguous situations and unknown intentions greatly increase the complexity of reciprocity dynamics, scholars have proposed that emotions function as an indispensable and ubiquitous lubricant to establish and maintain cooperation (McElreath et al., 2003; Van Lange et al., 2002).

Surprisingly, however, which discrete communicated emotions actually induce cooperation has (to our knowledge) never been tested empirically in the game-theoretical derivatives of reciprocal situations (i.e., prisoner's dilemma and give-some dilemma or—more broadly—social dilemmas, see Weber, Kopelman, & Messick, 2004). Nevertheless, some scholars propose that *anger* may have evolved to address defection in an interaction partner (Fessler & Haley, 2003; Keltner, et al., 2006). Physiologically and cognitively,

[3] This chapter is based on Wubben, De Cremer, & Van Dijk (2009a).

anger facilitates retaliatory action (Cannon, 1929; Lerner & Tiedens, 2006), making defectors more likely to cooperate because their costs of future defection are increased. But negotiation research suggests that communicating anger sometimes also has the opposite effect (Van Dijk et al., 2008; Van Kleef & Côté, 2007). Through emotional contagion it may elicit anger in the target person (Hatfield et al., 1994), who may become more likely to retaliate instead. Anger may therefore also engender rapid escalation (Canary, Spitzberg, & Semic, 1998). Thus, communicated anger may force cooperation by announcing retaliation, but it can also backfire, yielding mutual defection and an interpersonal crisis.

Although the theoretical debate of inducing cooperation in others has mainly focused on the antagonistic emotion of anger, we believe there is another largely overlooked emotion that seems relevant to this purpose: *disappointment* (Frijda, 1986; Van Dijk & Van Harreveld, 2008). Disappointment is experienced in response to unfulfilled positive expectations (Van Dijk, Zeelenberg, & Van der Pligt, 1999). Expressing disappointment to the person that caused this emotion therefore communicates that one had higher expectations of this person. It is this message rather than its action tendency that makes disappointment effective in inducing cooperation, because disappointment is associated with a tendency to do nothing (Van Dijk & Van Harreveld, 2008). Still, expressing disappointment in someone is a powerful statement that can even elicit concessions from negotiation partners (Timmers, Fischer, & Manstead, 1998; Van Kleef et al., 2006; Van Kleef & Van Lange, 2008). And exactly because it addresses defection without communicating a prospect of retaliation, as anger does, it is less likely to backfire. Our central hypothesis therefore is that reciprocal actions more successfully establish cooperation when one responds to defection with disappointment instead of anger.

2.2 EXPERIMENT 2.1

We will test our hypothesis by letting participants play a give-some dilemma (see below) against a tit-tor-tat (TFT) strategy. This strictly reciprocal strategy has become famous for establishing cooperation by always cooperating at its first move and subsequently mirroring its partner's actions (Axelrod, 1984). By doing so, it is *retaliatory* because it responds to defection with defection but also *forgiving* because it resumes cooperation after defection when its partner does so too. Because anger and disappointment may elicit perceptions of retaliation and forgiveness too, these emotions could strongly influence the effectiveness of TFT. Finally, we will examine if any effects of these emotions will carry over to future interactions with the same partner in another context.

2.2.1 Method

Participants and experimental design. Ninety-seven undergraduate students (22% male, M_{age} = 20.08) participated in exchange for €3.50 (approximately $5) or course credits. Participants were randomly assigned to the disappointment, anger or no-emotion condition.

Procedure. Upon arrival at the laboratory, participants were seated in separate cubicles in front of a computer. For our experiment we adjusted the paradigm used by Van Lange et al. (2002). Participants read that in every trial they and their partner, who was actually computer-simulated, would start with 10 coins and that they both had to decide simultaneously how many coins they wanted to donate to the other. Each coin kept to oneself was worth €0.50; coins donated to one's partner were worth €1.00. This situation represents a give-some dilemma because keeping one's coins yields higher individual outcomes than donating one's coins, yet if both players follow this strategy, each individual obtains lower outcomes than if they both donate all their coins. Participants who obtained more money with the game had higher chances to win one of several €10 prizes. Subsequently, every participant played for 14 trials against a TFT-strategy that donated 10 coins in the first trial and subsequently imitated the participant's donations.

Emotion manipulation. Participants read that either they or their partner, if desired, could send the other player emotion messages every three rounds. Participants therefore first practiced in composing messages by selecting an emotion label and indicating to what extent they experienced this emotion on a scale of 0 (not at all) to 10 (very much). To warrant the credibility of the emotion communication we emphasized that it was perfectly fine to communicate a specific emotion several times or with minimal intensity. Subsequently, their partner was seemingly at random appointed to send messages. After the second, fifth, eighth and eleventh trial participants in the anger and disappointment conditions would then receive a message reading that their partner felt *angry/disappointed* about the number of coins they had donated. It was clearly stated that the first emotion message pertained to the first two rounds and the subsequent emotion messages to every three preceding rounds. Participants in the no-emotion condition received no messages. To make the emotion information more realistic we covaried its communicated intensity with the number of donated coins. If participants had donated ten coins in the previous three trials the intensity was 0 out of 10—indicating that their partner did not at all feel angry or disappointed—and if participants had donated fewer coins the intensity increased to ultimately 10 out of 10 when no coins were donated.

Dependent measures. Our main dependent behavioral measure was the number of coins participants donated to their partner in each trial. To explore if the communicated emotions would also spill over to cooperation decisions in a different context, we gave

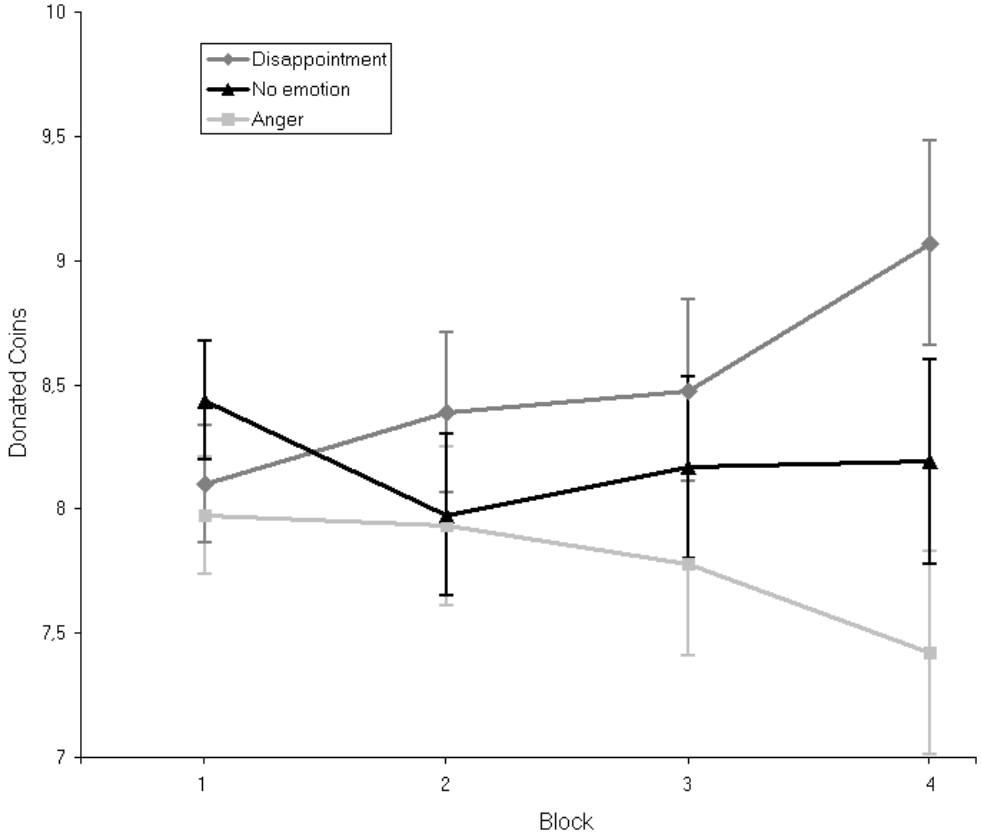
participants the opportunity to affect their partner's (and thereby also their own) chances in the lottery. They could anonymously decide to let their partner's number of tickets increase or decrease with 0-10%. Afterwards, we also asked a series of questions on a 7-point scale (1 = totally disagree, 7 = totally agree). Seven items were used to measure participants' impression of their partner (Van Kleef et al., 2006; e.g., "my partner made a cooperative impression", "during the game, my partner made a hostile impression"). Retaliation perceptions were measured with the items "My partner will react fiercely when something is done to him or her", "My partner will not retaliate if damage is caused to him or her" (reversed), and "My partner will take action if he or she is disadvantaged" (α = .68). Perceived forgiveness was measured with the items "my partner is forgiving" and "my partner will not easily let a conflict get out of hand"; r = .39, p < .001. Participants were also asked how angry they felt. Furthermore, we asked in both emotion conditions if participants found it justified that their partner felt as he or she had communicated, and if participants could imagine their partner's feelings (r = .95, p < .001). The emotion manipulation was checked by asking participants how often their partner communicated fear, shame, happiness, envy, pride, sadness and, importantly, anger and disappointment (1 = not at all, 7 = very often). Finally, participants were debriefed, paid and thanked.

2.2.2 Results

Manipulation check. Separate one-way ANOVAs on the anger (F[2, 94] = 54.64) and disappointment (F[2, 94] = 52.86) manipulation checks yielded strong effects of emotion (both ps < .001; both η^2s > .52). Communicated anger was reported most often in the anger condition (M_{anger} = 5.10, SD = 2.61 vs. $M_{\text{disappointment}}$ = 1.06, SD = 0.36 and $M_{\text{no emotion}}$ = 1.60, SD = 1.22; both ts > 8.54, both ps < .001) and communicated disappointment was reported most often in the disappointment condition ($M_{\text{disappointment}}$ = 5.26, SD = 2.38 vs. M_{anger} = 1.13, SD = 0.72 and $M_{\text{no emotion}}$ = 1.89, SD = 1.57; both ts > 8.09, both ps < .001).

Cooperation. We pooled the post-manipulation trials in four blocks by calculating the average contributions in the three trials following each emotion communication and conducted a 3 (emotion) × 4 (blocks) mixed-model ANOVA. In this and subsequent analyses we controlled for any pre-manipulation differences in cooperation by including the average contribution in the first two trials as a covariate. Results revealed an overall interaction, F(2, 93) = 3.01, p = .05, η^2_p = .06 (see Figure 2.1).

Figure 2.1: Number of donated coins as a function of emotion and block.



Note. Error bars depict standard error per condition.

Post-hoc comparisons showed that cooperation increased faster when disappointment as opposed to anger (F[1, 59] = 3.90, p = .05, η^2_p = .06) or no emotion (F[1, 63] = 5.08, p = .03, η^2_p = .07) was communicated. Moreover, linear trend analysis revealed that communicating disappointment gradually increased cooperation (F[1, 29] = 5.61, p = .02, η^2_p = .16) whereas anger and no emotion did not (both Fs < 1, both ps > .43). Finally, a one-way ANOVA on the last block of trials showed a main effect of emotion, F(2, 93) = 3.95, p = .02, η^2 = .06. Disappointment established more cooperation than anger (p = .007) with no emotion inducing intermediate cooperation in comparison to anger and disappointment (both ps > .12).

To examine any spill-over effects in the give-some dilemma we conducted a one-way ANOVA on the percentage with which participants decided to increase or decrease the other's lottery tickets. Results showed a main effect of emotion, F(2, 93) = 3.35, p = .04, η^2 = .06. Post-hoc tests revealed that people allocated a more positive outcome to their

partner when disappointment (M = +6.24%) was communicated as opposed to anger (M = +2.34%, p = .01) or no emotion (M = +3.37%, p = .06).

Emotion inferences. To test whether anger and disappointment affected retaliation and forgiveness perceptions, we conducted 3 (emotion) × 2 (perception: forgiving vs. retaliatory) mixed-model ANOVA. This yielded a significant interaction, $F(2, 93) = 5.35$, $p = .006$, $\eta^2_p = .10$ (see Table 2.1 for all means and standard errors). Simple-effect analyses showed that disappointed partners were perceived as more forgiving than retaliatory ($p = .006$), whereas for angry partners the opposite trend occurred, indicating they were perceived as relatively retaliatory ($p = .15$). Moreover, planned comparisons showed that angry partners were perceived as more retaliatory than partners in the disappointed ($p = .05$) and no-emotion conditions ($p = .06$) and as less forgiving (both ps < .02).

Table 2.1: Retaliation and forgiveness perceptions by emotion.

	Dependent variables	
Emotion	Retaliation	Forgiveness
Anger	4.73_a (0.18)	4.22_a (0.24)
Disappointment	4.21_b (0.19)	5.21_c (0.24)
No emotion	4.25_{ab} (0.17)	4.98_c (0.23)

Note. Entries are means on 7-point scales, with higher values indicating higher retaliation or forgiveness perceptions. Standard errors are given in parentheses. Means in the same row or column with a different subscript differ at $p \leq .05$.

Separate one-way ANOVAs showed main effects of emotion on reported anger ($F[1, 93] = 7.64$, $p < .001$, $\eta^2 = .14$) and impression of the opponent ($F[1, 93] = 12.47$, $p < .001$, $\eta^2 = .19$). Post-hoc analyses revealed that partners communicating disappointment (M = 6.11) or no emotion (M = 5.84) received a more favorable impression than partners communicating anger (M = 4.98; both ps < .001). Furthermore, angry partners induced more anger in participants (M = 1.84) than partners communicating disappointment (M = 1.02) or no emotion (M = 1.10; both ps < .001). Finally, participants evaluated communicating anger or disappointment as equally justified ($M_{disappointment} = 4.89$, $M_{anger} = 4.54$, $F < 1$, $p = .42$) and one sample t-tests showed that these ratings differed significantly from the midpoint of the scale ($t[61] = 3.06$, $p = .003$). These findings further indicate that the manipulation was credible and that differences in perceived appropriateness between both emotions cannot explain our findings.

2.3 GENERAL DISCUSSION

The present study investigated if the communication of discrete emotions is conducive to establishing cooperation when an interaction partner refrains from returning a favor. The results show that communicating disappointment in the other more successfully induces cooperation than does communicating anger or not communicating any emotion. Disappointed partners were perceived as forgiving rather than retaliatory, whereas the opposite was true for angry partners. Anger thus risks escalation, whereas disappointment emphasizes the possibility of obtaining better outcomes. Moreover, this behavioral effect carries over to future social decision-making with the same interaction partner.

Our point is not that communicating an intention to retaliate is necessarily detrimental. After all, reciprocation implies retaliation and TFT would be unsuccessful without it. But our results do show that addressing defection by communicating anger clearly overemphasizes retaliation. Not only did it evoke anger, participants also had a less positive impression of their partner. Expressing disappointment, however, is an attempt to address defection without incurring such costs. And in that it appears quite successful—at least when, like in the present study, its communication is experienced as appropriate. Moreover, because communicating disappointment does not lead to negative impressions, expressing anger still remains a viable option when disappointment fails to induce cooperation.

Even though we believe the importance and benefits of disappointment have not yet been fully appreciated in the emotion and cooperation literature, we do not want to suggest that it always induces more cooperation than anger does. For example, because anger more strongly emphasizes retaliation than disappointment does, it may be quite effective in averting defection when one's partner fears retaliation. In our experiment communicating anger may have resulted in escalation because both players had equal retaliatory power, but when in asymmetric give-some dilemmas the more powerful person communicates anger this may actually promote cooperation (cf. Van Kleef & Côté, 2007). Taken together, these results show that how people establish and maintain cooperation can only be fully understood by recognizing that communicated emotions are inherent to the dynamics of reciprocity.

To conclude, the next time someone fails to return a favor, it seems wise to reciprocate this action while communicating disappointment instead of anger. This emphasizes potential forgiveness rather than retaliation, thereby maintaining a good relationship with the other instead of evoking anger. But above all, communicating disappointment is more likely to establish a mutually beneficial relationship.

CHAPTER 3

3. THE COMMUNICATION OF MORAL ANGER AND DISAPPOINTMENT HELPS TO ESTABLISH COOPERATION THROUGH INDIRECT RECIPROCITY[4]

3.1 INTRODUCTION

Reciprocity is as pervasive in social interaction as it is conducive to establish and maintain cooperation. This is evident not only from proverbial wisdom such as "One hand washes the other", "You scratch my back, I will scratch yours" and "An eye for an eye, a tooth for a tooth". Scholars, too, have long since recognized the importance of reciprocity (Gouldner, 1960), judging from influential concepts as reciprocal altruism (Trivers, 1971), social exchange (Blau, 1964), exchange relationships (Clark & Mills, 1979) and strategies for resolving conflict (Osgood, 1962) or inducing compliance (Cialdini et al., 1975). These are all instances of *direct* reciprocity: no one but the *recipient* is expected, implicitly or not, to return helpful and harmful deeds in kind. Direct reciprocity resembles a barter economy based on the direct exchange of goods, because cooperation can only be established if what both parties have to offer each other is tailored to suit their needs. A limitation of such a mechanism is that person A may not provide a favor to B if B cannot reciprocate, even if B can actually cooperate with C instead and C can cooperate with A (Nowak, 2006). Money provides an economic solution to such allocation problems, but other solutions appear possible too. After all, when reciprocation is impossible or unlikely, people still do not ask for monetary rewards to donate blood, give up their seats in public transport, or even rescue complete strangers in emergencies (Becker & Eagly, 2004). Could one explanation for such behavior be that there is an equivalent of money that establishes cooperation when direct reciprocity is impossible?

This is exactly what *indirect* reciprocity theory proposes (Alexander, 1987; Nowak & Sigmund, 2005). Indirect reciprocity occurs when a *third party*, rather than the recipient, reciprocates a helpful or harmful deed. Thus, A cooperates with B and C subsequently cooperates with A. Person C, in turn, may be compensated by B or by yet another person. Bookkeeping of this 'passing the buck along' is done informally through *reputation* rather than through money. A reputation, then, is an aggregated judgment of character based on all available information of someone's cooperative and defective (i.e., non-cooperative) acts in the past. People with a positive reputation deserve cooperative

[4] This chapter is based on Wubben, De Cremer, & Van Dijk (2009b)

acts from others, whereas people with a negative reputation do not. Consequently, obtaining as positive a reputation as possible can become a goal in itself, as can be assessing, updating and communicating the reputations of others. Indirect reciprocity thus gives rise to gossip, information sharing networks, social norms, sanctioning systems, laws and, eventually, society. Forming a coherent reputation requires putting together numerous intricate pieces of ambiguous social information, which may be why people are equipped with faculties for advanced communication, morality, perspective-taking and lie-detection. Remarkably, these topics have been studied frequently in social psychology, but indirect reciprocity itself has received hardly any or only indirect empirical attention (De Cremer & Bakker, 2003; Hardy & Van Vugt, 2006; Klapwijk, Van Lange, & Reinders Folmer, 2009; Simpson & Willer, 2008).

Whereas cooperation through indirect reciprocity is theoretically possible, empirical demonstrations have been inconclusive. In theory, defectors should receive defection as their just dessert. Moreover, such *justified* defection should not damage one's reputation and, consequently, should not increase one's chances of being defected against (Leimar & Hammerstein, 2001; Ohtsuki & Iwasa, 2004; Nowak & Sigmund, 2005). But in practice, people have difficulties deciding when defection is justified and when not. Bolton and colleagues (2005) found that, even though defection in response to defection is more justified than defection in response to cooperation, participants hardly responded more cooperatively to it. Milinski and colleagues (2001) even found that participants responded as uncooperatively to defection against an unconditional defector as to defection against a person whose reputation was unknown. Thus, empirical studies have not been able to confirm the theoretical assumption that people can successfully distinguish justified from unjustified defection.

Perhaps justified defection would elicit more cooperation if it were clear to observers that it had the pro-social motive of retaliation against a defector. We will claim that the moral emotions of anger and disappointment fulfil exactly this communicative function (Haidt, 2003; Keltner & Haidt, 1999). Consequently, in Experiments 3.1 and 3.3 we will show in a situation of indirect reciprocity that defection out of anger or disappointment is seen as a just response to unjustified defection. It therefore elicits more cooperation than when these emotions are not communicated. Moreover, we will show that the difference between both emotions is that disappointment signals that a defector has a more positive reputation than anger does (Experiments 3.2 and 3.3). Moral emotions may thus present a reconciliation for the theoretically postulated but empirically unverified claim that justified defection is perceived and responded to differently than justified defection is.

3.1.1 The dynamics of indirect reciprocity

Cooperation is the provision of a benefit to a recipient who thereby gains more than that the benefit costs to the donor (Nowak, 2006). Consequently, cooperation pays off if the recipient reciprocates the cooperative act. But predicting if a recipient will reciprocate is difficult if you have never encountered this recipient before. One solution is to observe whether the recipient returns cooperative acts from *other* persons. By observing and remembering who cooperates and who does not, reputations are created. You minimize the risk of exploitation if you invest your valuable time, effort or resources in people with a positive reputation only. This discriminating strategy marks the onset of indirect reciprocity, because observers of your cooperative act may find cooperating with you worthwhile, and their cooperation may, in turn, be reciprocated by yet others (Alexander, 1987).

It should be noted, however, that this strategy of basing your decisions to cooperate in indirect reciprocity solely on how frequently your potential recipient cooperates and defects often does not establish cooperation (Leimar & Hammerstein, 2001; Nowak & Sigmund, 1998). It leads you to defect against a defector, but at the cost of decreasing your own reputation and therewith your own prospects of receiving cooperative acts. Indirect reciprocity theory has therefore posited that establishing cooperation requires observers to distinguish between defection that is *justified* and *unjustified* (Leimar & Hammerstein, 2001; Panchanathan & Boyd, 2003; Sugden, 1986). Unjustified is all defection against people with a positive reputation. Justified is all defection against people with a negative reputation. Justified defection therefore preserves one's current reputation, whereas unjustified defection damages it.

While theoretically important to solve the puzzle of cooperation, this distinction has received considerably less empirical attention. Most studies on indirect reciprocity inform participants only about the decisions of their immediate recipient (e.g., Bolton, Katok, & Ockenfels, 2004; Engelmann & Fischbacher, 2009; Klapwijk et al., 2009; Seinen & Schram, 2006; Stanca, 2009; Wedekind & Braithwaite, 2002; Wedekind & Milinski, 2000). But to judge if a defection was justified or not one also needs information about the reputation of the person that one's immediate recipient has defected against. Moreover, as noted above, two studies that did provide such information showed that people responded to justified defection almost as uncooperatively as they did to unjustified defection (Bolton et al., 2005; Milinski et al., 2001). How can this be?

A critical examination of the concept of justified defection may be useful. If justified defection deserves more cooperation than unjustified defection does, it has to be because its underlying *motive* is reciprocated rather than the defection itself (Panchanathan & Boyd, 2003). That the motives for one's actions matter in reciprocity has been proposed

long ago (Gouldner, 1960; Nemeth, 1972), has been formalized in various models (Dufwenberg & Kirchsteiger, 2004; Falk & Fischbacher, 2006; Levine, 1998; Rabin, 1993) and has received good empirical support (Blount, 1995; Charness, 2004; Cox, 2004; Falk, Fehr, & Fischbacher, 2008; Offerman, 2002; Tazelaar, Van Lange, & Ouwerkerk, 2004; Van Dijk & Wilke, 1999, but see Bolton, Brandts, & Ockenfels, 1998). Perhaps, then, for defection to qualify as 'justified', it needs to be clear that it is not only committed against someone with a negative reputation, but has a just motive as well. Defecting to withhold benefits from a defector is a just motive—defecting to obtain higher personal outcomes is not. Consequently, knowing *that* defection was committed in response to defection, but not knowing *why* may still lead to little leniency, as observed in Bolton and colleagues (2005). But also when exhaustive reputation information is available, as in Milinski et al. (2001), it may not be obvious when defection is motivated by a desire to retaliate. Even someone with a positive reputation may occasionally defect against someone with a negative reputation for no other reason than greed. Thus, unlike what is often assumed in the indirect reciprocity literature, having information about previous behavior but not about its underlying motives may be inadequate to determine if defection is justified or not.

Another difficulty with the concept of justified defection is its complexity in practice (Milinski et al., 2001; Nowak & Sigmund, 2005; Panchanathan & Boyd, 2003). To judge if defection is justified, the reputations of the recipient and of the recipient's recipient need to be known. These, in turn, are an aggregate of all information about earlier cooperative or defective acts. Perception errors may therefore occur and incomplete information may impede proper judgment. But this difficulty, too, can be remedied when a recipient would simply signal if his or her motive to defect is just and not selfish. At the very least, this would provide additional, more direct information to base one's own decision to cooperate or defect on. Therefore, we will now turn to how such underlying motives for defection may be communicated and help in making a distinction between justified and unjustified defection.

3.1.2 Moral emotions and justified defection

Misinterpretation of justified defection not only damages the reputation of the person who committed it, but also takes away an opportunity for third parties to respond cooperatively. Both those who observe and commit justified defection therefore profit from a reliable way to communicate when defection is justified, so that it is not met with less cooperation. *Emotions* can fulfil exactly such a communicative function. A social-functional account of emotions (Keltner & Gross, 1999; Keltner & Haidt, 2001; Oatley & Jenkins, 1992) in fact suggests that emotions are relatively fast, involuntary and automatic

responses that coordinate social interactions by signaling one's intentions and motivations. This coordination potential helps people to overcome social challenges, many of which pertain to the problem of cooperation (Bowles & Gintis, 2003; Fessler & Haley, 2003; Keltner et al., 2006). Indeed, that the communication of emotions affects other people's willingness to cooperate has been repeatedly validated, mostly in bargaining studies (for a comprehensive review, see Van Kleef et al., 2008; see also Pietroni et al., 2008; Van Kleef & Van Lange, 2008; Van Kleef & De Dreu, 2009).

These studies have all focused on anger with its social function of rectifying injustice (Solomon, 1990). A common finding is that anger signals dissatisfaction with the demands of one's negotiation partner and a resulting unwillingness to make concessions before one's opponent does so. This may indeed induce cooperation, though escalation may also result (Van Kleef & Côté, 2007; Van Dijk et al., 2008). Another emotion that is less studied than anger but that appears to address defection at least as effectively is *disappointment* (Lelieveld et al., 2009; Van Kleef et al., 2006; Van Kleef & Van Lange, 2008; Wubben, De Cremer, & Van Dijk, 2009a). Disappointment is an emotional reaction to unfulfilled positive expectations (Van Dijk & Van Harreveld, 2008). In mixed-motive situations, characterized by both conflict and mutual dependence (Schelling, 1960), it therefore signals dissatisfaction with the other person's unexpected decision to defect instead of cooperate. Thus, both anger and disappointment signal that the antecedent of one's own defection is the perceived injustice of the other person's defection.

It should be noted, however, that this extensive literature has only examined what may be called *personal* anger or disappointment (Batson et al., 2007; Batson, Chao, & Givens, 2009), that is, anger or disappointment aimed to address undeserved harm or defection against *oneself*. But in indirect reciprocity, anger and disappointment would need to address defection that is committed against *others*, including strangers. Such emotions that uphold the social order against transgressions from others, even if one's own interests are not directly harmed, are called *moral emotions*, or, more specifically, *other-condemning* moral emotions (Haidt, 2003). Whereas anger, with its clear pro-social action tendency of rectifying injustice, is a prototypical other-condemning moral emotion (Haidt, 2003), disappointment has to our knowledge never been studied from a moral perspective. Yet, given the effectiveness of personal disappointment to avert defection in dyadic interactions, moral disappointment may quite possibly avert defection in third-party interactions as well. Defection in indirect reciprocity that is motivated by anger or disappointment, then, signals that this defection is a justified, moral action in response to unjustified defection and it should therefore not increase one's chances of being defected against. Justified and unjustified defection may thus be distinguished.

The paper proceeds as follows. First, we will test with a laboratory experiment if in a situation of indirect reciprocity the communication of anger and disappointment

indeed affects whether defection is seen as justified or unjustified and is responded to accordingly. Assuming that both emotions fulfil this function, one may then wonder how anger and disappointment differ from each other. We will therefore test in a follow-up scenario study if defection that elicits anger is believed to be committed by someone with a less positive reputation than defection that elicits disappointment. In a concluding laboratory study we will test both hypotheses simultaneously with a different paradigm.

3.2 EXPERIMENT 3.1: JUSTIFIED VERSUS UNJUSTIFIED DEFECTION

In Experiment 3.1 we will first examine if decisions in indirect reciprocity elicit anger and disappointment in observers and, in particular, if unjustified defection arouses more anger and disappointment than justified defection does. Second, we examine if third parties find defection out of anger or disappointment justified and respond accordingly. Below, we will formulate these hypotheses more specifically.

Our first claim is that observing unjustified defection in indirect reciprocity triggers the moral emotions of anger and disappointment. Unjustified defection, as observed when someone defects against a cooperative recipient, should therefore elicit more anger and disappointment than cooperation does, as observed when someone cooperates with a cooperative recipient (*Hypothesis 1*). To exclude the possibility that reported anger or disappointment reflects the more general experience of negative affect rather than these two discrete moral emotions, we also included the emotional state of boredom as a control measure. Boredom was chosen for its negative valence and its obvious lack of a moral component, while still being conceivable as a third party's reaction to a behavioral decision (Damrad-Frye & Laird, 1989). Our second claim is that anger and disappointment help distinguish justified and unjustified defection. Participants should then feel less angry and disappointed about defection against a defector than about defection against a cooperator (*Hypothesis 2*).

In the second part of the experiment, participants receive information about the emotions of their recipient, so that effects of communicated anger and disappointment can be contrasted against a no-emotion and a boredom condition. The boredom condition again serves to show that any emotion inferences do not merely stem from the negative valence of anger and disappointment. The main purpose of Experiment 3.1 is to show that the display of moral emotions allows one to distinguish justified and unjustified defection. Thus, we predict people to infer that the person to whom anger or disappointment is directed has defected (*Hypothesis 3a*) and that this defection was unfair or disreputable (*Hypothesis 3b*). Second, we predict that someone who reciprocates such unjustified defection out of anger or disappointment is perceived to do so for moral reasons and is thus

a just, reputable person (*Hypothesis 4*). Therefore, we expect participants to respond to this justified defection with cooperation rather than defection (*Hypothesis 5*).

3.2.1 Method

Participants and experimental design. Participants were 27 undergraduate students (12 men, 15 women; *M* age = 21.11) who participated voluntarily and received a show-up fee of €7. They were told in advance that this fee could decrease or increase to €5, €7, €9 or €11, depending on their own and other participants' decisions. In the first part of the experiment we used a within-subject design to manipulate the information participants had about their recipient's choice behavior (cooperated with cooperator vs. cooperated with defector vs. defected against defector vs. defected against cooperator). We measured participants' emotions, as well as their choice behavior, which could afterwards determine their eventual payoff. In the second part of the experiment emotion (disappointment vs. anger vs. boredom vs. no emotion) was the within-subject variable and we measured emotion inferences and choice behavior, which could, again, determine the payoff of participants.

Procedure. For this experiment we developed a new paradigm in which participants played for real money and in which full experimental control was maintained over the emotions that were communicated to participants. No deception was used, which renders alternative explanations based on any suspicion of participants unlikely (Hertwig & Ortmann, 2008a, 2008b; Kelman, 1967; MacCoun & Kerr, 1987; Taylor & Shepperd, 1996). Moreover, providing tangible financial incentives makes cooperation truly costly, so that participants make more realistic and less socially desirable choices (Camerer & Hogarth, 1999).

After participants had received their show-up fee and had been seated in separate cubicles, they proceeded with a first questionnaire. Participants, who were denoted with the letter M, read that in this experiment they would get the opportunity to help someone named person L. Person L had had the opportunity to help someone named person K, who had had the opportunity to help yet someone else. Participants knew that a future participant would in turn get the opportunity to help them. Thus, a chain was created such that participant could help and be helped by exactly one person[5]. Help could be given by

[5] We initiated the indirect reciprocity chain by having a participant that took part in an unrelated experiment agree to be provided an underpayment of €2 in exchange for the chance that the second person in the chain used the opportunity to help her. This second person took part in the same unrelated experiment, but could donate €2 of his reward to the first person, so that she would get €4. The procedure for the third person was the same as for

donating €2 of one's show-up fee to one's recipient. The experimenter would double this amount so that the recipient received €4. This situation allows for cooperation through indirect reciprocity because donating €2 is costly, but if a third party reciprocates this donation, the resulting benefit of €4 outweighs this cost.

To measure participants' emotional reactions to justified and unjustified defection, we used a variant of the 'strategy method' (Selten, 1967). This method requires participants to specify their response to every possible situation in a game, not just the specific situation that actually occurs. As a result, complete information about participants' responses can be obtained and compared without sacrificing experimental control. Accordingly, participants had to indicate how angry, disappointed and bored they felt (1 = not at all, 7 = very much) over person L's decision for each of the four possible situations that could emerge: (a) person L helped, but person K had not, (b) person L did not help, but person K had helped (c) both helped and (d) neither helped. Furthermore, for each of these situations they had to select which emotion they experienced most: "disappointment", "anger", "boredom" or "none of these". For experimental design purposes (see below) we also asked if in each situation participants wanted to donate €2 of their show-up fee to person L or not. Afterwards, when person L and K's actual decisions were known, participants could be paid accordingly.

Subsequently, the experimenter brought in a second questionnaire in which we again applied the strategy method (Selten, 1967). This time, participants had to indicate their response (cooperate or defect) for each possible answer that person L could have filled out in the first questionnaire. More specifically, participants could choose to donate €2 to person L for all of the following four possible situations: person L had not helped person K and felt (a) angry, (b) disappointed (c) bored or (d) no emotion information was available[6]. These situations were offered in random order. We also asked how many cents they would have donated if they could transfer any amount of money from 0 to 200 cents.

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the second person. The fourth person in the chain was the first participant in our experiment. The last participant in the chain received an overpayment of €3 in an unrelated experiment and was told that this was because he would get the opportunity to help the second last person in the chain by donating €2, which would be doubled to €4. All participants whose data are reported in Experiment 1 were told that they would be inserted in the middle of the chain, so that their help always benefited another participant and another participant always received the opportunity to help them. Participants were encouraged to ask for additional information about the first or last persons in the chain if they deemed this necessary for their decisions, but none did so.

[6] We also asked if participants wanted to help if person L had helped and no emotion information was available. Because the hypothetical situation that person L had cooperated instead of defected was irrelevant to our research question about justified and unjustified defection, we included this question only to determine participants' payoffs if the previous participant in the chain had actually cooperated.

When they filled out the first questionnaire, participants did not know that their answer would be communicated to other participants, so strategic motives for communicating a specific emotion were of no concern. Participants also had to indicate for each possible situation whether they thought person K had helped or not (-7 = definitely not, 0 = no idea, 7 = definitely so) and if person L and K were considered just and fair (1 = totally disagree, 7 = totally agree; all rs > .41, all ps < .03).

After having finished both questionnaires, participants were debriefed and paid separately to guarantee their anonymity. The experimenter randomly selected either the decisions in the first or second questionnaire to determine the payment. If the first questionnaire was selected, the experimenter looked up if the previous two players in the chain had cooperated or not and checked if the participant had decided to help in that case. If the second questionnaire was selected, the experimenter looked up the communicated emotion and decision of the previous participant in the chain and paid participants according to their decision. Participants that had helped returned €2 from their show-up fee of €7 to the experimenter, who deposited €4 on their recipient's bank account. Finally, participants provided their own bank account number and were thanked for participating.

3.2.2 Results

Experienced emotion[7]. To analyze if people's reported emotions in the first questionnaire about person L's decision to cooperate or not also depended on person K's decision, we conducted a 4 (recipient's choice behavior) × 3 (emotion) repeated-measures ANOVA, with both factors as within-subject variables. As in all similar analyses reported below, we employed a Huynh-Feldt (1976) adjustment to the degrees of freedom to correct for violations of sphericity. This yielded main effects of choice behavior, $F(2.36, 59.10) = 19.49$, $p < .001$, $\eta_p^2 = .43$, and emotion, $F(1.70, 44.24) = 24.38$, $p < .001$, $\eta_p^2 = .48$, which were qualified by a significant choice behavior × emotion interaction, $F(4.57, 118.74) = 10.07$, $p < .001$, $\eta_p^2 = .28$.

[7] Monetary decisions in the first part of the experiment were irrelevant to our hypotheses and measured only so that participants could reciprocate real instead of imaginary decisions in the second part of the experiment. Still, readers may be interested to know that our data strongly resembled those of Bolton et al. (2005): Cooperation with cooperators was more frequent than with defectors (55.56% vs. 11.11%) and these frequencies were not strongly affected by whether one's recipient cooperated with a cooperator or with a defector (17 out of 27 vs. 13 out of 27 cooperated, $p = .12$, two-tailed) or whether one's recipient defected against a cooperator or defector (1 out of 27 vs. 5 out of 27 cooperated, $p = .12$, two-tailed).

Table 3.1: Means (and standard deviations) of participants' reported emotions by choice behavior of previous participant (L) and the participant before that (K) in the chain.

Decision K	Decision L	Emotion Participant		
		Disappointment	Anger	Boredom
Cooperate	Cooperate	1.37_{a} (0.63)	1.37_{a} (0.69)	1.67_{ab} (1.24)
Defect		2.22_{d} (1.67)	1.52_{a} (0.98)	1.33_{a} (0.62)
Cooperate	Defect	4.44_{c} (1.85)	3.07_{d} (1.73)	1.89_{b} (1.01)
Defect		3.07_{d} (2.13)	2.37_{b} (1.61)	1.79_{b} (1.04)

Note. Higher scores indicate higher intensities of the reported emotions. Means in the same row *or* column with subscripts that do not contain one or two similar letters differ at $p < .05$.

We used planned comparisons to test for the relevant contrasts articulated in Hypotheses 1 and 2 (see Table 3.1 for all means and standard deviations). In line with Hypothesis 1, defection against a cooperator elicited more anger and disappointment than did cooperation with a cooperator (both *p*s < .001). That defection against a cooperator also elicited more anger and disappointment than it elicited boredom (both *p*s < .001) is evidence that unjustified defection specifically evokes moral anger and moral disappointment rather than just a global, negative affective state. Unexpected, but contributing to the status of disappointment as a moral emotion, is that the reported intensity of disappointment was higher than that of anger ($p < .001$). Furthermore, in line with the idea that unjustified defection elicits stronger other-condemning moral emotions than does justified defection, defection evoked more anger and disappointment in participants when committed against a defector than against a cooperator, ($p_{anger} = .019$, $p_{disappointment} = .002$; Hypothesis 2). Interestingly, we also found that cooperation with a defector elicited more disappointment than did cooperation with a cooperator ($p = .006$). This effect was not significant for anger ($p = .40$).

Table 3.2: Means (and standard deviations) of participants' own cooperation and inferences about persons K and L.

Dependent Variable	Communicated Emotion L			
	Disappointment	Anger	Boredom	No Emotion
Inferred Cooperation Decision K	-4.66_a (1.90)	-4.79_a (1.72)	0.04_b (3.02)	-1.31_c (2.13)
Justice Perceptions K	3.44_a (0.86)	2.93_b (1.24)	4.09_c (1.03)	3.76_c (0.91)
Justice Perceptions L	4.56_a (0.80)	4.50_a (0.87)	3.30_b (1.26)	3.74_b (1.04)
Donated Money to L	67.22_a (65.26)	68.89_a (68.00)	21.63_b (38.36)	36.11_b (57.38)
Number of €2 Donations	$9 / 27_a$	$8 / 27_a$	$2 / 27_b$	$3 / 27_b$

Note. Higher scores indicate higher cooperation or inferred cooperation and higher justice ratings. Means in the same row without identical subscripts differ at $p < .05$.

Cooperation and emotion inference. We first tested if participants inferred that anger and disappointment were evoked by defection that was unjustified, as measured in the second questionnaire (Hypothesis 3a and 3b, see Table 3.2 for all means and standard deviations pertaining to Hypotheses 3 to 5). A repeated-measures ANOVA with emotion as the within-subject variable showed indeed a main effect on the item measuring person K's choice behavior, $F(2.33, 60.56) = 33.73$, $p < .001$, $\eta_p^2 = .56$. Separate t tests revealed that when person L communicated anger or disappointment over person K's decision, participants were more likely to infer defection than when boredom ($t_{anger} = -7.23$, $p < .001$; $t_{disappointment} = -6.44$, $p < .001$) or no emotion was communicated ($t_{anger} = -7.23$, $p < .001$; $t_{disappointment} = -6.30$, $p < .001$). Another repeated-measures ANOVA on justice judgments showed that participants did not approve of person K's defection that they had just inferred, $F(2.35, 61.17) = 10.25$, $p < .001$, $\eta_p^2 = .29$. Separate t tests revealed that communicated anger or disappointment over person K's choice behavior led participants to

judge person K as less just than when boredom (t_{anger} = -4.13, p < .001; $t_{disappointment}$ = -2.83, p = .009) or no emotion was communicated (t_{anger} = -4.29, p < .001; $t_{disappointment}$ = -2.51, p = .019).

Participants in the anger and disappointment conditions inferred that person K had committed an unjustified defection. Would they then judge person L's defection against person K as fair (Hypothesis 4)? Another repeated measures ANOVA indicated that participants indeed did so, $F(2.27, 59.09) = 13.67$, p < .001, η_p^2 = .34. Person L was seen as more just when communicating moral anger or disappointment than when communicating boredom (t_{anger} = 4.13, p < .001; $t_{disappointment}$ = 4.78, p < .001) or no emotion (t_{anger} = 3.26, p = .003; $t_{disappointment}$ = 3.65, p = .001). Additional evidence that moral emotions justify defection is that person L was seen as quite fair, because one sample t tests showed person L's justice ratings to be above the midpoint of the 7-point scale (p_{anger} = .006, $p_{disappointment}$ = .001).

These data support our view that moral emotions signal unjustified defection, making that defecting in response is justified and does not lead to a bad reputation. But do participants actually meet such justified defection with cooperation (Hypothesis 5)? Due to the binary, non-independent nature of the cooperation measure, we used General Estimating Equations to obtain an omnibus test of this hypothesis (Diggle, Heagerty, Liang, & Zeger, 2002; Hardin & Hilbe, 2003), which indeed showed a main effect of emotion[8], $\chi^2(4) = 13.77$, p = .008. Separate one-tailed McNemar tests showed that communicated disappointment and anger elicited more cooperation than did boredom ($p_{disappointment}$ = .008, p_{anger} = .035) or no emotion ($p_{disappointment}$ = .016, p_{anger} = .031). Furthermore, repeated-measures ANOVA showed that emotion also affected cooperation if participants could have donated any amount of money from 0 to 200 cents, $F(2.62, 68.21) = 7.89$, p < .001, η_p^2 = .23. Again, anger and disappointment induced more cooperation than did boredom (p_{anger} = .002, $p_{disappointment}$ = .001) or no emotion (p_{anger} = .019, $p_{disappointment}$ = .006).

3.2.3 Discussion

Defection can have the unjust motive of selfishly maximizing personal gains or the just motive of withholding benefits from defectors. Distinguishing both motives is

[8] To test for order-effects of emotion we compared the fit of a model featuring only emotion with four models that also featured the interaction of emotion with the order in which one of four types of emotion feedback was provided. All these models provided a worse fit (all QICCs > 618.29) than the model with only emotion as a predictor (QICC = 532.29). We therefore collapsed choice behavior across order of emotion.

necessary to establish cooperation through indirect reciprocity. Experiment 3.1 showed that moral anger and disappointment help in making this distinction. These emotions are not only elicited by but also signal a previously committed unjustified defection. They communicate that defecting against this unjustified defection is a morally motivated, just course of action. Defection out of anger or disappointment is therefore met with more cooperation than when no emotional information is present. Moral emotions thus seem indispensable lubricants of indirect reciprocity. Yet an interesting, unanticipated finding remains. Cooperation with a defector, or 'unjustified cooperation', also elicited disappointment, albeit not as much as unjustified defection did. This suggests that cooperation can occasionally even damage one's reputation. In the general discussion we return to this issue.

3.3 EXPERIMENT 3.2: COMMUNICATED ANGER VERSUS DISAPPOINTMENT

So far, both anger and disappointment appear to help in distinguishing justified from unjustified defection. This begs the question how both emotions differ from each other.

Indirect reciprocity is based on the assessment and reassessment of reputation and the communication thereof. Consequently, it may be insufficient to merely communicate *that* someone's reputation has been damaged. It may also be necessary to give an indication of *how positive* someone's reputation initially was. With these two parameters—reputation positivity and reputation change—community members can inform each other how much the defective and cooperative acts of fellow members have damaged or improved their reputations (see also Beersma & Van Kleef, 2009). Experiment 3.1 already showed that anger and disappointment communicate reputation change. What we will propose and test in Experiment 3.2 is that both moral emotions differ in how positive they communicate a defector's initial reputation to be, such that the more positive a defector's initial reputation is, the more likely it is that this defection will elicit disappointment rather than anger.

There is some indirect theoretical support for the idea that moral anger and moral disappointment communicate differential reputations in indirect reciprocity. Recall that disappointment is the emotion that occurs if an outcome does not fulfil one's positive expectations (Van Dijk & Van Harreveld, 2008). Consequently, feeling disappointed in someone else should communicate that this person has not lived up to your high expectations or, put differently, to his or her positive reputation (cf. Lelieveld, et al., 2009; Timmers et al., 1998; Van Kleef, et al., 2006; Van Kleef & Van Lange, 2008; Wubben, et

al., 2009a). Moral disappointment should then be elicited when observing a person with a positive initial reputation commit a moral transgression such as unjustified defection.

Disappointment is characterized by a tendency to do nothing rather than by clear retributive action tendencies (Van Dijk & Van Harreveld, 2008). This may precisely be why disappointment is functional in addressing defection by people with a positive rather than a negative reputation. First, a positive reputation can only be obtained by being responsive to the needs of others, so the mere expression of disappointment itself may suffice to get someone with a positive reputation to repent. Second, because the other person is likely to remain a valuable interaction partner, announcing retaliation may, unlike signaling a tendency to do nothing, be overly harsh and lead to unwanted, irreversible escalation (Wubben et al., 2009a). This would be particularly unfortunate when the other's alleged defection stems from a misperception—a plausible explanation when somebody with a positive reputation suddenly defects (Van Lange et al., 2002). Add to this that a tendency to do nothing also includes a tendency to not engage in cooperative behavior and it is clear that communicating disappointment to people with a positive reputation may be very effective in addressing their defection. Observers, then, may in turn infer from communicated disappointment that the defector had a fairly positive reputation.

Anger, on the other hand, may be particularly effective in addressing defection from people with a less positive or even a negative reputation. Anger is evoked by a "demeaning offense against me and mine", whereby arbitrary, malevolent and inconsiderate offenses are particularly demeaning (Lazarus, 1991, p. 222). Rectifying such instances of injustice is the function of anger (Solomon, 1990) and this is achieved through threats, coercion and retaliation (Canary et al., 1998; Lerner & Tiedens, 2006). Anger is therefore a strongly interpersonal emotion (Averill, 1983) and its communication can indeed induce cooperation in others, (e.g., Sinaceur & Tiedens, 2006; Van Kleef et al., 2004a), but may backfire as well (Van Dijk, et al., 2008; Van Kleef & Côté, 2007). This suggests that communicating anger is quite a risky and drastic strategy that is best reserved for 'serious cases'. Such a case may occur when a person with a negative reputation, in spite of earlier warnings from others, defects yet another time. This would justify such radical measures as expressing anger and risking conflict, because coercion may be the only remaining option to induce cooperation. And even if, in the worst case, escalation would lead to enduring defection by the person with a negative reputation, this would still make only a relatively small difference compared to this person's usual behavior. Thus, moral anger is an apt response when someone with a negative reputation commits an unjustified defection and we therefore expect other people to infer this negative reputation when moral anger is communicated.

3.3.1 Method

Participants and experimental design. Seventy-five undergraduate students (17 males, 58 females; M_{age} = 19.63) participated voluntarily in exchange for €1 or course credits. Participants were randomly assigned to the emotion conditions.

Procedure. Upon arrival in the laboratory, people were seated in a cubicle and presented with a scenario titled "helping colleagues at work". We opted for the setting of a medium-sized work environment, because it would be familiar to undergraduates and the setting made forming reputations of all colleagues feasible and appropriate. Moreover, the nature of the cooperative behavior (see below) would make indirect reciprocity the predominant underlying mechanism of cooperation. Participants had to imagine having an administrative secondary job that required them to finish a specific amount of work before going home. As a result, some employees would occasionally happen to finish early and spend the rest of the day playing minesweeper and solitaire while others had to work late. Therefore, although it was completely voluntary, employees that finished early could, instead of leisurely playing games, choose to help those who would have to work late. We told that the benefit of not having to work late easily outweighed the cost of not being able to play games. Thus a situation arose where cooperation through indirect reciprocity would be possible: cooperation was individually costly, but would pay off when reciprocated by a third party.

Participants then read that Mark, a colleague who had been working at the organization for a few months and was equally productive as other employees, happened to have received two extra hours of work on five occasions, while having finished two hours early on five other days. In all cases colleagues were available to help him, but colleagues could also use his help at days he finished early. Participants subsequently read that on all five occasions they had observed whether or not Mark had actually helped. We then told participant that on the fifth occasion Mark did *not* help, but played games instead. No further information was provided about the other four occasions. Participants in the disappointment condition were then asked to imagine that they clearly did not feel angry, but *disappointed* about Mark's action of yesterday, whereas participants in the anger condition were asked to imagine that they clearly did not feel disappointed but *angry*. Participants in the no-emotion condition were not asked to imagine how they felt about Mark's defection.

Dependent measures. Our main dependent measure was how often participants thought Mark had helped in the first four occasions he had the opportunity. This is a good indication of Mark's initial reputation before his defection on the fifth occasion. After all, reputations are judgments based on someone's cooperative and defective acts in the past.

To facilitate comparison with Experiment 3.1, though, we also asked again how just and fair (r = .61, p < .001) participants judged Mark to be.

3.3.2 Results and discussion

Reputation inferences. One-way ANOVA revealed that our manipulation of emotion communicated reputation information, $F(2, 72) = 24.72$, $p < .001$, $\eta^2 = .41$. According to post-hoc tests, participants inferred from anger that Mark's defection was preceded by less cooperation (M = 0.46, SD = 0.58) than they inferred from disappointment (M = 2.18, SD = 1.19, p < .001) or no emotion (M = 1.95, SD = 1.08, p < .001). The disappointment and no- emotion conditions did not differ (p = .43). Justice perceptions mirrored these results, $F(2, 72) = 5.13$, p = .008, η^2 = .12. Again, Mark was judged as more unfair when in response to Mark's defection anger (M = 2.13, SD = 0.86) as opposed to disappointment (M = 2.96, SD = 1.17, p = .006) or no emotion (M = 3.00, SD = 1.35, p = .01) was experienced.

These results provide strong evidence for the idea that reputation positivity is a fundamental dimension along which communicated anger and disappointment differ. Disappointment, then, conveys that someone had a positive initial reputation before committing defection, whereas anger conveys that someone has a less positive or negative initial reputation before committing defection.

3.4 EXPERIMENT 3.3: JUSTIFIED VERSUS UNJUSTIFIED DEFECTION AND ANGER VERSUS DISAPPOINTMENT

Experiment 3.1 showed that moral emotions signal whose motives for defection are just and unjust, such that they can be reciprocated accordingly. Experiment 3.2 showed that when someone commits an unjustified defection, disappointment communicates this person to have a more positive reputation than anger does. In Experiment 3.3 our aim was to replicate and extend both findings by using a new paradigm that also allows us to rule out some alternative explanations.

Again we predict that moral emotions help to reciprocate unjustified defection with justified defection and that such justified defection is met with more cooperation than when no emotion would be communicated. However, whereas in Experiment 3.1 participants had to respond to justified defection, we will now let them respond to unjustified defection. Consequently, participants should infer from the communication of anger and disappointment as opposed to no emotion that their recipient has defected and

was not justified in doing so. They should then also be more likely to respond with defection. Furthermore, because in the anger and disappointment conditions this defection would then be justified, participants should expect that the choice behavior of future donors would show relatively much approval of defection compared to cooperation, whereas this would not be the case in the no-emotion condition. The person who communicates emotion now also fulfils a different role than in Experiment 3.1. This person will be an observer who has acquired unique information about the reputation of the person that committed unjustified defection. We then expect participants to infer from this observer's expression of moral emotion, as in Experiment 3.2, that the reputation of a defector is more positive when disappointment as opposed to anger is communicated.

All in all, this new paradigm has several advantages. First, replicating the results of Experiment 3.1 in a situation where both people who communicate and receive emotional information have different roles testifies to the generalizability of our findings and to the flexibility of moral emotions as lubricants in indirect reciprocity in general. Second, unlike Experiment 3.1, we will not begin the experiment by measuring emotions in response to other people's choice behavior, thereby ruling out any priming effects and demand characteristics of this first questionnaire. Third, whereas participants in Experiment 3.2 had to imagine that they themselves would feel angry or disappointed, participants now have to make inferences about other people's communicated anger and disappointment. And fourth, whereas in Experiment 3.1 participants were informed that their recipient had defected, we did not provide this information in Experiment 3.3. Thus, if we replicated the findings of Experiment 3.1 and 3.2 by providing even less information to participants and introducing several methodological refinements that contribute to a more conservative test of our hypotheses, then this would deliver strong support for the idea that moral emotions are essential lubricants in indirect reciprocity.

3.4.1 Method

Participants and experimental design. Participants were 79 undergraduate students (26 men, 53 women; M_{age} = 19.86) who participated voluntarily in exchange for course credits. Participants were randomly assigned to the disappointment, anger, or no-emotion conditions.

Procedure. Participants entering the laboratory were welcomed and seated in separate cubicles behind a computer. We told them that in this experiment they would have to make financial decisions that would affect how many lottery tickets they would receive in a raffle with several €10 prizes. Participants could donate up to ten lottery tickets in each trial to other participants, who would then receive twice the number of donated

tickets. We explained that their chance to win a prize was independent of how many tickets other participants had accumulated. As in Experiments 3.1 and 3.2, this makes cooperation through indirect reciprocity possible, because donating tickets reduces one's chances of winning a prize, but pays off when it is reciprocated by a third party.

In the first part of the experiment we created a situation in which a person would supposedly obtain reputation information that the participant would not have. Because this person would also communicate anger or disappointment in the second part of the experiment, we could test if participants indeed inferred a more positive or less negative reputation from disappointment than from anger. In the first part, participants were therefore allegedly at random appointed to the role of observer in a sequential give-some dilemma between two other participants. In this game, one participant, named person K, would first get three opportunities to donate up to ten lottery tickets to the other, named person L. Person L would subsequently get three opportunities to donate tickets back to person K. All donated tickets would be doubled. Participants observed that both persons got forty lottery tickets and that in each of the first three trials person K donated eight out of ten tickets to person L. Participants did not get to see how many tickets in each of the following three trials person L donated back to person K, but person K did allegedly get to see this. The task was repeatedly interrupted with short delays to make participants believe that the computer connected to the server to transfer the information.

In the second part of the experiment participants played an indirect reciprocity game. They therefore received, like person K and L before, forty tickets. After a short wait, we told them that person L was given another opportunity to donate lottery tickets, this time to another unknown participant from a previous research session. Person L could decide to either donate 0 or 10 tickets and this amount would be doubled. Person K was said to have secretly observed person L's decision. Participants would then get the opportunity to help person L by donating any number of tickets between 0 and 10. An unknown participant from a future session would get the opportunity to help the participant.

This explanation of the second part was followed by the emotion manipulation. Person K, who the participant thought had seen all of person L's decisions, would communicate to the participant how he or she felt about person L's decision in the indirect reciprocity game. After a short wait, participants in the anger condition read that person K felt angry about person L's decision whereas participants in the disappointment condition read that person K felt disappointed. In the no-emotion condition no such information was provided. Next, the dependent variables were measured and finally the participants were debriefed, thanked and paid. One week later the winners of the lottery were announced.

Dependent measures. After the emotion manipulation we first asked whether participants thought that person L had decided to cooperate with the participant from the

previous session (-7 = definitely not, 0 = no idea, 7 = definitely so) and if person L was perceived as just and fair (1 = totally disagree, 7 = totally agree; r = .69, p < .001). Subsequently, we asked participants how many tickets they would want to donate to person L. We also measured if participants believed that the participant from a future session would help them in case they would have donated 0 tickets and in case they would have donated 10 tickets (1 = totally disagree, 7 = totally agree). For both questions participants had to assume that this future participant would have the same information about person K and L as they themselves had. This allowed us to measure expectations of future cooperation while controlling for participants' actual donations. Next, we measured how positive a reputation participants believed that person L had obtained in the first part of the experiment. We therefore asked how many lottery tickets participants thought that person L had donated back to person K in trials four, five and six during the first task (α = .93). Finally, we administered two manipulation checks by asking to what extent person K felt disappointed and angry about person L's decision toward the participant from the previous session.

3.4.2 Results

Manipulation checks. If our emotion manipulation was successful we should find an interaction between the emotion that was communicated and participants' perceptions of the emotion that was communicated. That is, participants should fill out higher scores for the emotion that person K communicated than for the other emotions (a within-participants check) and reported disappointment should be highest in the disappointment condition whereas reported anger should be highest in the anger condition (a between-participants check). A 3 (emotion: disappointment vs. anger vs. no emotion) × 2 (rating: disappointment vs. anger) did indeed yield an interaction, $F(2, 73) = 23.36$, p < .001, $\eta_p^2 = .39$. Planned comparisons showed that participants in the anger condition rated person K as more angry (M = 5.58) than did participants in the disappointment (M = 3.54, p < .001) or no-emotion condition (M = 3.41, p < .001). Also, participants in the disappointment condition rated person K as more disappointed (M = 5.50) than did participants in the no-emotion condition (M = 3.85, p < .001). The difference between the disappointment rating in the disappointment and anger conditions was marginally significant ($M_{\text{disappointment}} = 5.52$, $M_{\text{anger}} = 5.03$, p = .089). Furthermore, paired-sample t tests revealed that the participants' in the disappointment condition rated person K as significantly more disappointed than angry (p < .001) and that participants in the anger condition rated person K as significantly more angry than disappointed (p = .02).

Table 3.3: Means (and standard deviations) of participants' own cooperation, expected cooperation from the next person in the chain and inferences about person L.

Dependent Variable	Communicated Emotion		
	Disappointment	Anger	No Emotion
Inferred Cooperation	-3.44_a	-3.33_a	3.41_c
Decision L	(2.40)	(2.75)	(2.62)
Justice Perceptions L	3.12_a	3.22_a	4.10_b
	(0.85)	(0.81)	(0.45)
Donated Lottery Tickets	5.72_a	5.75_a	7.19_b
	(2.35)	(2.66)	(2.09)
Expected Cooperation When Donating 10 Tickets	5.20_a	4.83_a	5.90_b
	(1.12)	(1.43)	(0.60)
Expected Cooperation When Donating 0 Tickets	2.84_a	3.33_a	2.63_a
	(1.43)	(1.69)	(1.86)
Reputation	18.21_a	14.83_b	22.85_c
	(5.59)	(7.87)	(3.50)

Note. Higher scores indicate higher cooperation, reputation and justice ratings. Means in the same row without identical subscripts differ at $p < .05$.

Cooperation and emotion inferences. Did anger and disappointment signal unjustified defection? A one-way ANOVA showed that they did, $F(2, 73) = 59.88$, $p < .001$, $\eta^2 = .62$ (for means and standard deviations of Experiment 3.3, see Table 3.3). According to post-hoc tests, participants estimated it less likely that person L had cooperated when disappointment or anger ($M_{disappointment} = -3.44$, $M_{anger} = -3.33$) rather than no emotion was communicated ($M = 3.41$, both ps $< .001$). That anger and disappointment scores deviated from the midpoint of the scale ($t_{anger} = -7.17$, $t_{disappointment} = -5.95$, both ps $< .001$) is additional evidence that participants inferred defection. Moreover, a one-way

ANOVA on justice judgments showed the same pattern, $F(2, 73) = 14.46$, $p < .001$, $\eta^2 = .28$. Person L was perceived as less fair when anger or disappointment were communicated ($M_{disappointment} = 3.12$, $M_{anger} = 3.22$) as opposed to no emotion ($M = 4.10$, both ps $< .001$), thereby indicating that person L's defection was unjustified.

Did participants meet this unjustified defection by defecting themselves? A one-way ANOVA indeed showed a main effect of emotion, $F(2, 73) = 3.26$, $p = .04$, $\eta^2 = .08$. Post-hoc tests revealed that disappointment and anger about person L led participants to cooperate less with this person ($M_{anger} = 5.75$, $M_{disappointment} = 5.72$) than when no emotion was communicated ($M = 7.19$, both ps $= .03$). Hence, participants responded to communicated anger and disappointment with defection.

Finally, when comparing the anger and disappointment conditions to the no-emotion condition, the choice behavior that participants expected from their future donor should be relatively favorable if they would have defected instead of cooperated. A 3 (emotion) × 2 (participants' decision: cooperation vs. defection) mixed-model ANOVA indeed yielded this interaction, $F(2, 73) = 4.05$, $p = .01$, $\eta_p^2 = .12$. Interestingly, simple-effect analyses showed that participants' defection seemed not so much encouraged by their expectation of a cooperative response ($F[2, 73] = 1.16$, $p = .32$) but rather by their expectation of a relatively uncooperative response if they would have cooperated, $F(2, 73) = 6.40$, $p = .003$, $\eta^2 = .15$. Accordingly, post-hoc tests showed that when anger or disappointment was communicated, participants expected their cooperation to be met with less cooperation than when no emotion was communicated ($p_{anger} = .001$, $p_{disappointment} = .02$). Thus, when deciding how to respond to unjustified defection, communicated anger and disappointment make the option of cooperation less attractive and as such encourage justified defection.

Experiment 3.3 has thus far provided additional evidence for every hypothesis tested in Experiment 3.1. To replicate the main finding of Experiment 3.2 that disappointment communicates a more positive initial reputation than anger does, we conducted a one-way ANOVA on the number of lottery tickets that participants believed person L had donated in the first part of the experiment. This yielded a main effect of emotion, $F(2, 73) = 12.13$, $p < .001$, $\eta^2 = .25$. Post-hoc tests revealed that participants inferred a more positive initial reputation when disappointment ($M = 18.21$) versus anger ($M = 14.83$) was communicated, $p = .047$. Furthermore, when no emotion was communicated such that participants had no reason to assume defection in the first place, person L's inferred initial reputation was higher ($M = 22.85$) than when anger or disappointment was communicated ($p_{anger} < .001$, $p_{disappointment} = .003$).

3.5 GENERAL DISCUSSION

Our studies support the central hypothesis that the display of moral emotions allows people to distinguish when defection is justified and unjustified in indirect reciprocity and act accordingly. When moral anger or disappointment was communicated, people tended to (a) infer that an unjustified defection had been committed, (b) retaliate against this defector by defecting, and (c) respond with cooperation to such justified defection. We also showed that disappointment signaled a defector to have a more positive reputation than did anger. Our results thus show that moral emotions function as indispensable lubricants of indirect reciprocity that allow people to assess, communicate and act upon the reputations of others. Below, we will further outline and elaborate on our findings and subsequently discuss contributions and implications of our research, as well as possible limitations and avenues for future research.

3.5.1 Summary of findings

We began by showing that defection in indirect reciprocity does indeed elicit anger and disappointment (Experiment 3.1). Moreover, these emotions were stronger when witnessing defection against a cooperator than when witnessing defection against a defector. Because the latter instance of defection is more justified, this provides evidence that anger and disappointment differentiate between unjustified and justified defection. Note that these potent emotional reactions were evoked even though participants did not experience any direct disadvantage from the completely anonymous defection they observed. This defection, that did not harm participants' interests, therefore qualifies in Haidt's (2003) terms as a disinterested elicitor. Because a defining characteristics of moral emotions is that they are triggered by such disinterested elicitors (Haidt, 2003), our findings not only attest to the functionality of moral anger or outrage, but also introduce disappointment as a potential moral emotion. Moreover, disappointment over defection could not have been reported for strategic reasons, was even reported at higher intensities than was moral anger or than when no moral transgression was present and did not merely reflect the experience of non-discrete negative affect. These findings further increase the credibility of disappointment as an other-condemning moral emotion.

Anger and disappointment are not merely a private reaction to unjustified defection, however. Experiments 3.1 and 3.3 showed that they also fulfil an important communicative and regulatory function in indirect reciprocity. First, the display of moral anger and disappointment makes publicly known who has stooped to defection. Second, such moral disapproval signals that the rightful response is to defect and, indeed, this is

what participants did. Finally, the moral motivation behind this defection encouraged an equally moral response: cooperation. Moral anger and disappointment thus signal who defected and why, so that unjust motives can be met with defection and just motives with cooperation. This enables people to establish cooperation through indirect reciprocity.

Why at least two separate emotions deal with defection in indirect reciprocity was shown in Experiments 3.2 and 3.3. Indirect reciprocity is a game of reputations and these may vary considerably between people. Consequently, effective ways of dealing with unjustified defection may also vary. When people with a negative reputation defect yet again, a forceful, antagonistic response like anger may be required, whereas people with a positive reputation may only need to hear that they did not live up to their precious reputation. Accordingly, people inferred that a defector had a more positive initial reputation when disappointment as opposed to anger was communicated. The previous findings that people who express disappointment instead of anger are perceived to be more pro-socially motivated (Lelieveld, et al., 2009) and forgiving rather than retaliatory (Wubben et al., 2009a) also follow from our idea that disappointed people still envision their interaction partner as relatively valuable, reputable and worthy of future cooperation.

We also obtained an interesting finding that we did not specifically predict: people cared about unjustified *cooperation*, too. In Experiment 3.1, cooperation with a defector elicited more disappointment than cooperation with a cooperator did. Furthermore, in Experiment 3.3 people feared that if they would cooperate with a defector, others would in turn defect against them. These findings, however, are not unprecedented in indirect reciprocity theory, which, in fact, has identified conditions under which defection in response to unjustified cooperation can be an established norm that promotes cooperation (Ohtsuki & Iwasa, 2004; 2006; Nowak & Sigmund, 2005). Apparently, then, moral anger and disappointment are not triggered specifically by unjustified defection, but rather by any deterioration of reputation. With that being said, unjustified defection did emerge as the cardinal transgression. In Experiment 3.1, it elicited more anger and disappointment than unjustified cooperation did. In Experiment 3.3 participants explicitly indicated that anger and disappointment was a clear sign of unjustified defection and not of unjustified cooperation.

Thus, whereas defection against unjustified cooperation might be justifiable, such a norm does not prove as widespread as refusal to cooperate with defectors.

3.5.2 Implications and contributions

Indirect reciprocity has been studied mainly by economists, biologists and game theorists. This has yielded convincing evidence that indirect reciprocity can establish

cooperation, as is also evident from the increasing popularity of reputation mechanisms to regulate anonymous one-shot business transactions (e.g., in web-based auctions). Psychologists may contribute by elucidating in what situations and how exactly people process which specific input to successfully deal with situations of indirect reciprocity. As it turns out, having exhaustive, descriptive information of who cooperated with who is insufficient input for people to distinguish situations in which defection is justified versus unjustified (Milinski et al., 2001). Having complementary information about moral emotions experienced by other people is at least as useful. Moral emotions provide information about the motives behind people's behavior, making that defection may actually be perceived as fair and in that case be met with cooperation. The nuance, then, that not only actual behavior, but also its perceived underlying motivation influences people's decisions to cooperate opens up indirect reciprocity even more to future psychological study.

Although cooperation has received little psychological attention in situations of indirect reciprocity, it has been widely studied in situations called social dilemmas. Social dilemmas include problems such as deforestation, the emission of greenhouse gases and free-riding on the efforts of others in team projects and have in common that acting in one's individual interest damages the collective interest (Weber et al., 2004). Both social dilemmas and indirect reciprocity therefore take place in groups, but in indirect reciprocity defective acts can be intentionally directed at specific defectors whereas in social dilemmas they disadvantage the whole group, including its cooperators. Cooperation therefore typically breaks down over time during later trials in social dilemmas, unless these trials are alternated with indirect reciprocity trials, so that defectors in the social dilemma can be singled out and defected against (Milinski, Semmann, & Krambeck, 2002; Rockenbach & Milinski, 2006; see also Fehr, 2004; Panchanathan & Boyd, 2004). We show that such instances of justified defection are driven and coordinated by moral emotions. And, importantly, in social dilemmas moral emotions can, unlike justified defection, actually be directed at specific individuals (Wubben, De Cremer, & Van Dijk, 2009c). Display of moral emotions in social dilemmas may therefore, despite its lack of scholarly attention, increase cooperation to the high levels typically observed in indirect reciprocity. More specifically, cooperation may increase because moral emotions allow group members to show their dissatisfaction with a defector through more appropriate ways than defecting (Xiao & Houser, 2005). Furthermore, compared to defection, moral emotions could more effectively rally support for structural solutions such as punishing, sanctioning or excluding specific defectors (Fehr & Fischbacher, 2003; Fehr & Gächter, 2000; Mulder, Van Dijk, De Cremer, & Wilke, 2006; Ouwerkerk, Kerr, Gallucci, & Van Lange, 2004; Yamagishi, 1986). And finally, moral emotions may avert a negative spiral

of defection by communicating that one's own defection is solely motivated by getting defectors to repent and is therefore merely of a temporary nature.

These virtues of moral emotions may be met with reticence by those who advise caution when labelling emotions, and particularly anger, as moral (Batson et al., 2009; Batson et al., 2007; Montada & Schneider, 1989). Batson and colleagues point out that the critical elicitor of moral anger—the violation of a moral standard—has never been disentangled from the victim's relevance to one's own identity. In fact, when they did disentangle both elicitors, they found that the moral violation of torture only aroused considerable anger when the identity of the victim was relevant to the participants and not when it was irrelevant—even though both violations were judged as equally immoral. Consequently, what has always been studied as moral anger might instead actually be identity-relevant *personal* anger. Our research may help remove such doubts about whether sincere moral anger or moral outrage really exists. This is because in Experiment 3.1 we do find, unlike Batson and colleagues, strong evidence of moral anger. Defection is more morally justified against a defector than against a cooperator and indeed elicited less anger. But, importantly, the relevance of the victim's identity and the amount of inflicted harm were kept equal in both cases and therefore do not present an alternative explanation for the emergence of moral anger. Batson and colleagues (2009) noted that such a finding, combined with theirs, would be evidence that moral anger exists, but is conditional. That is, whereas moral judgments are applied universally, moral emotions are aroused only when the violation harms an identity-relevant person. This conditional nature of moral anger may be beneficial given that anger is highly energy-consuming (Cannon, 1929), but the downside of this may be that, for example, charities should not count on moral anger to motivate donations to victims of injustice as long as these victims are perceived as irrelevant to the donor's identity.

Though the present results show, as with moral anger, that the violation of a moral standard is the critical elicitor of moral disappointment too, the more pressing theoretical question at hand is how moral disappointment fits in with the three other moral emotions that may be experienced when witnessing a transgression: contempt, anger and disgust (Haidt, 2003). Rozin, Lowery, Imada and Haidt (1999) have presented evidence that these three emotions map cleanly onto three different moral domains: Community, Autonomy and Divinity. Consequently, violations of communal codes elicit contempt, violations of individual rights elicit anger and violations of purity or sanctity elicit disgust. Should this so-called *CAD-hypothesis* be extended with a fourth domain to accommodate disappointment? We believe not. Disappointment is an emotional reaction to any type of unfulfilled positive expectations (Van Dijk & Van Harreveld, 2008) and therefore not specific to any moral domain. A minor moral violation by someone with a positive reputation in one of the three domains may then be satisfactorily addressed with

disappointment. Community, autonomy or divinity violations by frequent defectors can then, as the CAD-hypothesis states, be met with, respectively, the more drastic emotions of contempt, anger, or disgust.

3.5.3 Possible limitations and future research

Before closing with some avenues for future research, we wish to discuss a possible limitation to our findings: there was no face-to-face interaction. We decided against a procedure with face-to-face interaction to maintain full experimental control, thus increasing our confidence in a causal link between the communication of moral emotions and cooperation in indirect reciprocity. Caution is therefore advised when generalizing these results. However, as is evident from reputation-based e-commerce, indirect reciprocity often occurs without face-to-face interaction and information about third parties is frequently obtained through media such as e-mail, short message services (SMS), web logs and letters, all of which bear resemblance to our experimental procedures (Dellarocas, 2003; Ling, 2008; McGrath & Hollingshead, 1994; Solove, 2007). Moreover, research paradigms similar to ours have produced findings that have been replicated when emotions were communicated non-verbally (Pietroni, et al., 2008, see also Van Kleef et al., 2009) or in face-to-face settings (Sinaceur & Tiedens, 2006). Thus, we have no *a priori* reasons to doubt the external validity of our findings, but future research on the generalizability of emotion effects in indirect reciprocity would nevertheless be desirable.

Other avenues for future research also readily present themselves. Moral emotions communicate whose reputations are positive and negative and how the latest events changed them. Would emotion intensity then communicate the magnitude of this change? And would changes in an intermediate reputation elicit a mixed emotion? Can emotion information also lead to a reinterpretation of someone's motives for previous defections? If anger and disappointment, both other-condemning moral emotions, affect reputations negatively, do other-praising moral emotions such as gratitude, admiration and elevation then affect reputations positively (cf. Haidt, 2003; Algoe & Haidt, 2009)? Are particularly stubborn defectors that need to be excluded because they undermine the whole community identified through contempt instead of anger or disappointment (cf. Fischer & Roseman, 2007; Rozin et al., 1999)? How do emotions regulate reputations when opportunities to cooperate are not symmetrical (cf. Keltner, Van Kleef, Chen & Kraus, 2008)? And can the reputation dynamics that underlie indirect reciprocity be interpreted in terms of the insights that the emerging literature on gossip has to offer (cf. Baumeister, Zhang, Vohs, 2004; Beersma & Van Kleef, 2009; Dunbar, 2004 Emler, 1994; Foster, 2004)? Answers to these

questions may shed further light on perhaps the most important mechanism for cooperation: indirect reciprocity.

3.5.4 Conclusion

Indirect reciprocity can establish cooperation. Evolutionary game theory proves this and everyday observation verifies it. Now it is up to the social sciences to solve the puzzles that separate both extremes. We embarked on this undertaking by showing how people manage to defect against defectors without unleashing a chain reaction of defection. For this it has to be clear not only *that* someone has defected, but also *why*. Moral emotions communicate both. As a result, justified and unjustified defections can be distinguished, reputations reassessed and decisions to cooperate reconsidered. Thus, moral emotions appear indispensable lubricants of indirect reciprocity: they allow just motives to be reciprocated with cooperation and unjust motives with defection.

CHAPTER 4

4. WHEN EMOTIONS OF OTHERS AFFECT DECISIONS IN PUBLIC GOOD DILEMMAS: AN INSTRUMENTAL VIEW[9]

4.1 INTRODUCTION

In our lives we belong to many groups. Whereas these groups serve many of our interests, it is also true that on many occasions our individual interests conflict with the collective interest of the group. Research on social dilemmas investigates people's decisions when individual and collective interests collide (for reviews, see e.g. Messick & Brewer, 1983; Weber et al., 2004). Consider the situation in which a group wants to provide a public good, that is, a good that may benefit all members, even those who do not contribute to its provision. Often such public goods can only be achieved if the contributions surpass a certain threshold or *provision point*. In such a situation, individuals may be tempted to free-ride on the contributions of others by refraining from contributing themselves. But if every group member follows this strategy of self-interest, the contributions will fall short and the public good will not be provided.

Whereas people often think of public good dilemmas as pertaining to large scale settings such as the issue of contributing to reduce the CO_2 emission, many public good dilemmas that people face, such as team projects, take place in small group settings (see e.g., Hart & Van Vugt, 2006; Kerr, 1989). In such public good dilemmas group members often want to coordinate how much each member will contribute to the provision of the public good (Van Dijk & Wilke, 1993). The most obvious way of coordination is through intragroup discussion and extensive research has indeed shown that this increases the collective outcome (e.g., Dawes, van de Kragt, & Orbell, 1990; Kerr & Kaufman-Gilliland, 1994). However, often it is not feasible to solve public good dilemmas this way, making that group members are encouraged to find more *implicit* ways of coordination. Examples of cues used for tacit coordination are group members' endowment sizes (Van Dijk & Wilke, 1995), their social value orientation (De Kwaadsteniet, van Dijk, Wit, & De Cremer, 2006) and their use of reciprocity (Komorita et al., 1992).

In the present article, however, we argue that an important, socially informative cue has not been examined yet in public good dilemmas: The emotions displayed by the other group members. We posit that the emotions that group members communicate allow people to infer whether or not the group can be expected to act fairly. These inferences subsequently affect people's decisions in social dilemmas. We will argue and demonstrate

[9] This chapter is based on Wubben, De Cremer, & Van Dijk (2008)

that particularly the emotions of those who are most instrumental in providing the public good (i.e., those who have most resources available) will be influential.

4.1.1 Communicated emotion as a socially informative cue in public good dilemmas

The question of what exactly emotions are has been subjected to extensive research. Keltner and Gross (1999) define emotions as "episodic, relatively short-term biologically based patterns of perception, experience, physiology, action, and communication that occur in response to specific physical and social challenges and opportunities" (p. 468). However, relative to the amount of research that has been done on the structure of emotions, the question of whether emotions also influence social interactions has been vastly underrepresented. Only recently, researchers have started to focus on the potential of emotions to regulate and coordinate social interactions (i.e., a functional account; Keltner & Gross, 1999). In particular, researchers have acknowledged that someone communicating an emotion may signal certain intentions to the other interaction partner(s), who could subsequently take these into account for his or her future actions.

Recent work by Van Kleef and colleagues (2004a) illustrates this point very clearly. These authors presented participants with a two-player negotiation paradigm in which the simulated negotiation opponent communicated either anger or happiness. Their results showed that participants adjusted their demand level accordingly. When anger was expressed, participants placed lower demands and made more concessions, while the opposite tendency occurred when happiness was communicated. Van Kleef et al. (2004) theorized that as an angry opponent could not be expected to make any (further) concessions, the only way to prevent the negotiation from ending in an impasse would be by making concessions oneself. In contrast, participants should infer from happiness that there was no threat to reaching an agreement, so that the necessity to concede would be lower. In concordance with this explanation, they showed that this effect of communicated emotion on demand level was mediated by the inferred limits of the negotiation partner. In short, these studies clearly show that in interdependent social interactions people readily use communicated emotions to make inferences, which are then used as the basis for subsequent actions (see also Van Kleef et al., 2006).

The above studies were conducted in dyadic negotiation settings. In the current article, we aim to investigate whether a functional account of emotions may also be applied to public good dilemmas – another type of mixed-motive situation (Komorita & Parks, 1994). More specifically, will people pay attention to emotions that fellow group members express about, for example, the collective contributions in a team project? Will

people find it useful to know the emotions of a chairperson in a club concerning the contributions of other volunteers or the contributions of all financiers? We expect that they will, because emotions signal justice intentions which are important for future decision-making within the group (De Cremer et al., 2007). In work teams, for example, people may infer from emotions that their group members are unlikely to arrive at a fair distribution of tasks and that as a result they would have to do an unfair amount of work to make the team project a success. This may lead them to take rigorous actions, such as leaving the group (see below). Furthermore, because more actors are involved in public good dilemmas than in dyadic negotiation settings, group members are typically less certain about how much the others will contribute, making coordination more of an issue. Hence, the display of an emotion by a group member can be expected to be an even more informative cue in such a situation.

4.1.2 Anger and guilt as coordination means in social dilemmas

In the current studies we will focus on two discrete emotions that have been shown to predict actions in social dilemmas: anger (Stouten et al., 2005) and guilt (Ketelaar & Au, 2003). As we will argue below, both anger and guilt elicit justice related inferences. Therefore we will examine whether these inferences mediate the effects of these two emotions on decision-making in public good dilemmas.

Anger can be briefly defined as the emotion that is being provoked by "a demeaning offense against me and mine" (Lazarus, 1991, p. 222). An offense is particularly demeaning when it is inconsiderate, arbitrary or malevolent (Lazarus, 1991). From a functional perspective, anger serves to rectify injustice (Lerner & Tiedens, 2006; Solomon, 1990). Thus, when in a group a person communicates anger, one may infer that an unfair act has happened (De Cremer, Wubben, & Brebels, 2008). Indeed, in social dilemma settings it has been consistently shown that self-interested, defective behavior elicits anger in group members (e.g., Dawes et al., 1977; Schroeder, Steel, Woodell and Bembenek, 2003), which subsequently motivates them to take retributive measures against the defector (De Kwaadsteniet, Van Dijk, Wit, & De Cremer, in press; Stouten et al., 2006). Thus, a group member who is angry may not be expected to contribute many resources to the common pool, seeing that this would only encourage even more exploitative behavior. So when anger is communicated to a third group member, this person may not expect the others to strive for a fair contribution to the public good in the near future – at least not until the defector has diametrically changed his or her behavior.

When guilt is communicated on the other hand, the opposite prediction can be made about the anticipated justice in the group. Guilt can briefly be described as the

emotion that is experienced after "having transgressed a moral imperative" (Lazarus, 1991, p. 240). Thus, unlike anger, guilt communicates that it is not another person but one self who is responsible for a detrimental or unfair action toward the other group members. And with it, it communicates an intention to repair this deleterious action (Baumeister et al., 1994; Keltner & Buswell, 1997). Thus, when in a public good dilemma guilt is communicated to a third group member, this person will infer that the transgressor is out to restore justice in the group (Ketelaar & Au, 2003; Schroeder et al., 2003). It can be concluded, then, that communicated guilt will lead a third party to anticipate a higher level of justice in the group than when anger is communicated.

Will the emotion of *any* group member have a similar effect on one's justice inferences and decisions? Or, will it depend on the extent to which the group member communicating the emotion is instrumental in providing the public good? In social dilemmas often group members are not equally influential or powerful (De Cremer, 2007). In the social dilemma literature such situations are known as asymmetric public good dilemmas, referring to the notion that some members are more instrumental in providing the public good than others (Van Dijk & Wilke, 1993). This notion is commonly modelled by varying group members' endowment sizes, effectively making some group members "wealthier" than others. Research on such asymmetric dilemmas has revealed that differences in endowments make those with high endowments contribute more to the public good and feel more critical and influential than those with fewer endowments (De Cremer & Van Dijk, 2002; Van Dijk & Wilke, 1995).

In the present research, we argue that particularly the emotions of the group members who are highly instrumental in providing the public good (i.e., wealthy members) will influence people's decisions. The notion that emotions have a function of coordinating social interactions suggests that other group members are capable of being responsive to the displayed emotions (Keltner & Gross, 1999). In the case of asymmetric step-level public good dilemmas, the main reason for coordinating the social interaction is to reach the provision point. In this view, it follows that the person who is most instrumental in reaching this provision point (that is, the one who possesses the most resources) is most important for efficient coordination. Therefore we predict that group members will be more responsive to the emotion of a wealthy person than of a person who can contribute relatively little to the public good.

4.1.3 Behavioral reactions: Exit and democratic leadership

Even though research on public good dilemmas usually focuses on contributions, we decided to examine different behavioral reactions. Our reason for doing so is that it

may be ambiguous how the anticipated level of justice that is inferred from communicated emotions will affect contributions. For example, when one suspects that the group will not act fairly, one may either decrease one's own contributions to avoid being a "sucker", or increase one's contributions to compensate for the expected low contributions of one's fellow group members. However, research on social dilemmas shows that the anticipated level of injustice does unambiguously encourage people's preference to *change the structure* of the dilemma (Messick et al., 1983; Rutte & Wilke, 1984; Samuelson & Messick, 1986; Samuelson, Messick, Rutte, & Wilke, 1984). Therefore we will focus on these alternative reactions.

Even though the anticipated injustice that could be inferred from communicated emotion may be dealt with by resorting to structural changes, this does not necessarily mean that these changes benefit the group as a whole. That is, structural changes may either be situated at the individual or collective level. An important individual structural solution may be that people individually decide to withdraw from the situation by leaving the group. For example, workers in an industry can decide between pulling together in union activities and not doing so, but they may also choose to exit the industry or unit in which the organizing efforts are made (Orbell et al., 1984). Moreover, as prior research has shown, this decision to exit the situation is particularly likely to be made when unfair decision procedures are used or expected (Brockner, Tyler, & Cooper-Schneider, 1992; Hirschman, 1970; Olson-Buchanan, 1996). Note however that – especially in small group settings – this individual solution may be detrimental to the collective interest. Indeed, if too many group members decide to exit the group, then not enough group members will be left to reach the provision point and obtain the public good (Van Vugt & Hart, 2004; Van Vugt, Jepson, Hart, & De Cremer, 2004).

In contrast to this individual (and possibly detrimental option) of exiting the group, people may also opt for a more constructive structural change for the group as a whole by installing a leader (De Cremer, 2000, Messick, 1983; Rutte & Wilke, 1984, 1985). Because one of the main reasons to implement a leader in these cases is to further the collective outcome by preventing any unfair decisions from being made, it follows that especially a strong preference will be observed for the adoption of a democratic leader. These type of leaders consult other group members before making decisions and can be held accountable for their actions or even be replaced if necessary (Bass, 1990).

Thus, when justice prospects endanger the provision of the public good, group members may resort to either opting for an individual structural change such as exiting the group – even though this has detrimental consequences for the group – or adopt the more positive collective solution of installing a democratic leader. Therefore it is important to investigate both preferences for the exit option (Experiment 4.1) and preferences for installing a democratic leader (Experiment 4.2).

4.2 EXPERIMENT 4.1: EXIT

As discussed before, communicated anger and guilt differ in who is to blame for a detrimental action. Therefore we predict that an angry group member is perceived to have contributed more to the public good in previous trials than a group member who expresses guilt. Also, for the upcoming decision round we expect to find a main effect of emotion, such that an angry group member is expected to contribute less to the common pool than a group member who communicates guilt.

According to the instrumental view, the inferences about the single group member who communicates the emotion will be particularly consequential for the inferences about the group as a whole when this person is able to contribute many endowments to the public good. Thus, when anger is communicated, the group will be less perceived to aim for justice than when guilt is expressed, but especially when this emotion is displayed by a group member with high endowment size. Similarly, when a group member displays anger, this will lead to higher preferences to exit the group than when guilt is communicated, but, again, particularly when the person expressing this emotion is highly instrumental for the provision of the public good. Moreover, we hypothesize that the interaction effect of communicated emotion and differences in endowment size on exit preferences will be mediated by the anticipated level of justice in the group.

4.2.1 Method

Participants and experimental design. Participants were 73 undergraduate students at Tilburg University (22 males, 51 females, M_{age} = 20.25, SD = 2.62) who participated in exchange for course credit or a monetary reward of €4 (approximately $5). The experimental design included the group member's emotion (anger vs. guilt) and endowment size (low vs. high) as between-participants variables. Participants were randomly allocated to these experimental conditions.

Procedure. Upon arrival at the laboratory, participants were welcomed and seated in separate cubicles in front of a computer. They were led to believe that they would engage in a computer-mediated interaction with other participants.

Introduction to the public good dilemma. In the present experimental paradigm the participants were told that they would be a newcomer to a group that had already been playing several trials in a public good dilemma. To enhance the credibility of this statement, first an individual filler task was administered while the other group members were allegedly "taking decisions in a group". After approximately ten minutes, participants were told that as a newcomer they would now replace another participant in a group that

had already been taking decisions. Subsequently, the nature of the public good dilemma was explained. Participants were told that sometimes personal interest and collective interest are at odds and that they would be placed in such a situation. They would form a group of three members (that is, the participant as a newcomer and two old-timers) and each of the three group members would possess a certain number of chips. Because the identity of group members would not be revealed, each member was denoted by a number. More precisely, group member 1 would have 100 chips (i.e., low endowment size), the participant would always receive number 2 and an endowment of 200 chips and group member 3 would have an endowment of 300 chips (i.e., high endowment size). Participants were told that each chip was worth €0.10 (approximately $0.12) and that each group member had to decide how many chips to contribute to the group. If a total amount of 400 or more chips was contributed, every group member would receive an amount of 200 chips, regardless of their own contributions to the group. Thus, if the threshold would be reached, each participant would receive the bonus of 200 chips plus the chips one decided not to contribute. However, if the provision point of 400 chips was not reached, no bonus was disbursed and participants would only keep the chips they decided not to contribute.

Manipulations. After the explanation of the public good dilemma, participants were instructed by means of a pre-programmed message on the computer to open an envelope that had just been delivered by the experimenter a few minutes earlier. Inside the envelope was a form with three questions that had allegedly been filled out by one other group member. The first two questions were multiple choice and served to manipulate how wealthy the group member communicating the emotion was. The questions "Which group member are you?" and "What is the maximum number of chips that you received to contribute in each round?" were filled out with "1" and "100" respectively in the condition where the group member communicating the emotion had a low endowment size and with "3" and "300" respectively in the high endowment size condition. Then, the emotion manipulation followed by means of the third question. The exact formulation of this question was: "As you have been working with this group for several rounds, we want to ask you the following: How do you feel with respect to how the contributions to the collective pool are developing?" Depending on whether guilt or anger was manipulated, the answer of the alleged group member read: "I feel rather guilty/angry about the way things are going here".

Dependent measures. Inferences about the past and future contributions of the group member communicating the emotion were measured using two items: "I think that the group member from whom I received the envelope has contributed many of his or her chips in the previous trials" and "I think that the group member from whom I received the envelope intends to contribute few of his or her chips to the public good". To assess the

participants' anticipated level of justice in the group, they were asked the following question: "I think this group will set out to achieve a fair contribution of chips". In line with Van Vugt and Hart (2004), we measured exit preferences as follows: "Due to the specific events I experienced, I would rather exit the group". It was made clear that participants would retain their chips if they chose to exit the group. These four items were all measured on a scale ranging from 1 = *totally disagree* to 7 = *totally agree*. To assess whether the manipulation of the person who communicated the emotion was effective, participants were asked to indicate from which group member they had received an envelope and how high that person's endowment size was. Following Tiedens (2001), participants rated the message they received from their fellow group member on a variety of emotions including the focal emotions anger and guilt (1 = *not at all angry/guilty*, 7 = *very much angry/guilty*). Finally, participants were thoroughly debriefed, paid and thanked.

4.2.2 Results

Manipulation checks. Participant's ratings of the fellow group member's emotions were submitted to a 2 (group member's emotion: angry vs. guilty) × 2 (endowment size: low vs. high) ANOVA, revealing only a significant main effect of group member's emotion. That is, when participants to whom guilt was communicated were asked after their fellow group member's emotion, they reported that the group member felt more guilty (M = 6.30, SD = 1.66) than participants in the angry group member condition (M = 1.94, SD = 1.15); $F(1, 69) = 164.40$, $p < .001$, $\eta^2 = .70$. Likewise, the group member was perceived to be more angry by participants to whom anger (M = 6.25, SD = 1.42) as opposed to guilt (M = 3.41, SD = 1.14) was expressed, $F(1, 69) = 87.69$, $p < .001$, $\eta^2 = .56$. Finally, it may be noted that participants rated their group member's emotions significantly above the midpoint of the 7-point Likert scale on the corresponding checks, both when anger was communicated (M = 6.25, SD = 1.42, t = 9.50, $p < .001$) and when guilt was expressed (M = 6.30, SD = 1.66, t = 8.40 $p < .001$).

To check whether the manipulation of the group member's endowment size was successful, we examined whether participants could recall which group member communicated the emotion and how large his or her endowment size was. Out of the 73 participants, 70 (95.9%) answered both questions correctly.

Inferred contributions. A 2 (emotion: angry vs. guilty) × 2 (endowment size: low vs. high) ANOVA on the item measuring inferred contributions in previous trials yielded only a significant main effect of emotion, $F(1, 69) = 51.09$, $p < .001$, $\eta^2 = .42$. A group member who expressed anger was believed to have contributed more of his or her chips to the public good in previous trials (M = 5.11, SD = 1.67) than a group member

communicating guilt (M = 2.62, SD = 1.28). A 2 (emotion: angry vs. guilty) × 2 (endowment size: low vs. high) ANOVA on the item measuring expected contributions in the upcoming trial also revealed, as predicted, only a main effect of emotion, but now in the opposite direction, $F(1, 69) = 8.85$, $p < .005$, $\eta^2 = .11$. That is, a group member who expressed anger was expected to contribute less of his or her chips to the public good in the upcoming trial (M = 5.03, SD = 1.83) than a group member who communicated guilt (M = 3.70, SD = 1.94)

Inferred justice in the group. The item measuring to what extent the group was perceived to aim for a fair contribution of chips was submitted to a 2 (emotion: angry vs. guilty) × 2 (endowment size: low vs. high) ANOVA. First, a main effect of emotion was found, $F(1, 69) = 4.00$, $p < .05$, $\eta^2 = .05$: when anger was communicated, participants expected the group to behave less fairly in the future (M = 3.53, SD = 1.50) than participants in the guilt condition (M = 4.08, SD = 1.19). A main effect was also obtained for endowment size, $F(1, 69) = 6.41$ $p < .05$, $\eta^2 = .08$, indicating that these justice judgments were more positive in the low (M = 4.16, SD = 1.34) as opposed to the high endowment size condition (M = 3.44, SD = 1.32). These main effects were qualified by a significant interaction between emotion and endowment size, $F(1, 69) = 5.45$, $p < .05$, $\eta^2 = .07$ (see Table 4.1). Simple-effects analysis showed that within the high endowment condition, the displayed emotion had a significant effect on the inferred justice in the group. When a wealthy group member communicated anger, participants expected the group to be less fair (M = 2.76, SD = 1.03) than when a wealthy group member expressed guilt (M = 4.05, SD = 1.27), $F(1, 69) = 9.26$, $p < .005$, $\eta^2 = .13$. Within the low endowment condition, however, no such effect was obtained; $F(1, 69) < 1$, $p < .82$.

Table 4.1: Inferred justice in the group as a function of communicated emotion and endowment size.

Dependent Variable		Communicated Emotion	
	Endowment Size	Anger	Guilt
Inferred Justice in the Group	Low	4.21^{a} (1.55)	4.11^{a} (1.13)
	High	2.76^{b} (1.03)	4.05^{a} (1.27)

Note. Higher scores indicate higher inferred justice. Standard deviations are given in parentheses. Means with a different superscript differ at $p < .05$ according to simple-effects analyses.

Preferences to exit the group. A 2 (emotion: angry vs. guilty) × 2 (endowment size: low vs. high) ANOVA on the exit measure revealed a main effect of emotion, $F(1, 69) = 7.69$, $p < .01$, $\eta^2 = .09$, showing that participants preferred to leave the group more

when a group member expressed anger (M = 3.75, SD = 1.59) as opposed to guilt (M = 2.95, SD = 0.97). This main effect was qualified by a significant interaction between emotion and endowment size, $F(1, 69) = 5.12$, $p < .05$, $\eta^2 = .06$ (see Table 4.2). Simple-effects analysis revealed that within the high endowment condition exit preferences were higher when a fellow group member communicated anger (M = 4.29, SD = 1.40) instead of guilt (M = 2.79, SD = 0.98), $F(1, 69) = 12.50$, $p < .001$, $\eta^2 = .15$. Again, in the low endowment size condition this effect was absent $F(1, 69) < 1$, $p < .72$.

Table 4.2: Exit preferences as a function of communicated emotion and endowment size.

Dependent Variable		Communicated Emotion	
	Endowment Size	Anger	Guilt
Exit Preferences	Low	3.26^{a} (1.63)	3.11^{a} (0.96)
	High	4.29^{b} (1.40)	2.79^{a} (0.98)

Note. Higher scores indicate higher preferences to exit. Standard deviations are given in parentheses. Means with a different superscript differ at $p < .05$ according to simple-effects analyses.

Mediation analysis. To examine whether the interaction effect on exit preferences can be explained by participants' inferences about justice in the group, a mediation analysis following Baron and Kenny's (1986) procedure was conducted. First, predicting exit preferences by entering communicated emotion, endowment size and their interaction in a linear regression model yielded results that were identical to ANOVA. That is, the same main effect of emotion (β = -.31; $p < .01$) and the interaction effect occurred (β = -.25; $p < .05$). When these three terms were used to predict justice judgments in the group, the results also matched those of the reported ANOVA. The same main effects of emotion (β = .22; $p < .05$) and endowment size (β = -.28; $p < .05$) and the significant interaction (β = .26; $p < .05$) were revealed. Third, when justice judgments were included as a covariate with emotion, endowment size and emotion × endowment size to predict exit preferences, a significant effect of justice judgments on exit preferences emerged (β = -.31; $p < .05$). Finally, and most importantly, in this model the interaction effect between emotion and endowment size on exiting preferences was considerably reduced, β = -.17; p = .12.

Even though the recommendations of Baron and Kenny (1986) to establish mediation are widely used, their procedure has also been criticized for a lack of statistical power (MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002). Moreover, it does not directly test the null hypothesis that the indirect effect significantly differs from 0.

Another, more formal test of mediation that is commonly used, is the Sobel-test. However, this test requires distributional assumptions that may not be met in small sample sizes (Preacher & Hayes, 2004; Shrout & Bolger, 2002). We therefore decided to also test for mediation by adopting a bootstrap method as advocated by Preacher and Hayes (2008; see also Bollen & Stine, 1990; Mallinckrodt, Abraham, Wei, & Russell, 2006; Preacher and Hayes 2004; Shrout and Bolger, 2002), which suffers from none of these disadvantages.

Following Preacher and Hayes (2008), we used bootstrapping to estimate the indirect effect of the emotion × endowment term on exit preferences with group justice judgments as mediator, while controlling for the emotion and endowment terms. Using 10,000 bootstrap resamples and bias corrected and accelerated intervals, we obtained confidence intervals that did not contain zero at the 95% level (i.e., LL CI = -.282; UL CI = -.005). Thus, the extent to which participants believed that the group would set out to achieve fair contributions mediated the interaction effect between emotion and endowment on exit preferences ($p < .05$).

4.2.3 Discussion

The results of Experiment 4.1 were in line with our reasoning. Angry group members were perceived to have contributed a large share of their endowment in the past, but were expected to contribute little in the near future, while group members who communicated guilt were perceived to have contributed little in the past, but were expected to contribute much in the near future. But even though in the case of communicated anger both wealthy and less wealthy group members were expected to contribute a relatively small share of their endowments in the upcoming trial, it was only when the anger was communicated by a wealthy group member that it had a differential impact on the inferences about the group as a whole. That is, our findings show that people preferred to leave the group more when their fellow group member felt angry as opposed to guilty, but only when this person was highly instrumental for provision of the public good. In addition, participants also considered the group as more unfair when anger was communicated relative to guilt, but again, only in the large endowment size condition. These findings thus provide the first evidence ever (at least to our knowledge) that emotions of wealthy group members affect the decisions of new group members in social dilemma settings, in this case, the decision to leave the group. Moreover, the extent to which participants judged that the group would set out to achieve a fair contribution of chips appeared to mediate this interaction effect.

4.3 EXPERIMENT 4.2: DEMOCRATIC LEADERSHIP

Group members are not always able to leave the group immediately (i.e., this choice is not always presented or presents a viable option). Thus, the choice for the individual structural change is not always possible when unfairness is expected. Under such circumstances, what may group members decide then? As we mentioned earlier in our introduction, under circumstances of impending unfairness people may also opt for a constructive structural solution for the group as a whole by implementing a leader (De Cremer, 2000; Messick, 1983; Rutte & Wilke, 1984, 1985). In particular, they may want to install the kind of leader that may help prevent unfair decisions from being made (i.e., a democratic leader, Bass 1990). Thus, we expect that when people are unable to leave the group, they will prefer to assign a democratic leader.

In the above line of reasoning we suggest that the presence of an angry (relative to a guilty) person who can contribute many endowments to the public good implies that unfair decisions are made in the group and that as a result this wealthy person will refrain from contributing to the group's welfare. The mediation analysis of Experiment 4.1 already provided some evidence for this assumption, but, in Experiment 4.2, we do not focus solely on a measured impression of fairness and preparedness of the wealthy member to contribute. Instead we will manipulate this proposed process (Sigall & Mills, 1998). That is, in Experiment 4.2, we will manipulate whether the wealthy person displaying the emotion promises to act in the collective interest or does not make such a promise. Consequently, we can expect that if this promise is made, the effect of the displayed emotion of the wealthy group member on the preference for a democratic leader will not emerge. After all, in that case, one may be less fearful that the angry person will refrain from cooperating because of the unfair situation. If no promise is made, we expect that there will be a stronger preference for implementing a democratic leader when the wealthy member is angry relative to guilty.

Taken together, in Experiment 4.2, an interaction effect between promise-making and display of emotions is expected on preferences for a democratic leader. People will prefer a democratic leader more when anger as opposed to guilt is communicated, but primarily when the person expressing the emotion does not also include a promise to cooperate. Because Experiment 4.1 showed that the effect of communicated emotion emerges only when the communicator is able to contribute much to the public good, all participants were placed in the condition where the emotion was communicated by a wealthy group member.

4.3.1 Method

Participants and experimental design. Seventy-six undergraduate students at Tilburg University (58 female and 18 male, M_{age} = 20.28 *SD* = 2.66) participated voluntarily in exchange for course credit or a monetary reward of €4 (approximately $5). The experimental design included two between-subjects variables: communicated emotion (anger vs. guilt) and promise (yes vs. no). The assignment of participants to these conditions was random.

Procedure. The procedure of Experiment 4.2 was identical to the one of Experiment 4.1, except for the following issues. First, in Experiment 4.2 all participants were placed in the high endowment condition. Second, the manipulation of a promise was introduced by adding a line to the answer of the alleged group member on the question about how he or she felt with respect to the contributions to the collective pool (i.e., the emotion manipulation). In the promise condition, participants could read in addition to their group member's emotion: "In the next round I will do my best for the group". In the no-promise condition, no additional information was given.

Dependent measures. We told participants that based on their expectations of the decision round, they could decide to adopt a democratic leader (cf. Van Vugt & De Cremer, 1999). In line with Van Dijk, Wilke, & Wit (2003) the following item was used to measure preferences for a democratic leader: "I would like to appoint a leader who consults others to make decisions for the group" (1 = *totally disagree* to 7 = *totally agree*). The effectiveness of the emotion manipulation was checked in the same way as in Experiment 4.1. The promise manipulation was checked by asking participants to write down the contents of the message that had been delivered to them. Finally, participants were debriefed, paid and thanked.

4.3.2 Results

Manipulation and procedure checks. Participants' ratings of the group member's emotions were submitted to a 2 (group member's emotion: angry vs. guilty) × 2 (promise: yes vs. no) ANOVA, revealing only a significant main effect of group member's emotion. That is, participants in the guilt condition reported the group member to feel more guilty (M = 6.31, SD = 1.33) than participants in the anger condition (M = 3.20, SD = 1.80); $F(1, 72) = 74.17$, $p < .001$, $\eta^2 = .51$. Likewise, participants in the anger condition evaluated the group member to be more angry (M = 6.65, SD = 0.74) than those in the guilt condition (M = 2.75, SD = 1.57); $F(1, 72) = 202.92$, $p < .001$, $\eta^2 = .73$. Finally, participants' ratings of their group member's emotions were significantly above the

midpoint of the 7-point Likert scale on the corresponding checks, both when anger was communicated (M = 6.65, SD = 0.74, t = 22.79, $p < .001$) and when guilt was expressed (M = 6.31, SD = 1.33, t = 10.42, $p < .001$).

To check the procedure for the promise manipulation, participants were asked to recall the message they received from the fellow group member. Out of the 76 participants, 2 participants in the anger condition and 4 participants in the guilt condition (7.9% in total) recalled this information incorrectly. This difference between conditions was not significant.

Preferences to appoint a democratic leader. A 2 (emotion: angry vs. guilty) × 2 (promise: yes vs. no) ANOVA on the preference for a democratic leader score yielded only the expected significant interaction, $F(1, 72) = 5.07$, $p < .05$, $\eta^2 = .07$ (see table 4.3). Simple-effects analysis showed that in the no-promise condition, participants preferred to appoint a democratic leader more when the wealthy group member expressed anger (M = 5.55, SD =1.23) as opposed to guilt (M = 4.39, SD = 2.15), $F(1, 72) = 5.06$, $p < .05$, η^2 = .06. When the wealthy group member did make a promise, no effect of emotion was found, $F(1, 72) < 1$, $p < .36$.

Table 4.3: Preferences to appoint a democratic leader as a function of communicated emotion and endowment Size.

Dependent Variable		Communicated Emotion	
	Promise	Anger	Guilt
Democratic Leadership	Yes	4.85^{ab} (1.35)	5.33^{ab} (1.53)
	No	5.55^{a} (1.23)	4.39^{b} (2.15)

Note. Higher scores indicate higher preferences to exit. Standard deviations are given in parentheses. Means with a different superscript differ at $p < .05$ according to simple-effects analyses.

4.4 GENERAL DISCUSSION

Across two laboratory experiments it was shown that the emotion displayed by a group member affects one's preferences to install structural changes or to leave the group altogether, particularly when the one expressing the emotion was highly instrumental in providing the public good. Moreover, the analyses provided insights in the underlying mechanisms of the interactive effect between group member's communicated emotion and endowment size on preferences for exit and structural changes. Below, we discuss the most important findings and implications.

The first important contribution of the present research is the interaction between the type of emotion communicated by a fellow group member and the endowment size of this person. More precisely, Experiment 4.1 showed that people were more inclined to exit the group when anger relative to guilt was communicated, but only when the person displaying the emotion was able to contribute much to the public good. This moderating role of endowment size shows that people take the emotional displays of the wealthy (relative to the less wealthy) more into account for their subsequent evaluations about the group. The present findings also support our reasoning about the effects of anger and guilt. These emotions have distinct effects on exit preferences because they signal different justice prospects, at least for the near future. More specifically, someone expressing anger is signalling that a person in the present group has been acting unfairly and that therefore fair contributions to the public good can not be expected until this conflict has been resolved. On the other hand, when guilt is expressed, an unfair act has also occurred, but the person committing this act communicates the intentions to make up for this behavior (which is especially important if this positive future behavior is displayed by the wealthy group member). Thus, as our analyses have also shown, communicated anger leads people – more than guilt – to conclude that their group would not set out to achieve justice.

A second important finding is that the reason why communicated anger (relative to guilt) affects decision-making seems to be explained not only by one's justice concerns (see Experiment 4.1), but also by the fact that the group member who displays anger is expected to refrain from cooperation. Indeed, when in Experiment 4.2 the group member who was highly instrumental in providing the public good made an explicit promise not to violate the moral norm of cooperation, the effect of displayed emotions did not emerge. This finding provides additional support for the idea that the emotions used in the present research exert their effects (at least partly) by means of implicitly signalling justice prospects in the group. After all, the effect of emotions is overridden when a more explicit justice cue such as a promise to contribute is provided. Previous research has primarily examined promises in a prisoner's dilemma context (e.g. Lindskold & Bennett, 1973) or as an explanation for why group discussion increases cooperation (e.g. Orbell, Van de Kragt, & Dawes, 1988), but the current research is (at least to our knowledge) the first to show that within a step-level public good dilemma a promise to cooperate may play a role in one's desire to install structural changes such as a democratic leader. Also, by showing that in a social dilemma a promise may counteract the effect of communicated emotions because it alters justice prospects, this research contributes to the ongoing integration of the social dilemma and justice literature (see De Cremer & Tyler, 2005; Schroeder et al., 2003).

It is also interesting to note that in Experiment 4.1 the effect of communicated guilt did not seem to be moderated by whether or not the person displaying the emotion

was highly instrumental in providing the public good or not. This finding provides further evidence for the view that the function of guilt is merely to repair one's detrimental action and not necessarily to overcompensate it (cf. Baumeister et al., 1994). Therefore, when a group member communicates guilt, the recipient of that emotion may perceive this as an intention to restore justice and not necessarily as an intention to lift justice beyond the originally anticipated level. Thus, people do not prefer to stay in the group more when a wealthy as opposed to a less wealthy group member expresses guilt.

To summarize so far, the present findings thus contribute significantly to the social dilemma literature, both from a theoretical and more applied perspective. Public good dilemmas may be found on different levels of aggregation, ranging from world scale issues like CO_2 emissions and global warming to small group behavior like contributions to a team effort. With our focus on interpersonal emotions and individual reactions such as exit from the group, our findings are especially relevant to the understanding of small group behavior. Take, for example, the public good dilemma of a work team in which the group members are dependent on each other to complete the team project. When in such a team a group member communicates an emotion, this provides a salient reference point for people to make decisions such as whether or not one wants to exit the team or assign a democratic leader that may facilitate coordinating individual efforts in the task. Moreover, we showed that emotions displayed by group members who are highly instrumental in making the team project a success have a greater impact on such preferences for structural changes than group members who are less instrumental. Furthermore, the reason why anger and guilt have these effects in work teams is that they signal implicitly whether or not a work team will set out to achieve justice and can be expected to cooperate. Thus, the research shows that to better understand how groups or teams may manage social dilemma situations a focus on intragroup relations (e.g., the emotions and promises that group members communicate to one another) can be fruitful (see also Stouten et al., 2006).

Before closing, a potential limitation to the reported findings needs to be addressed. In real life situations, emotions are often communicated verbally in a face-to-face interaction. Our reason for manipulation by means of a written note was to maintain as much experimental control as possible to demonstrate causality. As a consequence, caution is advised when generalizing these results. On the other hand, nonverbal communication of emotion through a computer is becoming increasingly prevalent nowadays due to the rising popularity of e-mail and chat programs, so in this sense our procedure does actually have significant ecological validity. Furthermore, it is common for media to use interviews and quotes of people, (e.g., opinion polls and eyewitness reports in newspapers), making that individually expressed emotion by means of messages can be quite influential in many social dilemmas. Finally, in a negotiation context, the findings of a paradigm similar to ours have been replicated in face-to-face settings (Van Kleef et al.,

2006; Sinaceur & Tiedens, 2005). Nevertheless, future research to the generalizability of our research is desirable.

To conclude, the emotions of other group members may serve as a potent, socially informative cue that may direct people in making decisions in social dilemma situations. Communicated emotions may be especially potent because they allow people to draw justice inferences that in turn affect their decisions, even before these justice inferences are confirmed or invalidated by what exactly happened in the contribution session. As such, the current research delivers an important contribution to our understanding of how the relations and shared history that individuals in a group have with each other (as communicated by emotional displays) play a role in how they cope with and decide in social dilemma situations.

CHAPTER 5

WHEN AND HOW COMMUNICATED GUILT AFFECTS CONTRIBUTIONS IN PUBLIC GOOD DILEMMAS[10]

5.1 INTRODUCTION

People interacting in groups sometimes find that their individual interests conflict with the collective interest. Individuals may be tempted, for example, to refrain from investing time, energy, or resources in a team project, so they may free-ride on the efforts of others. If, however, each individual follows this strategy, the team project will inevitably fail and all will be worse off than if they would have cooperated. This type of mixed-motive situation is referred to as a social dilemma, or—more specifically—as a *public good dilemma* (for reviews, see Pruitt, 1998; Weber et al., 2004). Often, public goods can only be provided when the total amount of contributions surpasses a certain threshold or *provision point*. Such instances are known as *step-level* public good dilemmas and will be the focus of the present research.

In step-level public good dilemmas it is important for people to display cooperation by means of coordinating their individual contributions so that they do not squander resources in an attempt to reach the provision point. A generally preferred solution to this coordination problem is for each group member to contribute an equal share of the provision point (Lutz, 2001; Messick, 1993). Indeed, because this so-called *equality rule* is both fair and efficient (Stouten et al., 2005), it is an effective coordination principle that is frequently adhered to or at least used as an anchor to base one's eventual contributions on (Allison et al., 1992; Samuelson & Allison, 1994; Van Dijk & Wilke, 1995).

For an individual group member, using the equality rule to coordinate contributions is only effective when the other group members can be expected to act in a similar way. One therefore needs to be responsive to cues from other group members that may signal their intentions to cooperate, especially when one is a newcomer to a group and thus lacks information about previous social dilemma interactions. One cue that people entering an existing group may pay attention to, and one that has been neglected by social dilemma research so far, is how the group members *feel* about past decisions. An interesting illustration that affect about past decision behavior within the group may be present and thus can be used by group members to base their inferences and decisions on is provided by Dawes and colleagues (1977; see also Xiao & Houser, 2005). They noted that

[10] This Chapter is based on Wubben, De Cremer, & Van Dijk (2009c)

after playing a social dilemma "one of the most significant aspects of this study did not show up in the data analysis" (p. 7) thereby referring to the observation that it was not unusual for participants "to become extremely angry, or to become tearful" (p. 7) at other participants who had defected. In fact, these authors even note that the affect level was so high that they were unwilling to run any intact groups because of the effect the game might have on the members' feelings of each other.

In the present research we therefore aim to answer two questions. First, when will group members' display of emotions such as guilt be considered as useful or informative in determining decisions to contribute, or—as we prefer to define it in the present paper—when will it be evaluated as *instrumental* (Experiment 5.1)? Second, how will this emotional display affect contributions and the use of the equality rule in public good dilemmas (Experiment 5.2)? In the present paper, we will first claim that emotions can serve as important cues to base decisions on. Second, we will reason that such cues will be most functional when coordination is needed the most. Thus, we will develop the argument that communicated emotions are most instrumental when it is relatively difficult to achieve the public good (i.e., high provision point).

5.1.1 Emotional displays in social dilemmas

A large quantity of research has addressed what exactly an emotion is. Accordingly, emotions can be defined as: "episodic, relatively short-term biologically based patterns of perception, experience, physiology, action, and communication that occur in response to specific physical and social challenges and opportunities" (Keltner & Gross, 1999). However, scholars have also started to focus on the potential of emotions to regulate and coordinate social interactions (i.e., a functional account; Frijda & Mesquita, 1994; Keltner & Gross, 1999; Oatley & Jenkins, 1992).

The idea that communicated emotions may convey certain intentions which one may subsequently take into account for one's own actions has been convincingly demonstrated by Van Kleef, De Dreu and Manstead (2006; see also De Cremer et al., 2008; Sinaceur & Tiedens, 2006; Van Kleef et al., 2004a). These authors showed that when a negotiation opponent communicated guilt, people were unlikely to concede because they expected their opponent to be willing to make up for his or her tough demands that were offered in previous rounds (Van Kleef et al., 2006). Even more important for the present paper, very recent research has provided first evidence that in step-level public good dilemmas emotions communicated by fellow group members shape a third party's justice judgments of the group, which subsequently affect this person's preferences for structural change (Wubben, De Cremer, & Van Dijk, 2008). Thus, the

information that communicated emotion conveys about fellow group members' intentions may be expected to also influence a third party's contribution decisions and use of the equality rule.

5.1.2 Communicated guilt as a coordination means in step-level public good dilemmas

What do people entering an existing group wish to know in a public good dilemma? They are probably interested in how previous social dilemma interactions have developed and whether or not the other group members can be expected to cooperate in the future. Emotions communicate such inferences. In the present article we focus on communicated guilt. We do so because people often evaluate social dilemmas in terms of morality (e.g., Van Lange & Kuhlman, 1994), and guilt is the emotion that is experienced after "having transgressed a moral imperative" in the past (Lazarus, 1991, p. 240; see for applications of guilt in social dilemma settings e.g., Ketelaar & Au, 2003; Nelissen et al., 2007).

What do we infer if we see that a particular member communicates guilt? The communication of guilt may simultaneously generate inferences about the person displaying guilt *and* the other persons in the group. In a public good dilemma people may first of all conclude that the member who communicates guilt has not contributed enough to the public good. And if not contributing to the public good in a previous decision round leads a group member to feel guilty, a newcomer may infer that there must have been a well-established norm of cooperation to which the other group members did adhere. That is, if one's fellow group members would have refrained from cooperating as well, there would be no norm prescribing cooperation and not contributing to the public good would therefore be no reason to experience guilt. Guilt may therefore not only signal that the person displaying guilt did not contribute, but also that the other persons in the group did cooperate. Thus, whereas at first sight guilt merely indicates the presence of a repentant transgressor, other group members may indirectly profit from this emotional display because it may lead third parties to evaluate them as prosocial.

So how do these inferences affect the expectations regarding the *future*? From a functional perspective, guilt signals appeasement (Barrett, 1995; Keltner & Buswell, 1997). As such it is associated with an intention to repair the damage that one has inflicted to a relationship (Baumeister et al., 1994; Lewis, 2000). Guilt therefore leads to increased prosocial behavior, including helping, making amends, compliance and cooperation (Carlsmith & Gross, 1969; Ketelaar & Au, 2003; Regan, Williams & Sparling, 1972; Van Kleef et al., 2006). A person communicating guilt therefore signals the willingness to contribute to the public good in the future. And because guilt may also signal that the other

group members are willing to contribute, a third party may infer that all fellow group members intend to cooperate in the upcoming decision round. Thus, even though guilt suggests collective failure in the *past*, people may infer that their fellow group members aim to reach the provision point in the *future*.

The main question in Experiment 5.1 which we alluded to earlier (i.e., when do newcomers find communicated guilt instrumental in determining their contribution decisions?) is thus related to the question "When do people find it instrumental to know that one's fellow group members can be expected to cooperate?" The answer is not immediately clear, because having information about fellow group members' intentions will not always be required to determine how much one should contribute to the public good in order to reach the provision point (cf. Van Vugt & De Cremer, 2002; Wubben et al., 2008, for similar accounts of instrumentality). In fact, even without receiving emotion feedback it is quite common for people to expect others to adhere to equality (Allison et al., 1992; Samuelson & Allison, 1994; Van Dijk & Wilke, 1995). Communicated guilt may therefore primarily facilitate coordination under circumstances where people would anticipate that their fellow group members might not cooperate. Under such conditions, people may feel that their own contributions may be wasted. In step-level public good dilemmas, the anticipation that others may not contribute such that their own contributions may be wasted, is referred to as *fear* (Rapoport & Eshed-Levy, 1989). It has been shown to be particularly prevalent when the provision point increases to more than 60% of group members' total endowments (Poppe & Zwikker, 1996). Indeed, under such circumstances efficient coordination is impeded because people's actual contributions do not rise accordingly, making not only that the public good is provided less often but also that more resources are wasted by those who did contribute (Suleiman & Rapoport, 1992). Therefore we reason that only when the provision point is high the display of guilt may be evaluated as more instrumental than neutral emotion feedback, because only then there is substantial fear that communicated guilt may help reduce.

5.2 EXPERIMENT 5.1

Experiment 5.1 was designed to test if communicated guilt is particularly instrumental in deciding how much to contribute when the provision point is perceived as difficult to obtain. That is, as a first test of our hypothesis we used a subjective evaluation of a fixed provision point to investigate the potential importance of communicated guilt for decision-making in step-level public good dilemmas. Thus, we asked participants to what extent they felt that many chips were required to reach the provision point and, subsequently, how helpful and useful they considered the emotion feedback from a fellow

group member to be. Using a separate first study for only these critical inferences allowed us to measure perceived instrumentality directly without unintentionally influencing participants' contribution decisions.

5.2.1 Method

Participants and experimental design. Participants were 47 undergraduate students (17 men and 30 women, average age = 18.79 years, *SD* = 0.95) who participated voluntarily in exchange for course credits or a monetary award of €3 (approximately $4). The study consisted of an Emotion (guilt vs. neutral) × Judgment of provision point level (continuous) between-participants design. Participants were randomly assigned to the emotion conditions.

Procedure. Upon arrival at the laboratory, participants were divided into groups of three and were placed in front of a computer in three adjacent individual cubicles. It was explained that the experiment was about "taking decisions in groups" and that all interactions between group members would take place via the computer.

After being seated, participants were informed that two group members would immediately start one trial of making decisions in groups, while one group member would join the others in round two as a newcomer. Although participants believed that the computer assigned the role of newcomer at random to one of the group members, in reality the participant was always the newcomer. Furthermore, the participant was denoted by the letter B, whereas the other two persons would be known as group member A and C. While group members A and C were allegedly playing the first trial in a public good dilemma, the participant was requested to fill out a short individual filler task. Next, the nature of the public good was explained. Participants were told that sometimes personal interest and collective interest are at odds and that they and their group members would be placed in such a situation. It was mentioned that when the participant joined the other two group members, the game would be transformed from a two-person to a three-person game. Each group member would receive 200 chips and had to decide how many chips to contribute to the group. We set the provision point at the intermediate level of 50% (Poppe & Zwikker, 1996). Thus, if 300 or more chips were contributed in total to the group, each group member would receive 280 chips, regardless of their own contributions to the group. Thus, if the threshold was reached, each participant would receive the bonus of 280 chips plus the chips he or she decided not to contribute. However, if the provision point of 300 chips was not reached, no bonus would be given and participants would only have the chips that they had decided not to contribute.

Because we were interested in exploring the influence that participants' *subjective* evaluation of the difficulty to establish the provision point could exert on how instrumental participants considered the communicated emotion information to be (see below), we asked them directly to what extent they felt that they had to contribute many chips to obtain the bonus (1 = *totally disagree* to 7 = *totally agree*).

Manipulation. We manipulated communicated emotion by providing participants with emotion feedback from the participants who had allegedly played a trial in a public good dilemma already. To enhance the credibility of this manipulation, participants were requested to fill out a printed form with three questions that had just been brought in by the experimenter. First, participants had to indicate whether they were participant A, B or C. Second, they had to fill out whether they were a newcomer or had already been taking decisions for one round. For the third and last question it was made very clear that it should only be answered by participants who in the second question had indicated not to be a newcomer. It read: "How do you feel with respect to how the contributions to the collective pool are developing?" All participants correctly indicated that they as group member B were a newcomer and subsequently they all left the third question unanswered, as was instructed. Next, they were asked to contact the experimenter who let them wait for a few minutes until everybody had filled out their form. When eventually all three group members were ready, the experimenter would open the doors of the three adjacent cubicles simultaneously and instruct the group members collectively. Thus, a situation was created in which the subjects could not see each other, but all could see the experimenter. The experimenter explained that he would collect all forms, complete a few administrative tasks and would then redistribute the forms. A minute after each participant had handed over his or her form, the experimenter reopened the three cubicles one at a time to ask each participant separately if it was correct that he or she would be the newcomer in the upcoming trial. When participants confirmed this, he delivered them a bogus form that was exactly similar to the one the participant had filled out, but with different answers to the three questions. The question "which group member are you" was answered with "A" and it was indicated that the fellow group member who allegedly filled out the form was not a newcomer, but had already been taking decisions during the first round. The communicated emotion was manipulated by means of the third answer. The question "How do you feel with respect to how the contributions to the collective pool are developing?" was answered with either "I feel rather guilty about these contributions" in the guilt condition or with "I don't really have a pronounced feeling about these contributions" in the neutral-emotion condition. Subsequently, the dependent measures were administered. Finally, participants were debriefed, paid and thanked[1].

Dependent measures. To assess whether participants considered the communicated emotion to be instrumental in determining their contributions, we used two

items. More precisely, we asked them to indicate to what extent they considered what member A wrote about his or her feelings to be "useful" and "necessary information" to help determining how much to contribute. (i.e., "I find what group member A has written about his or her feelings necessary to determine accurately how many chips I should contribute" and "The form that has been filled out by group member A helps me to determine how many chips I have to contribute"; 1 = *totally disagree* to 7 = *totally agree*). These two items were averaged into a measure of *instrumentality of communicated emotion* (r = .69, p < .001). To check the effectiveness of the emotion manipulation, we presented participants with a variety of emotions—including the focal emotion guilt—and asked them to what extent they believed participant A experienced this emotion (1 = *totally disagree* to 7 = *totally agree*; cf. Tiedens, 2001).

5.2.2 Results and Discussion

Manipulation checks. To check the effectiveness of the emotion manipulation, the item measuring to what extent the participants perceived group member A to feel guilty was submitted to a one-way ANOVA, revealing a main effect of emotion. When group member A had communicated guilt, participants reported this person to feel more guilty (M = 6.33, SD = 1.35) than when no emotion had been communicated (M = 3.27, SD = 1.08); $F(1, 45) = 74.61$, $p < .001$, $\eta^2 = .62$.

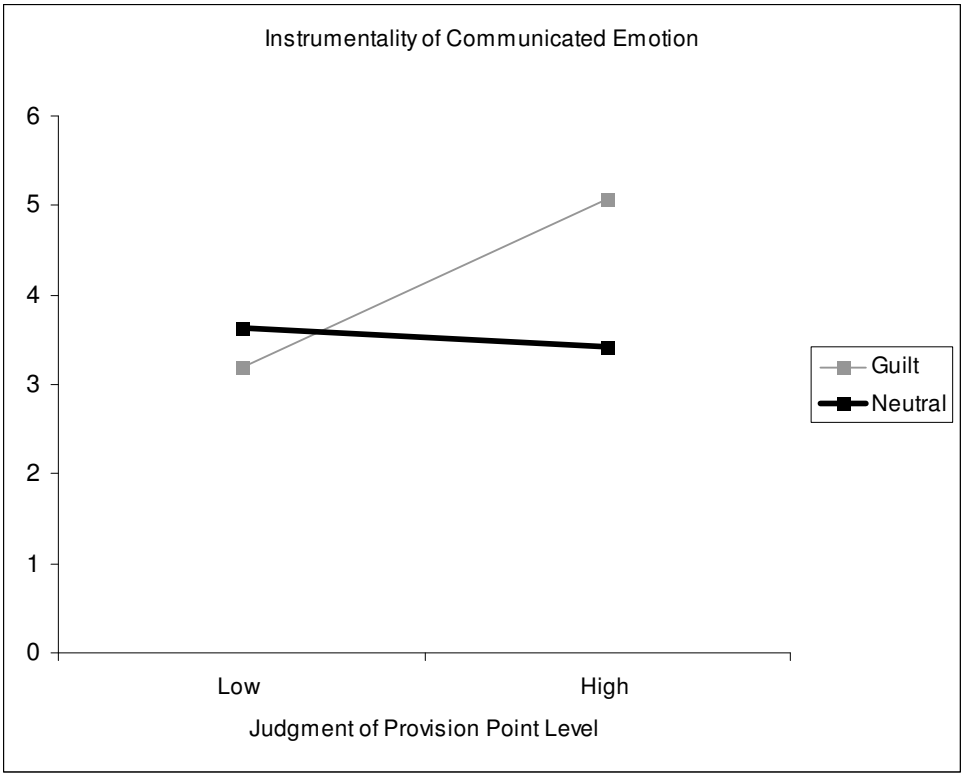
Instrumentality of communicated emotion[11]. To analyze when participants perceived the communicated emotion to be most instrumental, we first centered the scores on the item measuring to what extent participants judged the provision point to be high (Cohen, Cohen, West, & Aiken, 2003). We also effect-coded the emotion variable by assigning the value -1 to the guilt condition and the value 1 to the neutral condition. Next, a hierarchical regression analysis was conducted in which the instrumentality of the communicated emotion was predicted by the main effects of emotion and judgment of provision point level in step 1 and the product of these two variables in step 2.

As predicted, the analysis revealed a significant interaction term between emotion and judgment of provision point level (β = -.31, p < .05). To further explore this effect, we plotted the interaction using the predicted means one standard deviation above and below the mean of the measure of judgment of provision point level (for high and low scores on

[11] Because participants' subjective evaluation of the difficulty of realizing the public good was measured *before* the emotion manipulation, there was no reason not to assume the orthogonality of both variables. Indeed, a one-way ANOVA showed that participants in the guilt condition did not find the provision point harder to obtain (M = 4.62, SD = 1.12) than participants in the no-emotion condition (M = 4.27, SD = 1.54), $F(1,45) < 1$, p = .39.

judgment of provision point level, respectively). These means are presented in Figure 5.1. Subsequent simple-effect analyses revealed that when the provision point was evaluated as difficult to obtain, communicated guilt was considered more instrumental than neutral emotion feedback in determining how much to contribute ($\beta = -.50$, $p < .05$). On the other hand, when participants felt they did not need to contribute many chips to reach the provision point, no such difference emerged ($\beta = .13$, $p = .55$).

Figure 5.1: The relationship between emotion and instrumentality of communicated emotion as a function of judgment of provision point level (Experiment 5.1).



Note. Higher values reflect higher instrumentality.

Experiment 5.1 can be regarded as a first test of the idea that emotional information from fellow group members is not always regarded as useful information to employ in one's decision behavior. Indeed, the results provide supportive evidence for the idea that people entering the group value and desire emotional information more when they estimate the provision point as difficult to reach. These findings should be interpreted with caution, however, for two reasons. First, we did not manipulate the provision point

level but used a subjective evaluation of the difficulty to reach the provision point. Second, we measured perceptions instead of behavior to assess the instrumentality of the communicated emotion. The results of Experiment 5.1 nevertheless suggest that effects of communicated guilt can be expected to become manifest only when the provision point is high.

5.3 EXPERIMENT 5.2

Having established when emotion information will probably be most instrumental in providing the public good and thus when effects of communicated guilt can be expected to occur, we moved on to test our second research question, that is, will communicated guilt affect a third party's inferences and contribution decisions and, if so, how? To this end, we assessed not only people's inferences about previous events that caused their fellow group member to feel guilty, but also measured contribution decisions and contribution expectations at different levels of the provision point. In addition we now manipulated the provision point. More precisely, in the low-provision-point condition we set the threshold to a mere 35%, but in the high-provision-point condition we set it at 70%; a level at which fear is typically important (Poppe & Zwikker, 1996; Suleiman & Rapoport, 1992).

In our introduction we already theorized which inferences people may make when they learn that a member communicates guilt. In Experiment 5.2 we will actually measure these inferences about the previous and upcoming decision round to test our hypotheses. Because we will not provide participants with specific information of how high the provision point in the first round was (see below), we hypothesize that participants' inferences of their fellow group members' previous contributions are based only on the emotion manipulation. More specifically, as explained before, we first expect that when a person communicates guilt in a public good dilemma, a newcomer to the group will infer that this person has contributed less in the previous decision round than the other group member (*Hypothesis 1a*). In line with this hypothesis, we predict that a person communicating guilt will also be inferred to have contributed less than when this person would have communicated no emotion (*Hypothesis 1b*). As a result, a newcomer may conclude that it is less likely that the public good has been provided in the previous trial when guilt as opposed to no emotion is communicated (*Hypothesis 1c*). Finally, a newcomer may infer that when a group member communicates guilt, the other person in the group has made higher contributions than when a group member communicates no emotion *(Hypothesis 1d)*.

As alluded to earlier, the emotional display of guilt also allows one to draw inferences about contributions in the upcoming decision round. As for the person who

communicates guilt one may wonder to what extent this person will actually make up for his or her violation. In this regard it seems that guilt merely signals an intention to repair a detrimental action and not so much an intention to overcompensate it (Baumeister et al., 1994). Therefore we predict that a person communicating guilt will be expected to increase his or her contributions compared to the previous round. In that case, this person can be expected to restore his or her cooperation to the same level as a person who provided only neutral feedback. A third party may therefore expect a person communicating guilt to increase his or her contributions compared to the previous decision round so that an effect of communicated guilt versus no emotion on expected contributions in the upcoming decision round will not emerge (*Hypothesis 2a*). As for the other group member, one may infer that this person has already displayed a willingness to cooperate—something that is not so obvious when no emotion is communicated. A newcomer may then infer that this group member can be expected to cooperate again in the upcoming decision round, even when the provision point is high. Thus, we predict that this person will be expected to contribute when the provision point is low, regardless of the emotion that is communicated, while in the high-provision-point condition this person will be expected to contribute more when guilt as opposed to no emotion is communicated (*Hypothesis 2b*). The total expected contributions of both fellow group members together, then, will yield a similar interactive effect of emotion and provision point (*Hypothesis 2c*).

How will these favorable expectations about fellow group members' contributions when guilt is communicated affect a newcomer's own contributions? A prevalent reason not to contribute to a public good dilemma consists of the *fear* that one's resources are wasted if others refrain from contributing (Parks & Hulbert, 1995; Rapoport & Eshed-Levy, 1989). This fear is especially dominant when the provision point is high (Poppe & Zwikker, 1996; Suleiman & Rapoport, 1992). The display of guilt will reduce this fear, however, due to the implicit assumption that one's fellow group members can be expected to cooperate. As a result, we expect that newcomers will be cooperative and not fear adhering to equality, even when the provision point is high. Thus, an interactive effect of emotion and provision point on contributions (*Hypothesis 3a)* and adherence to equality (*Hypothesis 3b)* is predicted, such that differential effects of guilt and neutral emotion feedback will only emerge when the provision point is high. In that case we predict a third party to cooperate more when guilt instead of no emotion is communicated. Following this reasoning, we predict that a third party's expectations of his or her fellow group members' contributions mediate the expected interaction between emotion and provision point level on a third party's contributions (*Hypothesis 4).*

5.3.1 Method

Participants and experimental design. A total of 152 undergraduate students (37 men and 115 women, average age = 19.04 years, *SD* = 1.60) participated voluntarily in exchange for course credits or a monetary award of €4 (approximately $5). Participants were randomly assigned to a 2 (emotion) × 2 (provision point) factorial design.

Procedure. For this experiment we assigned participants to similar roles as in Experiment 5.1. That is, we again used the letter A to denote the person communicating guilt or no emotion, the letter B to denote the participant and the letter C to denote the other group member. The emotion manipulation was also kept identical: right before the dependent measures were administered the experimenter brought in a manually filled out form with guilt or no emotion information that was allegedly written by group member A.

Experiment 5.2 was in two important ways different from Experiment 5.1. First, participants in the high-provision-point condition were introduced to a public good dilemma in which they had to contribute 420 chips to reach the provision point. In the low-provision-point condition, participants had to contribute 210 chips to reach the provision point. Hence, if one were to follow the equality rule, one would need to contribute 70 chips in the low- and 140 chips in the high-provision-point condition. Because each participant had 200 chips available, participants had to contribute 35% and 70% to provide the public good in the low- and high-provision-point condition, respectively. We also explained that now the participant would join the group as a newcomer, the parameters of the game that were used in round one were changed. This was done so that participants were unable to determine what the provision point in the first decision round had been, allowing us to exclude the possibility that our results were influenced by any anchoring effects.

Second, because participants now had to play a trial in a public good dilemma, a financial incentive was introduced to promote the experimental realism of our paradigm (cf. Aquino, Steisel, & Kay, 1992). It was explained that the more chips one was able to accumulate, the higher the chance to win one of six prizes of €10 (approximately $13). These prizes were awarded one week after the experiment. When all instructions about the public good dilemma and the emotion feedback were provided, the dependent measures were administered.

Dependent measures. To understand how the emotion that was communicated by group member A would be interpreted with respect to previous events, participants indicated on a scale ranging from 1 = *totally disagree* to 7 = *totally agree* to what extent they agreed with the following item: “I think that group member A has contributed many chips during the first round”. The same question was asked for the third group member, who was known to participants as group member C. Participants also had to indicate whether or not they believed that during the first round the public good had been provided.

Our main dependent measure was the amount of chips that the participant was willing to contribute to the public good. In addition, we asked how many chips participants estimated that group member A would contribute and how much they estimated participant C to contribute to the public good. The provision point level was checked with the following question: "How many chips does the group need to contribute, so that the bonus will be disbursed to the group?" The effectiveness of the emotion manipulation was checked in the same way as in Experiment 5.1.

5.3.2 Results

Manipulation checks. Out of 152 participants, 4 participants (2.6%) were unable to correctly indicate the provision point level and they were removed from further analyses[12]. The emotion manipulation was checked with a 2 (emotion) × 2 (provision point) ANOVA, revealing only the expected main effect of emotion; $F(1, 144) = 246.19$, $p < .001$, $\eta^2 = .63$. Group member A was perceived to feel more guilty when guilt ($M = 6.45$, $SD = 1.20$) as opposed to no emotion ($M = 3.31$, $SD = 1.22$) was communicated.

Inferences about first decision round[13]. The relevant means for these inferences can be found in Table 5.1. We predicted participants to infer about the first decision round that the person communicating guilt had contributed little to the public good, leading them to expect that the provision point had not been reached. Therefore we submitted the items measuring estimated contributions of group member A and C to a 2 (emotion) × 2 (provision point) × 2 (group member) mixed-model ANOVA with the last factor as a repeated-measures variable. This yielded main effects of emotion ($F[1, 144] = 32.44$, $p < .001$, $\eta^2 = .18$; for guilt $M = 3.27$, $SD = 0.73$; for no emotion $M = 3.98$, $SD = 0.78$) and group member ($F[1, 144] = 194.82$, $p < .001$, $\eta_p^2 = .57$; for member A $M = 2.86$, $SD = 1.43$; for member C $M = 4.42$, $SD = 1.23$). These main effects were qualified by a significant Emotion × Group member interaction, $F(1, 144) = 172.81$, $p < .001$, $\eta_p^2 = .55$. In line with Hypothesis 1a, simple-effects analyses revealed that when group member A communicated guilt, he or she was estimated to have contributed less in the first trial than group member C, $F(1, 144) = 353.21$, $p < .001$, $\eta_p^2 = .71$. This effect did not emerge when group member A communicated no emotion, $F < 1$, $p = .56$. In addition, two separate 2 (emotion) × 2 (provision point) ANOVAs on the items measuring estimated contributions

[12] Including these participants in the analyses showed the same pattern of results.

[13] Because the information provided in Experiment 5.2 prohibited participants from making any reasonable estimation of the provision point level in the first decision round, we did not expect, nor obtain any effects of provision point on these measures.

of group member A and C in the first trial showed two main effects of emotion. Supporting Hypothesis 1b, when group member A communicated guilt, he or she was believed to have contributed less during the first trial than when no emotion was communicated, $F(1, 144) = 232.48$, $p < .001$, $\eta^2 = .62$.

Table 5.1: Means and standard deviations on estimations of group members' contributions in decision round one by emotion (Experiment 5.2).

Dependent Variables	Emotion	
	Guilt	Neutral
Estimated contributions group member A[a]	1.69_a	3.94_b
	(0.67)	(1.06)
Estimated contributions group member C[a]	4.85_c	4.03_b
	(1.37)	(0.93)

Note. Higher scores indicate higher contributions. Standard deviations are given in parentheses. Means with a different subscript differ at $p < .05$.

[a]Group member A is the person communicating the emotion; group member C is the other fictional person.

In accordance with Hypothesis 1c, a 2 (emotion) × 2 (provision point) ANOVA on the item measuring to what extent participants believed that the provision point had been reached in the first trial, revealed that communicated guilt was believed to indicate a lower probability of collective success in the first trial ($M = 2.38$, $SD = 1.20$) than when no emotion was communicated ($M = 3.58$, $SD = 1.50$), $F(1, 144) = 28.43$, $p < .001$, $\eta^2 = .16$.

Finally, the results of a 2 (emotion) × 2 (provision point) ANOVA confirmed Hypothesis 1d. When group member A communicated guilt, group member C was perceived to have contributed more than when participants received neutral emotion feedback, $F(1, 144) = 18.11$, $p < .001$, $\eta^2 = .11$.

Expected contributions. Table 5.2 shows the means of all expected contributions, including the participants' own contributions. Whereas participants inferred that group member A had defected in the first decision round when he or she communicated guilt as opposed to no emotion, we also expected this effect to disappear for the upcoming decision round (Hypothesis 2a). To show that this effect was specific for group member A and not for group member C, we standardized participants' estimations of group member A and C's contributions in round one and round two using z-scores and conducted a 2 (emotion) × 2 (decision round) × 2 (group member) ANOVA, with the latter

Table 5.2: Means and standard deviations on participants' and estimations of group members' contributions in decision round two by emotion and provision point (Experiment 5.2).

Dependent Variables	Emotion	Provision Point	
		Low (210)	High (420)
Contributions participant	Guilt	73.26_a	138.61_c
		(22.57)	(20.20)
	Neutral	70.93_a	109.24_b
		(12.77)	(52.44)
Contributions group member A[a]	Guilt	70.29_a	113.75_b
		(32.13)	(39.14)
	Neutral	68.00_a	103.95_b
		(18.84)	(43.76)
Contributions group member C[a]	Guilt	66.43_a	124.44_c
		(18.49)	(33.76)
	Neutral	72.00_a	94.22_b
		(12.85)	(45.03)

Note. Higher scores indicate higher contributions. Standard deviations are given in parentheses. Means with a different subscript differ at $p < .05$ according to simple-effects analyses.

[a]Group member A is the person communicating the emotion; group member C is the other fictional person.

two factors being repeated-measures variables. This yielded a significant three-way interaction, $F(1, 146) = 86.12$, $p < .001$, $\eta_p^2 = .37$. A separate 2 (emotion) × 2 (decision round) repeated-measures ANOVA on the estimated contributions of group member C did not reveal a significant interaction, suggesting that the reported effect of emotion on estimated contributions in round 1 (see hypothesis 1d) was not significantly different in round 2, $F(1, 146) = 1.94$; $p = .17$. A similar repeated-measures ANOVA on the estimated contributions of group member A, however, did reveal a significant interaction of Emotion × Decision round, $F(1, 146) = 102.90$, $p < .001$, $\eta_p^2 = .41$. Whereas participants inferred that a person communicating guilt had contributed less than a person communicating no emotion (as reported when testing Hypothesis 1c), in line with Hypothesis 2a this effect of

emotion was no longer present in participants' estimation of group member A's contribution for the upcoming decision round.

Next, we tested if participants estimated group member C to be cooperative when guilt was communicated—even when the provision point was high (Hypothesis 2b)—by submitting this group member's expected contributions for the upcoming decision round to a 2 (emotion) × 2 (provision point) ANOVA. This yielded, first, main effects of provision point, $F(1, 144) = 65.32$, $p < .001$, $\eta^2 = .29$ and emotion, $F(1, 144) = 65.32$, $p < .001$, $\eta^2 = .29$. Participants expected higher contributions when the provision point was high ($M = 109.12$, $SD = 42.41$) than low ($M = 69.40$, $SD = 15.87$) and when guilt was communicated ($M = 95.85$, $SD = 39.87$) compared to no emotion ($M = 82.68$, $SD = 34.20$). These main effects were qualified by a significant Emotion × Provision point interaction, $F(1, 144) = 13.00$, $p < .001$, $\eta^2 = .06$. In line with Hypothesis 2b, simple-effects analysis indicated that when the provision point was high, participants predicted that group member C would contribute more when group member A communicated guilt instead of no emotion, $F(1, 144) = 18.33$, $p < .001$, $\eta^2 = .08$. This effect was absent when the provision point was low ($F < 1$, $p = .43$).

A 2 (emotion) × 2 (provision point) ANOVA on group member A and C's total expected contributions also yielded the predicted interaction (Hypothesis 2C); $F(1, 144) = 5.91$, $p < .05$, $\eta^2 = .03$. Again, compared to no emotion feedback ($M = 198.16$, $SD = 83.82$), communicated guilt led to higher expected contributions ($M = 238.19$, $SD = 52.24$) when the provision point was high, but this effect did not emerge with a low provision point ($F < 1$, $p = .79$).

Contributions. Participants' contributions were submitted to a 2 (emotion) × 2 (provision point) ANOVA, revealing main effects of provision point, $F(1, 144) = 104.28$, $p < .001$, $\eta^2 = .39$ and emotion, $F(1, 144) = 9.75$, $p < .005$, $\eta^2 = .04$. Contributions were higher when the provision point was high ($M = 123.73$, $SD = 42.32$) as opposed to low ($M = 72.01$, $SD = 17.93$) and when guilt ($M = 106.39$, $SD = 39.17$) as opposed to no emotion ($M = 89.34$, $SD = 41.92$) was communicated. More importantly and supporting Hypothesis 3a, the interaction between emotion and provision point was significant, $F(1, 144) = 7.09$, $p < .01$, $\eta^2 = .03$. Simple-effects analysis revealed that when the provision point was high, participants contributed more when guilt was communicated than when neutral emotion feedback was given, $F(1, 144) = 16.55$, $p < .001$, $\eta^2 = .06$. When the provision point was low, however, this effect was absent; $F < 1$, $p = .74$.

Adherence to equality and coordination. Even though these findings seem to suggest differences between conditions in adherence to equality, the correct procedure to validate this claim would be to test whether there are differences in the frequencies with which group members use the equality rule. Thus, participants were classified as following the equality rule when they contributed 70 chips and 140 chips in the low and high-

provision-point condition, respectively. Using these strict criteria[14], 62 out of 148 participants adhered to equality. To examine this classification as a function of provision point and emotion, a hierarchical log-linear analysis was conducted (cf. Van Dijk & Wilke, 2000), revealing the highest order interaction (Emotion × Provision point × Adherence to equality) to be significant, $\chi^2(1) = 7.47$, $p < .01$. To further explore this interaction, separate chi-square tests on the emotion and adherence to equality variables were performed at different levels of the provision point. In the high-provision-point condition, there was a significant effect of emotion on whether or not participants would adhere to equality, $\chi^2(1) = 5.31$, $p < .05$. In line with Hypothesis 3b, odds ratios indicated that the odds of adherence to equality when guilt was communicated was 3.24 times as high as the odds of adherence to equality when no emotion was communicated. When the provision point was low, however, this effect of emotion was absent, $\chi^2(1) = 2.29$, $p = .13$, odds ratio guilt: no emotion = 0.49:1.

Mediation analysis. We predicted that participants will use their expectations of both group member A and C's contributions in the upcoming decision round to determine whether or not they will contribute to the public good (Hypothesis 4). To examine this mediated moderation hypothesis, we decided to adopt a different approach than the one advocated by Baron and Kenny (1986). Even though their recommendations to establish mediation are widely used, their procedure has also been criticized for a lack of statistical power (MacKinnon et al., 2002). Moreover, it does not directly test the null hypothesis that the indirect effect significantly differs from 0. Another, more formal test of mediation that is commonly used, is the Sobel-test. However, this test requires distributional assumptions that may not be met in small sample sizes ($N < 200$; Preacher & Hayes, 2004; Shrout & Bolger, 2002). We therefore decided to test for mediation by adopting a bootstrap method

[14] A limitation of using such strict criteria for adherence to equality is that participants who deviate only slightly from equality are lumped into the same category as participants who deviate heavily. Therefore we complemented this analysis with a 2 (emotion) × 2 (provision point) ANOVA on the absolute difference between participants' actual contributions and the amount that they should contribute to adhere to equality (i.e., 70 and 140 chips in the high and low-provision-point condition, respectively; cf. Van Dijk & Wilke, 2000). The results were in line with the analysis we presented above. We again observed a significant interaction, $F(1,144) = 17.71$, $p < .001$, $\eta^2 = .10$. Simple-effect analyses showed that communicated guilt led people to deviate from equality less ($M = 11.67$, $SD = 16.43$) than neutral emotion feedback ($M = 41.03$, $SD = 44.63$) when the provision point was high, $F(1, 144) = 23.52$, $p < .001$, $\eta^2 = .16$. This effect was absent when the provision point was low, $F(1,144) = 1.17$, $p = .28$ (Ms = 13.89 vs. 7.43, SDs = 17.94 vs. 10.37).

as advocated by Preacher and Hayes (2008; see also Bollen & Stine, 1990; Preacher and Hayes 2004; Shrout and Bolger, 2002), which suffers from none of these disadvantages.[15]

Following Preacher and Hayes (2008), we used bootstrapping to estimate the indirect effect of the Emotion × Provision point term on participants' contributions with the total expected contributions of both group member A and C as mediator, while controlling for the emotion and provision point terms. The basic idea of this procedure is to extract *n* cases with replacement from the original sample, and reestimate the size of the indirect effect in this new resample. This procedure should be repeated at least 1000 times. If, when using standard significance levels of $\alpha = .05$, the size of the indirect effect in at least 95% of these resamples is in all cases either larger or smaller than 0 (as indicated by the obtained confidence intervals), the indirect effect is significant. Accordingly, using 10,000 bootstrap resamples and bias corrected and accelerated intervals (see Preacher & Hayes, 2008), we obtained confidence intervals that did not contain zero at the 99% level (i.e., LL CI = -7.23; UL CI = -0.11). Thus, the expected contributions of the other group members mediated the interaction effect between emotion and provision point on participants' own contributions ($p < .01$).

5.4 GENERAL DISCUSSION

Taken together, the present results are supportive of the central hypothesis that communicated guilt is an important, socially informative cue that people use for their decisions to contribute and adhere to equality in a step-level public good dilemma. In addition, we identified a structural variable (i.e., provision point) that plays an important role in when differential effects of communicated guilt as opposed to neutral emotion feedback are particularly likely to emerge. The results show that communicated guilt has

[15] If we were to follow Baron and Kenny's procedure, we would also arrive at the conclusion that group members' expected contributions mediated the interaction effect of emotion and provision point on own contributions, as will be shown here. First, predicting participants' contributions by entering emotion, provision point and their interaction in a linear regression model yielded results that were identical to ANOVA. That is, the same interaction effect occurred ($\beta = -.16$; $p < .01$). When these three terms were used to predict expected contributions of fellow group members, the results also matched those of the reported ANOVA. Again a significant interaction of emotion and provision point ($\beta = -.16$; $p < .05$) was revealed. Third, when expected contributions were included as a covariate with emotion, provision point and emotion × provision point to predict own contributions, a significant effect of expected contributions on participants' contributions emerged ($\beta = .45$; $p < .001$). Finally, and most importantly, in this model the interaction effect between emotion and provision point on participants' contributions disappeared, $\beta = -.09$; $p = .12$.

effects at three separate stages of the decision-making process. It does not only provide information about how fellow group members behaved in previous social dilemma interactions, but also about how these group members will behave in the future. Ultimately, communicated guilt is therefore also instrumental in making one's own contribution decisions. Below, we discuss the most important findings and implications.

The first important contribution of this research is that the communication of an emotion in a social dilemma is sufficient for people to draw conclusions about previous events in a social dilemma. Indeed, the mere communication of guilt readily led people to come up with the scenario of a selfish group member who added to collective failure despite the cooperative efforts of the other group member. As such the present research further emphasizes the salience of concepts such as collective failure and variance in cooperative behavior between group members, because even very basic information about how a fellow group member feels already revealed very strong effects on inferences that are related to these concepts (cf. De Cremer & Van Dijk, 2002; Samuelson & Messick, 1986). Note that obtaining these findings should be accredited to the use of a newcomer paradigm, because this required participants to make inferences about previous social dilemma interactions in which they did not take part.

People go beyond this question of which events induced an emotional state in a fellow group member, however. The present research shows that people also use information about a fellow group member's emotion as a basis for their expectations of this person's future contributions and even the future contributions of other fellow group members. More specifically, the results supported the idea that guilt mainly communicates an intention to *repair* instead of overcompensate one's detrimental action (cf., Baumeister et al., 1994; see also Wubben et al., 2008). That is, a person communicating guilt was expected to contribute his or her fair share in the future, but not more than that. A possible explanation for this finding that a transgressor seems able to get away with merely promising to not transgress again may be that the victim of the detrimental action is partly comforted already by the knowledge that the experience of guilt is very unpleasant for the transgressor (Baumeister et al., 1994; O'Malley & Greenberg, 1983). Our findings suggest a complementary explanation however. Experiencing guilt may not only be a punishment for the transgressor, but also a reward for the victim. That is, when a person communicates guilt, third parties also seem to evaluate the *other* group members as more prosocial than when guilt is not communicated. This forwards the interesting and paradoxical hypothesis that inducing the unpleasant feeling of guilt in a fellow group member may in itself be beneficial because it actually allows one to build a reputation of being a cooperator (cf. Hardy & Van Vugt, 2006).

The effects of communicated emotion are not merely limited to inferences about fellow group members. The present research also shows that the communication of guilt

may actually increase one's own contributions to the public good by inducing people to adhere to equality more often. As such these findings respond to the recent call that "research on social dilemmas could be significantly improved by examining cooperation [...] as a process driven by emotion communication" (Boone & Buck, 2003, p. 176). In this regard it is important that participants were told that the person from whom they received emotional information was unaware that this information would be communicated to them. The question whether the display of guilt also induces cooperation in social dilemmas when strategic motives for communication are not excluded therefore remains to be addressed in future research (cf. Van Kleef et al., 2006).

The present research also reveals that differential effects of communicated guilt versus no emotion may not always become manifest. Only in situations where people are not so sure or even distrustful about their fellow group members' cooperative intentions may communicated guilt increase one's contributions. Such a situation occurs when the provision point is high (as opposed to low). Especially in that case participants fear wasting many resources as a result of their fellow group members' potential failure to assist in contributing the high amount of resources that is required to provide the public good. Our findings show that in such instances emotion information is evaluated as very useful and valuable (Experiment 5.1). When the provision point is high, emotional information is useful because in the case of communicated guilt it signals that one's fellow group members may be expected to cooperate and thus there is less fear that one's own contribution is simply a waste of many resources. Under circumstances of a low provision point fear of wasting one's resources is less prevalent because the public good is easy to obtain. In fact, under conditions of a low provision point there was a nonsignificant tendency for people to evaluate communicated guilt as *less* valuable than no emotion information. Also, when in that case guilt was communicated there was a nonsignificant trend for people to deviate from equality more often in such a way that they contributed slightly more than necessary. These slight trends in the data lead to the interesting suggestion that when a coordination task is easy already, additional information may—even when it is favorable—only complicate coordination. This will merely cause participants to contribute more than necessary in order to "play it safe".

A final important finding of the present research is that the interactive effect of emotion and provision point on people's own contributions is mediated by their expectations of fellow group members' contributions. This suggests that people deliberately consider their fellow group members' expected contributions to decide whether or not they should act in the collective interest by trying to reach the provision point. Conversely, it is interesting to note that prior research has shown that communicated guilt in two-party negotiations encourages people to actually take advantage of their opponent's expected cooperation by setting higher goals for themselves and, subsequently,

making less concessions (Van Kleef et al., 2006). This apparent controversy is easily reconciled, however. First, the cell means of the expected contributions of fellow group members when guilt was communicated indicate that there was little opportunity for such strategic mismatching, seeing that participants generally did not expect to reach the provision point by contributing less than the equality rule would prescribe. Moreover, as opposed to negotiations, the risk/reward ratio for strategic mismatching in public good dilemmas may be perceived as quite high, because contributing too little would lead one to irreversibly squander one's complete contribution.

Following similar logic, we can provide evidence against two alternative explanations for our effects. First there is the possibility that the communication of guilt invokes a realization in people that apparently a social dilemma may induce guilt in oneself. This anticipated guilt may subsequently lead people to exhibit considerable levels of cooperation, even when the provision point is high. A second explanation is that the communication of guilt, which is a moral emotion (Tangney, 2007; Tracy & Robins, 2006), makes concepts of morality salient, thus encouraging cooperative behavior. First, these two explanations seem highly unlikely, because they cannot explain why, as mentioned above, in negotiations communicated guilt actually lead people to be less cooperative (Van Kleef et al., 2006). Moreover, our finding that people base their contribution decisions on their expectations of fellow group members' contributions is strong evidence for our explanation that communicated guilt reduces fear that the provision point will not be reached. This mediational role of expected fellow group members' contributions is less uniquely predicted by the alternative explanations of anticipated guilt or activated concepts of morality.

Before closing, we wish to outline a promising avenue for future research. Seeing that communicated guilt is an important emotional cue in social dilemmas, other emotions deserve scholarly attention as well. Anger in particular needs mentioning, because it can readily be elicited in social dilemmas (Stouten et al., 2005) and has the potential to degrade the whole group to enduring defection (Schroeder et al., 2003). Future research could therefore contribute significantly by focusing on preventing the potential escalating effect of communicated anger in social dilemmas. In a similar vein, social dilemma literature could be furthered by unveiling how communicated emotion may play a role in fostering and maintaining high levels of cooperation. For example, will communicated happiness safeguard cooperation, or will it under some conditions actually encourage fellow group members to act more selfishly in the future? These questions highlight the necessity to investigate communicated emotion in social dilemmas.

To conclude, an important strength of the present research is that it is the first to show in social dilemmas that communicated emotion allows people not only to infer what happened in past interactions, but also to predict how their fellow group members will

behave in the future. These expectations subsequently affect even people's own cooperative behavior in social dilemmas. The scarcity of research in this area is remarkable, given Dawes and colleagues' (1977) observation that it was not at all uncommon for the affect level in their social dilemma experiments to skyrocket. Our findings, then, are evidence that an intragroup focus—or a focus on emotional displays in particular—is fruitful for better understanding how groups may manage social dilemma situations.

CHAPTER 6

6. GENERAL DISCUSSION

This dissertation started with the observation that social dilemmas provoke unusually strong emotions. I cited a passage from Dawes et al. (1977) to underscore this, but there are others. Bonacich (1976, see also Dawes, 1980), for example, notes that in a social dilemma study where communication was allowed and the temptation to defect was high, participants jokingly threatened to push anyone that would defect down the stairs, to not let defectors leave the place alive, to beat them up, to report their misbehavior in the student newspaper or to take them to small claims court. Exaggerated as these threats may be, they still suggest emotional chaos if someone were to defect.

In fact, I can confirm this from my own four years of experience. Even though, in compliance with Dawes and colleagues' (1977) warning, I always took great care to make sure that participants remained anonymous, many of them still showed considerable emotional involvement. This was true when participants could earn lottery tickets, but especially so when the decisions that were made affected their outcomes directly, as in Experiment 3.1. In that experiment some participants inquired, in proper student slang, who it was that "screwed them over" or they called defectors names before rushing out (even though they never lost more than €2). One participant, after noticing during the debriefing that it was not uncommon to cooperate, confided in me that she felt guilty about defecting and quickly left the laboratory. Others gave me a pervasively sour look when I told them their cooperation had been met with defection and they therefore had to return part of their show-up fee, whereas yet others appeared visibly elated when I showed them that their decision to cooperate had inspired others to do the same in return.

Emotions in social dilemmas thus are real. But do they also serve any function or, at least, have interpersonal effects? The four empirical chapters in this dissertation represent the first systematic attempt to investigate if emotions urge defectors to cooperate, encourage group members to coordinate, or lead group members to install structural solutions. In this general discussion I will first summarize all main findings, then present their contributions and implications and, before closing, discuss some possible limitations and avenues for future research.

6.1 SUMMARY OF THE EMPIRICAL FINDINGS

The aim of Chapter 2 was to investigate if direct reciprocity, as embodied by the famous tit-for-tat strategy, can be even more effective in averting defection if it is backed up by the

communication of emotion and, moreover, which emotion then induces more cooperation: anger or disappointment. Both emotions had been found to establish cooperation (e.g., Van Kleef et al., 2004; 2006), but, unlike disappointment, anger had also been found to backfire under certain circumstances, to arouse anger in the other and cause further escalation of conflicts (Van Dijk et al., 2008; Van Kleef & Côté, 2007). It was therefore hypothesized that disappointment would more effectively avert defection than would anger.

To test this, participants played a give-some game against a computer-simulated partner that employed a tit-for-tat strategy. In this game both players had a number of coins that were twice as valuable to their partner. Donating coins to the other was therefore costly, but paid off when reciprocated. After every few rounds, one's partner would either communicate no emotion or would communicate anger or disappointment with an intensity that increased as participants defected more. As it turned out, when disappointment was communicated, higher levels of cooperation were indeed established than when anger or no emotion was communicated. Expressing anger did not lead to favorable outcomes: it evoked anger in participants, who had a negative overall impression of their partner and perceived him or her as relatively retaliatory and unforgiving. Disappointed partners were not perceived less positively or as unforgiving or retaliatory. In fact, when participants received the opportunity to inconspicuously increase or decrease their partner's outcomes, they were more generous when their partner had been disappointed than when anger or no emotion had been communicated. The data thus point clearly in favor of expressing disappointment instead of anger or no emotion when a return favor is refused.

Chapter 3 also focused on anger and disappointment, but then in indirect reciprocity. Cooperation through indirect reciprocity is based on reputation: people known to cooperate deserve cooperation and people known to defect deserve defection. Disappointment and anger were proposed as part of a solution to a problem that results from such indirect-reciprocity logic: How do you distinguish between selfish, unjustified defection, motivated by greed, and retaliatory, justified defection that is motivated by a desire to discourage defection?

In Experiment 3.1, participants played a game of indirect reciprocity for real money and without deception. First it was shown that the unjustified act of defection against a cooperator elicited more disappointment and anger than the more justified act of defection against a defector did. This is especially interesting because participants experienced these emotions as a third party, having nothing to gain or lose from the defection that they observed, which provides good evidence for the idea that both anger and disappointment can be truly moral emotions (cf. Haidt, 2003; Batson et al., 2008). More important, however, is that anger and disappointment also signaled to *third parties* whether defection was justified or unjustified. Defection out of anger or disappointment was seen as a response to unjustified defection, was perceived as just and elicited more

cooperation than defection out of boredom or defection without emotion communication did.

Experiment 3.1 was not designed to show differential effects of anger and disappointment; this was the purpose of Experiment 3.2. Disappointment is a reaction to unfulfilled positive expectations (Van Dijk & Van Harreveld, 2008) and may therefore be an appropriate response to people who did not live up to their relatively positive reputation because they defected. Anger is a more coercive, forceful reaction which, as Chapter 2 also showed, may lead to escalation and is therefore best reserved for more 'serious cases', that is, defection by people who already have a relatively negative reputation. To test this hypothesis, participants read a scenario in which cooperation through indirect reciprocity was possible. As predicted, participants inferred that an employee who failed to help his colleagues had committed more similar defections in the past when his latest defection elicited anger instead of disappointment. Compared to anger, disappointment thus signals that defection is committed by a person with a positive reputation.

Experiment 3.3 replicated the major findings of Experiment 3.1 and 3.2 with a new laboratory paradigm. It again showed that the communication of anger and disappointment allows third parties to discriminate justified from unjustified defection and that when disappointment over defection is expressed, third parties infer that the defector has a more positive reputation than when anger is expressed. Chapter 3 thus helps to solve a major problem in empirical research on indirect reciprocity by showing that through emotion communication people succeed in retaliating against defectors without unleashing a chain reaction of defection in response.

In Chapter 4, asymmetric step-level public good dilemmas were studied. It was investigated if emotions can be seen as social cues that inform participants about whether successful coordination is a likely prospect. The presence of an angry group member would suggest conflict and defection for the future, whereas the presence of a guilty group member would suggest social repair and cooperation. However, the idea was that such emotion inferences would only be instrumental for participants' subsequent decisions if the angry or guilty member was actually capable of contributing considerable resources to realize the public good. Evidence for such a process is best provided by measuring preferences for structural solutions, such as exiting the group and installing a democratic leader. After all, when a group member that can contribute many chips is angry and, consequently, the future prospects for successful coordination are bleak, clear preferences for structural solutions can be predicted.

Across two studies, evidence for this reasoning was obtained. Experiment 4.1 showed that an angry group member signaled an unwillingness to cooperate any further, whereas the opposite effect emerged for a guilty group member. However, only when the emotional group member had many endowments to contribute and thus was highly

instrumental in realizing the public good, participants inferred that the communicated emotion would affect whether or not a just future outcome would occur. Thus, participants chose to exit the group when a group member with many endowments expressed anger. Alternatively, when given the option of a more constructive structural solution, participants in Experiment 4.2 preferred to install a democratic leader when confronted with an angry group member with many endowments. Experiment 4.2 also showed another boundary condition to effects of emotion communication. When explicit promises are made, the implicit messages that can be inferred from emotions are no longer attended to.

The accumulated evidence from Chapter 4, which suggested that emotions may be used as socially informative cues in step-level public good dilemmas, paved the way to specifically study guilt in Chapter 5 and examine when and how exactly it allows people to coordinate their contributions to reach the provision point. Guilt signals that good chances of successful coordination await the group in the future, as was already clear from Chapter 4. But this knowledge should only be useful if there is a coordination task ahead that would otherwise be difficult to overcome. Experiment 5.1 therefore tested if participants found guilt, as expressed by a fellow group member, more informative when they judged the provision point as difficult, rather than easy, to reach. This is indeed what the results showed.

The logical next step, then, was to examine in Experiment 5.2 if the communication of guilt led participants to successfully coordinate their contributions when the provision point was so high that under normal circumstances they would find adhering to equality too risky. First, participants inferred, in line with the social correction function of guilt, that the group member expressing guilt probably defected in the past but would refrain from doing so in the future. Moreover, participants inferred that if defection was sufficient reason to experience guilt, the other group member probably was a cooperative person that could be expected to act cooperatively in the future. Being convinced, then, that both their fellow group members would cooperate, participants in the guilt condition typically contributed enough to reach the provision point, even when it was high. Participants in the no-emotion condition, in contrast, were less certain that their group members would cooperate and therefore only managed to coordinate successfully when the provision point was low. Guilt thus facilitates coordination, but this can only be demonstrated empirically if a situation is created in which coordination normally fails, such as a public good dilemma with a high provision point.

To summarize, in all empirical chapters emotions conveyed important social information that affected participants' subsequent decisions. They increased cooperation in an iterated prisoner's dilemma by signaling forgiveness instead of retaliation, they prevented a chain reaction of defection in situations of indirect reciprocity by signaling when defection was justified and unjustified, they increased preferences for structural

change by signaling bleak or bright prospects for future cooperation and they let people adhere to equality even when the provision point was high. The main finding of this dissertation, then, is that by and large, emotions function as ubiquitous and indispensable, socially informative cues that help establish cooperation.

6.2 IMPLICATIONS AND CONTRIBUTIONS

This is not the place to regurgitate the implications of each individual chapter, but rather to take a broader perspective. After all, the empirical chapters are in many ways interconnected. Chapters 2 and 3 both report findings on how anger and disappointment guide reciprocity. Chapters 4 and 5 both report findings on the coordination potential of emotions in step-level public good dilemmas. Comparing the findings of both pairs of chapters, then, leads to conclusions that reach further than those presented in each individual chapter. Moreover, Chapter 3, 4 and 5 are among the first empirical investigations of emotion communication in interdependent situations that do not focus on dyadic interactions, but more broadly on intragroup settings and situations with third party observers. Furthermore, in all chapters a social-functional approach to emotions is adopted, so the pros and cons of this approach are also worth discussing. I will also outline the practical implications of the present findings.

6.2.1 Disappointment and anger in reciprocal situations

The bold message of Chapter 2 was that in situations of direct reciprocity expressing disappointment induces more cooperation than expressing anger does. In Chapter 3 on indirect reciprocity, anger had a more positive role. There it was proposed that communicating anger may effectively address repeated or severe defection, whereas communicating disappointment may effectively address incidental or mild defection. A closer look at participants' donations in Experiment 2.1 (see also Figure 2.1) shows that before any emotion was communicated, participants already displayed an average cooperation rate of over 70%. This clearly does not qualify as severe defection. A possible boundary condition for the findings obtained in Chapter 2 therefore presents itself. When involved in a reciprocal relationship with a notorious defector, expressing disappointment may not be one's best hope. It may even be interpreted as an opportunity to defect some more without having to fear immediate escalation. Instead, expressing anger, combined with a tit-for-tat strategy, may induce more cooperation.

That disappointment is a less antagonistic emotion than anger does not necessarily mean it always is a 'weak' supplication emotion that communicates dependency and a need for support (Van Kleef et al., 2006; see also Clark, Pataki, & Carver, 1996). This may be true when one starts lamenting to a *third party* how disappointed one feels about being wronged (Timmers et al., 1998). But when one steps up directly to the wrongdoer and expresses disappointment, one does not so much desire support—one desires the other to live up to one's positive expectations or to a positive reputation (see Chapter 3). In Chapter 2, the communication of disappointment thus seems to be taken as an active attempt at rectification, rather than as a passive plea for help. But both motives do not necessarily conflict. Perhaps disappointment itself has the interpersonal function of eliciting empathy, but the subsequent intentional act of *communicating* one's disappointment to the person that caused it may function to elicit behavioral change—and be understood by both persons as such. When intentionally displayed, disappointment may thus grow from a 'weak' supplication emotion into a powerful emotional trump.

6.2.2 Guilt and anger in step-level public good dilemmas

Chapter 5 showed that when guilt was communicated in a symmetric public good dilemma, people contributed enough to reach a provision point that they would otherwise evaluate as too high to obtain. Would this finding generalize to *asymmetric* public good dilemmas, as studied in Chapter 4? Previous research has shown that asymmetry itself need not impede successful coordination; people readily adhere to a decision heuristic based on proportionality instead of equality (Van Dijk & Wilke, 1995; 2000). A precondition to also demonstrate effects of guilt in asymmetric dilemmas, then, again seems to be that the provision point is around 70% of group members' total endowments (which is slightly higher than the provision point used in Chapter 4). There are two complicating factors, however. First, recall that when in Chapter 5 a group member communicated guilt while the provision point was high, participants actually inferred the *other* group member to be significantly more cooperative than when no emotion was communicated. Consequently, if in an asymmetric dilemma a group member with many endowments feels guilty, increased cooperation may be expected from the group member with only few endowments—perhaps not the most encouraging prospect. A second complicating factor is that, conversely, when a group member with few endowments communicates guilt, participants may pay little attention to this information, as shown in Chapter 4. Only participants with, for example, a dispositional tendency to process much information before acting may realize after some deliberation that such guilt actually implies that the group member with many endowments will display increased cooperation

(Van Kleef et al., 2004). The effects that guilt has in asymmetric dilemmas may thus be somewhat weaker than in symmetric dilemmas, or at least more difficult to demonstrate empirically.

A complementary question is what effects the communication of anger, as studied in Chapter 4, may have on cooperation in symmetric step-level public good dilemmas, as studied in Chapter 5. Chapter 4 showed that angry group members were expected to no longer cooperate, which would bode ill for successful future coordination. Moreover, anger implies that other group members have previously defected (see also Schroeder et al., 2003; Stouten et al., 2005). In line with the mediation analysis of Chapter 5, people may infer that their contribution will be insufficient to reach the provision point and therefore defect too (Kerr, 1992; Messick et al., 1983; Rapoport & Eshed-Levy, 1989; Suleiman & Rapoport, 1992). Only when the provision point is quite low and the public good very profitable, it is conceivable that people try to compensate for their fellow group members' defection (cf. Karau & Williams, 1991). Yet such cooperation in the face of intragroup conflict, even when economically rational, may be rare. People fear being the "sucker" (Kerr, 1989) or, due to emotional contagion (Hatfield et al., 1994), simply defect out of irritation (Friedman et al., 2004; see also Chapter 2). One of the most constructive ways, then, to deal with anger in social dilemmas is through structural change, as examined in Chapter 4.

6.2.3 Intragroup dynamics

Research on interpersonal effects of emotion in interdependent situations has focused almost exclusively on dyadic interactions (for an exception, see Van Beest et al., 2008). As a result, it has been demonstrated that, for example, an angry negotiator is perceived as tough but also as dislikable and annoying, which may influence subsequent actions toward this negotiator (Friedman et al., 2004; Sinaceur & Tiedens, 2006; Van Kleef et al., 2004). In such research, anger is both communicated to and experienced toward the same person. But when more than two people are involved in an interdependent situation, the possibility arises that emotion is also communicated, be it intentionally or coincidentally, to a person to whom it is *not* experienced. Third parties may thus be informed of developments they themselves did not witness. This has important interpersonal consequences. When third parties know that—apparently—guilt, anger, gratitude or awe is experienced toward another, this is likely to affect their social perception of and subsequent social interaction with this person. The practical relevance of this is evident from the sheer fact that everyday conversations consist for 60% of often emotionally-laden talk about absent others (i.e., gossip; Wert & Salovey, 2004;

Baumeister, Zhang, & Vohs, 2004). But even outside the research area of interdependent situations, such emotion inference by third parties is basically ignored, at least by several authoritative volumes on social aspects of emotions (Guerrero & Andersen, 1998; Lewis, Haviland-Jones, & Feldman Barrett, 2008; Parkinson et al., 2005; Planalp, 1999). Affective influences on person perception have been studied empirically, but usually only when affect was experienced either by observers themselves (Forgas, 1991; Forgas & Bower, 2001), or by the observed person (Knutson, 1996; Montepare & Dobish, 2003; Sommers, 1984; Tiedens, 2001).

Nevertheless, it is evident from this dissertation that emotions, when communicated to third parties, are also informative of and even have monetary consequences for the person toward whom they are experienced. In Chapter 3, people that elicited anger or disappointment were believed to have defected and therefore received defection in return more often than when no emotional information was available. Disappointment also signaled a more positive reputation than anger did. In Chapter 5, third parties perceived a group member toward whom guilt was experienced as pro-social, which led them to act more cooperatively too.

Three conclusions may be drawn from these effects of emotion. First, they are driven more by inferences than by emotional contagion. Guilt, after all, does not spread through contagion, but did lead to pro-social impressions of the group member toward whom it was experienced. Contagion could play a role, though. Anger that is aroused through contagion may lead to aggression even before it is clear what injustice has been committed by the person that elicited anger. But even then it seems at least as common that communicated anger leads one to infer an injustice, which subsequently arouses anger toward the perpetrator in oneself, too. This process may even occur in absence of the perpetrator or of any factual information about the transgression. The fact that third parties are typically somewhat less directly involved in emotional episodes may cause a more inferential, analytical information-processing style as well.

Second, the communication of guilt appears to influence inferences about the person toward whom it is experienced through a more elaborate process than anger and disappointment do. In social dilemmas all three emotions primarily signal defection, but only in the case of guilt the emotional person is also the one who actually committed the defection. From this inference it is another step to infer that the person toward whom it is experienced probably did cooperate. Conversely, it is immediately clear that a person who elicited disappointment or anger has defected, but from there it is another step to infer that the emotional person him- or herself then probably cooperated. The accompanying effect sizes in studies 3.3, and 5.2 also suggest that inferences about the person toward whom an emotion is experienced are more primary for anger and disappointment than for guilt. In

situations of cognitive load, then, such effects are likely to occur only for anger and disappointment and not for guilt.

Third, these results show that emotions are an indication of someone's cooperative reputation. Guilt signals that the person to whom it is experienced has been more cooperative than when disappointment is expressed, which, in turn, signals more cooperation than anger. The position of other emotions along this continuum can easily be hypothesized as well: gratitude and admiration may outscore guilt, while contempt and disgust may even be outscored by anger. In social dilemmas this continuum of cooperative reputation may be most appropriate, but in other situations different types of reputations—or perhaps even a general valence dimension—may be accurate. Emotion intensity may communicate the magnitude of reputation change. Such processes demonstrate that emotion communication is also relevant for the literature on leadership, gossip and social perception.

6.2.4 Evaluating a social-functional account of emotions

After four empirical chapters of articulating hypotheses and discussing findings by adopting a social-functional account of emotions, the time has come to provide a critical evaluation of this account. Since the birth of our species cooperation has simultaneously been one of humanity's greatest strengths and greatest challenges, so if emotions truly have social functions, social dilemmas are where this should be apparent (Keltner et al., 2006). Many effects of communicated emotion are indeed documented in this dissertation, but does this mean emotions are socially functional?

First, there is a difference between testing a theoretical framework and using it to generate hypotheses. In Chapter 4, for example, when anger was communicated, installing a democratic leader that could monitor defectors was preferred. While this is clearly in line with the socially corrective function of anger, preference to install a democratic leader is too indirect a measure of this function to be a critical test of it. Certainly, structural change may solve social dilemmas, so it is wonderful that a social-functional account can so readily be used to generate sensible hypotheses about structural change. But this advantage of a social-functional account is rather tautological; positing that emotions are functional obviously generates more hypotheses than positing they are not functional. The real question is if functions can be tested empirically.

Here, another difficulty arises that I referred to earlier. Functions of emotions can not be identified solely through their regular beneficial consequences. Also required is an analysis of how these consequences are the result of goal-directed action that is implied in the origin and development of the emotion and its communication (Keltner & Gross,

1999). That means that hypotheses about the specific functions of emotions may be incorrect even if the beneficial consequences they predict are routinely confirmed empirically. Whether or not emotions serve social functions is therefore also a philosophical debate. But data are nevertheless helpful. They may not be able to provide a definite verification of hypotheses about function, but they can certainly falsify them by showing that certain beneficial consequences do not occur. Let us, with this in mind, re-examine several of the reported findings.

Good support was found in Chapter 5 for the social function of guilt: socially repairing one's transgressions (Baumeister et al., 1994; Frijda & Mesquita, 1994; Lewis, 2008). It should be noted that the 'manner of organization' (Keltner & Gross, 1999) of the social-functional account I adopted in this chapter differs from other chapters. In Chapters 2 and 3 I took specific functions as unit of analysis (i.e., averting defection in direct reciprocity and justifying defection in indirect reciprocity, respectively) and studied whether or not anger and disappointment serve these functions. In Chapter 5, however, I took a specific emotion as unit of analysis (i.e., guilt) and studied what function it had in social dilemmas. Thus, I did not examine beneficial effects of guilt by staging a situation in which social repair in a social dilemma was required, but instead examined if third parties inferred that a group member who felt guilty had transgressed and intended to socially repair this transgression. This is indeed what I found: group members that felt guilty were expected to restore their cooperativeness to conventional levels. But more beneficial consequences resulted. Guilt also improved the cooperative reputation of the group member toward whom it was experienced. It is difficult to determine whether or not this is also an integral part of the social function of guilt, but it could be if, as the data suggest, it leads a transgressor to get away with social repair instead of social overcompensation. The beneficial consequence that third parties also cooperated more when guilt was communicated is more likely to be a side effect than a social function of guilt.

Mixed support was found for the social function of anger. Chapters 2 and 3 provided a direct test of the effectiveness of anger in averting defection and justifying retaliation against defectors—two behaviors that can be subsumed under the supposed social correction function of anger (Averill, 1982; Frijda & Mesquita, 1994; Solomon, 1990). Anger did get the message across: in both chapters it signaled retaliation. But it only had beneficial consequences in Chapter 3, where third parties reacted more leniently to retaliatory defection that was motivated by anger. In dyadic interactions, anger did not induce more cooperation and even aroused anger in response, despite that its communication after a clear failure to reciprocate was certainly justified. To claim that anger is often not functional is premature, however. As noted above, in Chapter 2 anger might have been functional if the average level of cooperation in dyads had been lower.

Moreover, the claim that anger does not function to rectify injustice in interdependent situations needs to be based on more than one study. Few of such studies are available, though, because in most studies in which beneficial consequences of anger were not found, the expression of anger was not a response to a clear social wrongdoing and therefore not a direct test of its functionality (e.g., Friedman et al., 2004; Van Beest et al., 2008; Van Dijk et al., 2008; Van Kleef & Côté, 2007). Still, one may doubt to what extent some anger components—especially those that prepare for physical violence (e.g., increased blood flow to the arms; Ekman, Levenson, & Friesen, 1983)—are functional in modern societies where both parties can often be certain that physical violence will not result. Admittedly, false alarms need not imply dysfunctionality (Nesse, 1990) and anger displays may to some extent have been ritualized, but more successful ways to correct social wrongdoings may nevertheless be available.

The findings in Chapters 2 and 3 suggest that disappointment may be one of such ways to correct social wrongdoings. It averted defection in direct reciprocity and it justified retaliatory defection in indirect reciprocity. If these are functions of disappointment, they certainly need not be the only ones. Disappointment, after all, is often caused by other events than unjust actions or social wrongdoings (e.g., bad luck). However, as noted above, experiencing disappointment is one thing, but intentionally confronting a defector with it is another. In that case, disappointment, like anger, does in fact appear to assume the function of social correction. This process is a clear demonstration of how volition may play a role in the assignment of specific emotions to specific social functions. As a result, the extent to which there is functional overlap between anger and disappointment may vary across cultures. This leads to the interesting hypothesis that in cultures where disappointment has less of a social correction function, conflicts may be settled more often through anger and, possibly, physical violence.

All in all, then, the final evaluation of a social-functional account of emotion is generally positive, though a few caveats should be kept in mind. First, its success in generating and confirming interesting hypotheses is in itself no evidence for its main assumption that emotions are socially functional. Second, neither does evidence that emotions have beneficial consequences necessarily imply functionality. Third, not all emotions need to be equally functional—some may even have become somewhat less functional in contemporary society. And fourth, the relation between emotion and social function is rather dynamic: they may not always map cleanly onto each other and functional overlap between emotions may occur and change over time. With that being said, adopting a social-functional account of emotion has certainly been instrumental in showing that emotions communicate social information that can reduce social uncertainty, facilitate coordination and even transform (one's perceptions of) the underlying outcome structure of social dilemmas.

6.2.5 Practical implications

That this dissertation has drawn from and—so I hope—contributes to fundamental theories on social dilemmas and emotion does not mean, of course, that it does not also have clear practical implications. After all, as Kurt Lewin (1951) famously put it: "There is nothing so practical as a good theory" (p. 159). Indeed, it is obvious from everyday experience that emotions are involved when people return favors to each other and to third parties (or fail to do so) and when they work together in small groups. The most general advice that follows from this dissertation is to express these emotions, for they are mostly functional. One possible caveat, though, is that whereas emotions may establish cooperation, this does not mean they should be communicated if they are not experienced. In fact, in Chapters 3, 4 and 5 such strategic display of emotion was ruled out by the experimental procedure. Even in Chapter 2, where the communication of emotion was not involuntary, its expression was always appropriate and justifiable. Another caveat is that expressing anger directly to defectors may occasionally backfire. A constructive alternative to lashing out in anger may be, in small groups at least, to propose that a democratic leader be installed—a suggestion that other group members are likely to support if they suspect that anger is brewing.

That emotions generally encourage cooperation means from a practical point of view that care must be taken that the proper conditions for their communication are created. This can be achieved both in face-to-face and computer-mediated settings (Derks et al., 2008). What is important, though, is that group members are motivated to pay attention to each others' emotions. Under conditions of time pressure (Van Kleef et al., 2004) or distrust (Van Kleef et al., 2006), for example, emotions are unlikely to foster cooperation. Norms may also dampen the expression of emotions. Bies and Tripp (2007), for instance, criticize the 'managerial perspective' that is traditionally assumed in organizational psychology on the grounds that it depicts especially anger as inefficient and its expression as unprofessional. To the extent that such a managerial perspective is adopted in the workplace, then, any beneficial consequences of emotions on cooperation will not materialize.

A final practical implication that must not be overlooked has to do with the important guiding role that science plays in many people's lives. Cooperation is not some vague, theoretical concept and neither is emotion: people think about both a lot and even articulate lay theories about them (Ben-Artzi & Mikulincer, 1995; Miller, 1999; Wakefield, 1993; Zammuner, 2000). What if science would downplay people's predisposition to cooperate, portray emotions as dysfunctional remnants of the prehistoric era and assert that moral emotions do not exist? It might affect the world views and self-construals of many people and instill pessimism and cynicism. Of course, science is not

about sketching rosy pictures of human behavior. But this dissertation suggests that these three views are unrealistically gloomy—and that should be an encouraging thought to many.

6.3 LIMITATIONS AND SUGGESTIONS FOR FUTURE RESEARCH

I do not have the illusion that this dissertation provides a treatment of emotion communication in social dilemmas that is even anywhere near exhaustive. Many avenues for future research are recommendable. Furthermore, there are several possible limitations to this dissertation that deserve attention. I will outline these below.

6.3.1 Ecological validity of computer-mediated settings

In several empirical chapters I have already briefly discussed the pros and cons of my preference to study emotion and cooperation in computer-mediated instead of face-to-face settings. A more elaborate explanation for this preference follows here. The primary advantage of computer-mediated interaction is that emotions can be communicated without compromising experimental control, so that causality can be established. As demonstrated in Experiment 3.1, this does not necessarily require deception or prevent a proper use of monetary incentives. But it may evoke concerns about ecological validity. The act of cooperation itself, however, often does not occur in face-to-face settings. Donating money to charity, preparing for a meeting and writing a chapter for an edited book are all examples of cooperation in the absence of others—and all can even be conducted on a computer. Some social dilemmas are even inherent to digital environments (Smith & Kollock, 1999). But also the communication of emotion often does not occur in face-to-face settings, but through media such as e-mail, SMS, web logs or chat services (Derks et al., 2008; Ling, 2008). In this sense the research paradigms adopted in this dissertation are certainly ecologically valid.

Whether the current findings can also be generalized to face-to-face settings is another question. Indeed, there are obvious differences between both contexts (Derks et al., 2008). For example, in computer-mediated settings the absence of mimicry impedes emotional embodiment. Also, the increased time lag between messages may facilitate emotion regulation. But digital environments are by no means emotionally impoverished. The lack of physical contact and non-verbal emotional cues may be compensated with emoticons or an increased use of emotion words (Derks et al., 2008). Indeed, in spite of initial skepticism about the emotional richness of computer-mediated settings (Rice &

Love, 1987; Sproull & Kiesler, 1986), little evidence has accumulated since then that supports such view (Derks et al., 2008; Walther 1995; Walther & Burgoon, 1992). The crucial question, however, is if comparable effects of emotion communication can be observed in both settings. Whereas little research has addressed this question directly, many findings that were obtained with similar paradigms as reported here (e.g., Van Kleef et al., 2004a) have been replicated when emotions were communicated non-verbally (Van Kleef et al., 2009; Pietroni, et al., 2008) or in face-to-face settings (Sinaceur & Tiedens, 2006). I therefore have no *a priori* reason to question the generalizability of the present findings to face-to-face settings, but future research could resolve this issue more definitively.

6.3.2 Resource dilemmas

One could wonder to what extent the present findings generalize to other types of social dilemmas. I did examine interpersonal effects of emotion in iterated two-player give-some dilemmas, in indirect-reciprocity games and in step-level public good dilemmas, but not in another important type of social dilemmas: resource dilemmas (Ostrom, 2002). Obviously, like in public good dilemmas, group members in resource dilemmas are also confronted with general problems revolving around defection, coordination and structural change, so emotions will probably be no less functional here. Still, emotions may have somewhat different effects in resource dilemmas, for example because adhering to the decision heuristic of equal final outcomes instead of proportionality is more common. As a result, in asymmetric step-level resource dilemmas influential group members often end up with fewer resources than in asymmetric step-level public good dilemmas (Van Dijk & Wilke, 2000). This may affect the finding in Chapter 4 that the emotions of influential group members are attended to more closely, although it is not immediately clear how. A higher preference for equality may mean that one's attention to other group members (and their emotions) is also distributed more equally, though it may also mean that the higher level of cooperativeness that is expected from influential group members leads one to monitor their emotions more closely.

The effect of anger in step-level public good dilemmas on group members' preference to install a leader may also either be attenuated or exacerbated in resource dilemmas. On the one hand, unlike in resource dilemmas, group members in public good dilemmas have private possessions before making their decisions and may therefore not be willing to hand over their decisional freedom at the first sign of conflict in the group (Van Dijk et al., 2003). On the other hand, collective failure may be evaluated as a suboptimal gain in a step-level resource dilemma, but as a loss of one's own contributions in a step-

level public good dilemma (Brewer & Kramer, 1986; Fleishman, 1988). Because losses loom larger than gains (Kahneman & Tversky, 1979), imminent collective failure—as signaled by anger—may make group members more willing to install a leader in public good dilemmas than in resource dilemmas (Van Dijk et al., 2003). In other words, there are both reasons to hypothesize that the effects of emotion reported in this dissertation will be weaker and stronger in resource dilemmas. Future research, then, would probably succeed in replicating many of the present findings, but, in doing so, could also shed light on the various differences between dilemma types that are likely to affect the impact of communicated emotions.

6.3.3 Interpersonal effects of other emotions

Anger, guilt and disappointment are logical emotions to study in social dilemmas, but by far not the only ones. Contempt may signal that a group member has defected repeatedly and needs to be excluded from the social dilemma (Fischer & Roseman, 2007). A function opposite to that of anger may be fulfilled by gratitude, which signals an intention to reciprocate or reward a cooperative act (Trivers, 1971; Haidt, 2003). The communication of gratitude should therefore increase the likelihood of collective success in step-level social dilemmas, especially because, unlike guilt, it is not preceded by defection. Indebtedness also signals an intention to reciprocate, but this emotion is oppositely valenced than gratitude because it is more of a dutiful response to the perceived expectations of a benefactor (Watkins, Scheer, Ovnicek, & Kolts, 2006). Third parties may thus infer increased cooperation from indebtedness, but only in the short term. Personal achievements and success can elicit pride, which may communicate that one deserves increased status (Keltner et al., 2006; Tracy & Robins, 2007). However, in social dilemmas the definition of success may differ for cooperators and defectors, and for that reason also its interpretation by others when it is displayed. An important function of shame is, if possible, to repair one's damaged self-concept (De Hooge et al., 2008; Frijda, Kuipers, & Ter Schure, 1989; Tangney, Miller, Flicker, & Barlow, 1996), which can be done by cooperating with those toward whom one feels ashamed (De Hooge et al., 2008). Its interpersonal effects may therefore resemble those that were found for guilt in Chapter 5. Obviously, then, plenty avenues for future research exist, but there is a caveat. That much research has documented structural effects of specific emotions on human behavior does not necessarily mean that lay people will make similar predictions when observing emotional others. Future research may unveil structural differences between both that result from human fallacy—or bad experimental design.

6.3.4 Other social functions of emotions

As explained earlier, emotions have several general social functions at the interpersonal level (Keltner & Haidt, 1999; 2001; Keltner & Kring, 1998). One is to provide information about the other player's emotions, beliefs, and intentions. This function fits well with a research area like social dilemmas which is rooted in game theory, because information may alter (one's perceptions of) the underlying outcome structure of social dilemmas. To the extent that it does, it is likely to be instrumental in one's subsequent decisions, as especially Chapters 4 and 5 show. The type of emotional information that was studied in this dissertation was mostly social. And indeed, it elicited inferences about retaliation or forgiveness, justified or unjustified defection, bleak or bright prospects for successful coordination and intentions to cooperate. But emotions may not only reduce social uncertainty, but also provide information about the task environment. The previously mentioned study by Sorce and colleagues (1985) where infants were more likely to cross a visual cliff if mothers displayed joy or interest as opposed to fear or anger provides a clear demonstration of this. It is plausible that emotions have a similar function in social dilemmas. Future research could therefore study how and when emotions reduce resource or group size uncertainty.

Second, emotions have an evocative general social function (Keltner & Haidt, 2001). In particular, they may induce complementary emotions in others. Distress, for example, may evoke sympathy (Batson & Shaw, 1991) and embarrassment may evoke amusement (Keltner et al., 1997). Emotions that are thus evoked may subsequently elicit socially adaptive other-oriented responses such as avoidance, affiliation, and cooperation. Initially, the function of more contagious, reciprocal emotions—such as one person catching another's sadness (Hatfield et al., 1994)—were also labeled as evocative (Keltner & Haidt, 1999; Keltner & Kring, 1998), but their function was later seen as more informative instead (Keltner & Haidt, 2001). Indeed, unlike complementary emotions, emotions that are experienced through contagion typically seem less intentionally directed at other people, but may help to better understand why the other person experiences a particular emotion. This dissertation has primarily focused on the informative function of emotion, but the evocative function deserves future investigation as well. Such research could reveal interpersonal effects of emotions that are not so much mediated by inferences about intentions to cooperate, but by complementary emotions that alter the values individuals attach to their own and others' outcomes.

A final general social function of emotion is that of an incentive in social interaction (Keltner & Haidt, 1999; 2001; Keltner & Kring, 1998). In other words, emotional expressions can reinforce desirable and deter undesirable social behavior. Parent-child interactions provide an obvious illustration of this function (Tronick, 1989). I

wonder, though, if this nevertheless important function can also be subsumed under the evocative and informative functions of emotion. After all, how else than through evoking complementary emotion or providing information can emotions serve as incentives? Moreover, the evocative and informative functions still seem required to differentiate the deterrent function of anger and fear and the incentive function of joy and interest (Sorce et al., 1985). Perhaps, then, the concepts of deterrent and incentive are a convenient denominator of many interpersonal effects of emotion rather than that they represent a separate outcome or process. Still, it is clear from Chapter 2 that emotions are a deterrent of defection, so the exact underlying process is certainly worth studying.

6.3.5 Beyond social-functional accounts

Several decades ago, the only viable solution to social dilemmas was "mutual coercion, mutually agreed upon" (Hardin, 1968) and emotions were seen by many as "useless and bad for our peace of mind and blood pressure" (Skinner, 1948). In recent years both research areas have started to converge. Research on interpersonal effects of emotion in interdependent situations is becoming increasingly popular. How may this emerging research area be advanced? I predict that our understanding of cooperation will be furthered greatly by dual-process models that refine social-functional approaches to emotion. Dual-process models have great explanatory power because they hypothesize that behavior (or any other outcome) may result from at least two different pathways, such as a conscious and an unconscious one, that may interact in many ways (Gilbert, 1999). Indeed, dual-process assumptions are implicit in much modern theory on emotion (Baumeister et al., 2007), social dilemmas (Weber et al., 2004) and, in fact, as is evident from the above discussion, also in social-functional accounts of emotion.

Especially relevant to follow-up research is the Emotion as Social Information (EASI) model (Van Kleef, 2009). It proposes that emotions have interpersonal effects through an inferential or an affective pathway. The inferential pathway brings about behavior through an appraisal-based analysis of the other person's emotion, whereas the affective pathway brings about behavior through emotional contagion or by affecting interpersonal liking and impressions of the emotional person. Furthermore, the model proposes that the observer's information processing and social-relational factors moderate both processes. The model can parsimoniously account for many interpersonal effects of emotion and the distinction between an affective and an inferential route is appealing. But empirical research is needed to validate it further and suggest ways to extend it. For example, information processing and social-relational factors may determine whether the inferential or affective route takes precedence, but what determines how they both

influence each other, as would be the case when one's communication of anger leads to inferences that arouse anger in the other? And how is the finding that anger can subliminally elicit fear (Dimberg & Őhman, 1996) part of the affective route? Is this a special case of emotional contagion, or should the interpersonal effect of emotion on interpersonal liking that the model proposes be regarded as part of a more general process that involves several affective states (cf. complementary emotion, Keltner & Haidt, 2001)? The answer to such questions may be obtained in a context where the communication of emotion has been ignored until now: Social dilemmas.

6.4 CONCLUSION

It has been known for decades that social dilemmas elicit strong emotions. As it turns out, these are no mere epiphenomena—they actually help solve various cooperation-related problems that may arise. Suboptimal cooperation in reciprocal dyadic relationships may be addressed by communicating disappointment, which does not even convey a negative impression. Communicating anger is better reserved for situations of *in*direct reciprocity; it justifies retaliatory defection against defectors, especially against regular defectors. Otherwise, communicating disappointment is a better way to justify to observers that one defected to retaliate. The communication of anger in step-level public good dilemmas is another matter. Compared to guilt, it signals bleak prospects for future coordination, especially when expressed by an influential group member, making that group members often prefer structural solutions such as installing a democratic leader. Structural solutions are not necessary when guilt is expressed—guilt actually leads people to contribute their fair share even when collective success is difficult to obtain. Taken together, these findings show that emotions generally function as socially informative cues that help to solve social dilemmas. It is my hope that this encouraging finding inspires scholars and lay people alike to further explore the potential of emotions to promote mutual cooperation.

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SAMENVATTING (DUTCH SUMMARY)

Coöperatie is een fundamenteel organiserend principe van sociale interactie, niet alleen in tweetallen, maar ook in groepen en complexe samenlevingen (Nowak, 2006). Een handeling is coöperatief wanneer afstand gedaan wordt van het eigenbelang om het gemeenschappelijk belang te dienen. Situaties waarin eigenbelang en gemeenschappelijk belang botsen, en dus waarin coöperatie en non-coöperatie (*defectie*) mogelijk is, heten *sociale dilemma's*. Het is reeds lang bekend dat sociale dilemma's sterke emoties oproepen (Dawes e.a., 1977). De centrale vraag in deze dissertatie is echter wat voor invloed deze emoties hebben op medemensen in een sociaal dilemma. In hoeverre helpen emoties—of is het zelfs hun functie—om coöperatie te bewerkstelligen en sociale dilemma's op te lossen?

Hoofdstuk 1 biedt een inleiding tot coöperatie in sociale dilemma's en emoties. Een belangrijk mechanisme dat kan leiden tot coöperatie is *directe wederkerigheid*. Hier beantwoorden ontvangers van defectie en coöperatie dit *zelf* met, respectievelijk, defectie en coöperatie. Bij *indirecte* wederkerigheid zijn het niet de ontvangers, maar *derden* die defectie en coöperatie wederkeren. Belangrijk voor de studie van coöperatie zijn verder *publiek goed dilemma's*, gemodelleerd naar de realisatie van bijvoorbeeld clubs en schone lucht. Van deze publieke goederen kan ook geprofiteerd worden door hen die niet aan de voorziening ervan hebben bijgedragen. Dit maakt defectie individueel rationeel, maar ook collectief rampzalig. Om een publiek goed te realiseren is vaak een minimale hoeveelheid bijdragen nodig. Dit is het *provisiepunt*, en dergelijke dilemma's heten *stapsgewijze* publiek goed dilemma's. Het behalen van een provisiepunt vereist *coördinatie* van bijdragen tussen groepsleden onderling. Wanneer onvoldoende coöperatie dreigt, wordt vaak besloten tot *structurele oplossingen* zoals het aanstellen van een democratisch leider of het verlaten van het sociale dilemma.

Het belang van emoties voor zowel directe en indirecte wederkerigheid als publiek goed dilemma's volgt uit een sociaal-functionele benadering van emoties (Keltner & Haidt, 2001). Deze benadering stelt onder meer dat emoties sociale informatie verschaffen door de intenties, motivaties en overtuigingen van een interactiepartner aan te geven, wat helpt om sociale interacties te coördineren. Onderzoek naar onderhandelingen toont inderdaad aan dat het communiceren van emoties effect heeft op de concessies die onderhandelaars doen (bijv. Van Kleef e.a., 2006). Emoties zouden daarom eveneens kunnen helpen bij problemen die betrekking hebben op coöperatie, alsmede op coördinatie en structurele oplossingen, welke allen relevant zijn in sociale dilemma's. Op dit theoretische raamwerk werden de vier empirische hoofdstukken gebaseerd die in dit proefschrift zijn gerapporteerd.

Het doel van Hoofdstuk 2 was om te onderzoeken of directe wederkerigheid, belichaamd door de beroemde, strikt wederkerige, leer-om-leer (tit-for-tat) strategie zelfs

nog effectiever is in het afweren van defectie als deze gesteund wordt door de communicatie van emotie en, verder, welke emotie dan meer coöperatie teweegbrengt: boosheid of teleurstelling. Van beide emoties is bekend dat ze coöperatie bewerkstelligen (bijv. Van Kleef e.a., 2004; 2006), maar, anders dan teleurstelling, is bekend dat boosheid ook averechts kan werken in bepaalde omstandigheden, boosheid kan oproepen in de ander en verdere escalatie kan veroorzaken (Van Dijk e.a., 2008; Van Kleef & Côté, 2007). Verwacht werd daarom dat teleurstelling effectiever dan boosheid zou zijn in het afweren van defectie.

Om dit te testen speelden proefpersonen een 'geef-dilemma' met een computergesimuleerde partner die een leer-om-leer strategie hanteerde. In dit spel hadden allebei de spelers een aantal munten die twee keer zoveel waard waren voor de ander. Het doneren van munten was daarom kostbaar, maar loonde in geval van wederkering. Na elke paar ronden communiceerde de partner ofwel geen emotie, ofwel boosheid of teleurstelling met een intensiteit die toenam naarmate proefpersonen meer defecteerden. Het communiceren van teleurstelling bleek inderdaad hogere niveaus van coöperatie te bewerkstelligen dan het communiceren van boosheid of geen emotie. Het uiten van boosheid leidde niet tot gunstige resultaten: het wekte boosheid op in proefpersonen, die een negatieve algehele indruk kregen van hun partner en deze als relatief vergeldingsgezind en weinig vergevingsgezind beoordeelden. Sterker nog, wanneer proefpersonen de mogelijkheid kregen om zonder medeweten van hun partner diens opbrengsten te laten toe- of afnemen waren ze grootmoediger wanneer hun partner teleurstelling in plaats van boosheid of geen emotie had gecommuniceerd.

Hoofdstuk 3 focuste ook op boosheid en teleurstelling, maar dan in indirecte wederkerigheid. Coöperatie door middel van indirecte wederkerigheid is gebaseerd op reputatie: wie erom bekend staan te coöpereren verdient coöperatie en wie erom bekend staat te defecteren verdient defectie. Voorgesteld werd dat teleurstelling en boosheid onderdeel zijn van een oplossing voor een probleem dat voortkomt uit zulke indirecte-wederkerigheidslogica: Hoe onderscheid je zelfzuchtige, ongerechtvaardigde defectie, gemotiveerd door hebzucht, van vergeldingsgezinde, gerechtvaardigde defectie, gemotiveerd door een verlangen om defectie te ontmoedigen?

In Experiment 3.1 speelden proefpersonen een spel van indirecte wederkerigheid om echt geld en zonder deceptie. Eerst werd aangetoond dat de ongerechtvaardigde handeling van defectie tegen een coöperator meer teleurstelling en boosheid opriep dan dat de meer gerechtvaardigde handeling van defectie tegen een defecteerder deed. Dit is met name interessant omdat proefpersonen deze emotie als een derde partij ervoeren, zonder iets te winnen of verliezen te hebben van de defectie die ze oberveerden. Dit is een sterke aanwijzing dat zowel boosheid en teleurstelling wel degelijk morele emoties kunnen zijn. Belangrijker is echter dat boosheid en teleurstelling ook aan *derden* te kennen gaven of

defectie gerechtvaardigd was of niet. Defectie uit boosheid of teleurstelling werd gezien als een antwoord op ongerechtvaardigde defectie, werd als rechtvaardig beoordeeld en bracht meer coöperatie teweeg dan dat defectie uit verveling of defectie zonder communicatie van emotie deden.

Experiment 3.1 was niet ontworpen om verschillende effecten van boosheid en teleurstelling aan te tonen; dit was het doel van Experiment 3.2. Teleurstelling is een reactie op onvervulde positieve verwachtingen (Van Dijk & Van Harreveld, 2008) en kan daarom een gepast antwoord zijn op mensen die doordat ze hebben gedefecteerd niet voldaan hebben aan hun relatief positieve reputatie. Boosheid is een meer dwingende, krachtigere reactie die, zoals Hoofdstuk 2 liet zien, kan leiden tot escalatie en daarom beter bewaard kan worden voor meer 'serieuze gevallen', namelijk defecteerders die reeds een relatief negatieve reputatie hebben. Om deze hypothese te testen lazen proefpersonen een scenario waarin coöperatie door middel van indirecte wederkerigheid mogelijk was. Zoals voorspeld concludeerden proefpersonen dat een werknemer die naliet zijn collega's te helpen, in het verleden meer gelijksoortige defecties had gepleegd wanneer zijn meest recente defectie geen boosheid maar teleurstelling opriep. Vergeleken met boosheid geeft teleurstelling dus te kennen dat defectie gepleegd is door een persoon met een positieve reputatie.

Experiment 3.3 repliceerde de belangrijkste bevindingen van Experiment 3.1 en 3.2 met een nieuw laboratoriumparadigma. Het toonde opnieuw aan dat de communicatie van boosheid en teleurstelling derden in staat stelde om gerechtvaardige en ongerechtvaardigde defectie te onderscheiden en dat wanneer defectie teleurstelling oproept, derden concluderen dat de defecteerder een positievere reputatie heeft dan wanneer defectie boosheid oproept. Hoofdstuk 3 helpt zodoende om een belangrijk probleem in empirisch onderzoek naar indirecte wederkerigheid op te lossen door aan te tonen dat mensen er door middel van communicatie van emoties in slagen om terug te slaan tegen defectors zonder een kettingreactie van defectie te ontketenen.

In Hoofdstuk 4 werden stapsgewijze publiek goed dilemma's bestudeerd die *asymmetrisch* waren: niet alle groepsleden hadden evenveel geldmiddelen tot hun beschikking. Onderzocht werd of emoties als sociale hints beschouwd kunnen worden die proefpersonen informeren over of succesvolle coördinatie een waarschijnlijk vooruitzicht is. De aanwezigheid van een boos groepslid zou conflict en defectie suggereren voor de toekomst, terwijl de aanwezigheid van een schuldig groepslid sociale reparatie en coöperatie zou suggereren. Maar het idee was dat zulke gevolgtrekkingen uit emotie alleen instrumenteel zouden zijn voor de daaropvolgende beslissingen van proefpersonen als het boze of schuldige groepslid daadwerkelijk in staat was om een aanzienlijke hoeveelheid geldmiddelen bij te dragen om het publiek goed te realiseren. Evidentie voor een dergelijk proces kan het best verschaft worden door het meten van voorkeuren voor structurele

oplossingen zoals het verlaten van de groep en aanstellen van een democratisch leider. Immers, wanneer een groepslid dat veel geldmiddelen kan bijdragen boos is en de vooruitzichten voor succesvolle coördinatie derhalve somber zijn, valt onomwonden te voorspellen dat structurele oplossingen de voorkeur zullen hebben.

Door twee studies werd deze redenering bevestigd. Experiment 4.1 toonde aan dat proefpersonen van een boos groepslid vermoedden dat deze niet verder zou gaan met coöpereren, terwijl het omgekeerde effect gevonden werd voor een schuldig groepslid. Echter, alleen wanneer het emotionele groepslid veel geldmiddelen kon doneren en dus uitermate instrumenteel was in het realiseren van het publiek goed, concludeerden proefpersonen dat de gecommuniceerde emotie invloed zou hebben op of er al dan niet een rechtvaardige opbrengst behaald zou worden. Proefpersonen kozen daarom alleen om de groep te verlaten wanneer een groepslid met veel geldmiddelen boosheid communiceerde. Anderzijds, wanneer ze konden kiezen voor een meer constructieve structurele oplossing, gaven proefpersonen in Experiment 4.2 er de voorkeur aan om een democratisch leider aan te stellen wanneer ze geconfronteerd werden met een boos, invloedrijk groepslid. Experiment 4.2 demonstreerde ook een andere voorwaarde voor effecten van gecommuniceerde emoties. Wanneer expliciete beloften zijn gemaakt wordt er niet langer aandacht besteed aan de impliciete betekenis die uit emoties kan worden afgeleid.

De opeengestapelde evidentie van Hoofdstuk 4 die suggereerde dat emoties gebruikt kunnen worden als sociale hints in stapsgewijze publiek goed dilemma's, baande de weg om meer specifiek schuld te bestuderen in Hoofdstuk 5 en te bekijken wanneer en hoe precies emoties mensen in staat stellen om hun bijdragen te coördineren om het provisiepunt te behalen. Schuld is een teken dat goede kansen om succesvol te coördineren in het verschiet liggen, zoals ook uit Hoofdstuk 4 bleek. Maar deze kennis zou alleen nuttig moeten zijn als er een coördinatietaak voorhanden is die anders moeilijk te overwinnen zou zijn. Experiment 5.1 testte daarom of proefpersonen vonden dat schuld, geuit door een medegroepslid, informatiever was wanneer zij het behalen van het provisiepunt als makkelijk, in plaats van moeilijk, beoordeelden. Dit is inderdaad wat de resultaten lieten zien.

De logische volgende stap was dan ook om te bekijken in Experiment 5.2 of het communiceren van schuld ertoe leidde dat proefpersonen hun bijdragen succesvol coördineerden wanneer het provisiepunt zo hoog was dat ze het onder normale omstandigheden te riskant zouden vinden om hun eerlijke deel bij te dragen. Ten eerste concludeerden proefpersonen, overeenkomstig de sociale correctiefunctie van schuld, dat het groepslid dat schuld uitte waarschijnlijk gedefecteerd had in het verleden, maar daarvan zou afzien in de toekomst. Verder concludeerden proefpersonen dat als defectie voldoende reden was om schuld te ervaren, het andere groepslid waarschijnlijk een coöperatief persoon was waarvan verwacht kon worden dat deze ook in de toekomst zou

coöpereren. In de overtuiging dat beide medegroepsleden dus zouden coöpereren, droegen proefpersonen doorgaans genoeg bij om het provisiepunt te bereiken, zelfs als deze hoog was. Proefpersonen in de geen-emotie conditie, daarentegen, waren er minder zeker van dat hun groepsleden zouden coöpereren en slaagden er daarom alleen in om succesvol te coördineren wanneer het provisiepunt laag was. Schuld faciliteert dus coöperatie, maar dit kan enkel empirisch aangetoond worden als een situatie gecreëerd wordt waarin coöperatie normaliter faalt, zoals een publiek goed dilemma met een hoog provisiepunt.

De bevindingen die in deze vier empirische hoofdstukken werden gedaan, worden in Hoofdstuk 6 nog eens op een rijtje gezet. De bevindingen van Hoofdstuk 2 en 3 samen en van Hoofdstuk 4 en 5 samen worden bestudeerd om bredere uitspraken te kunnen doen over, respectievelijk, boosheid en teleurstelling in wederkerigheid, en boosheid en schuld in stapsgewijze publiek goed dilemma's. Hoofdstuk 3, 4 en 5 worden ook besproken omdat er voorafgaand aan dit onderzoek weinig bekend was over de communicatie van emotie in situaties waarin meer dan twee mensen onderling afhankelijk zijn voor de allocatie van opbrengsten. De implicaties en steun voor een sociaal-functionale aanpak van emoties worden ook weergegeven, evenals praktische implicaties van dit proefschrift.

Verder worden in Hoofdstuk 6 beperkingen van het huidige onderzoek en suggesties voor toekomstig onderzoek besproken. De voor- en nadelen van het bestuderen van door de computer gemedieerde sociale interactie worden genoemd en bekeken wordt in hoeverre het huidige onderzoek gegeneraliseerd kan worden naar een ander belangrijk type sociaal dilemma, namelijk *resource* dilemma's. Verder wordt gespeculeerd over mogelijke interpersoonlijke effecten van andere emoties en over mogelijke andere functies van emoties in sociale dilemma's, afgezien van het verschaffen van sociale informatie. Ook wordt aangevoerd dat onderzoek naar interpersoonlijke effecten van emoties verrijkt kan worden door middel van "dual process models". Het proefschrift sluit af met de bemoedigende conclusie dat emoties over het algemeen functioneren als sociale hints die helpen om coöperatie te bewerkstelligen.

BIOGRAPHICAL NOTE

Maarten Johannes Jacobus Wubben was born on May 22, 1983 in Tilburg, the Netherlands and grew up in the nearby village of Berkel-Enschot. Having received his secondary education diploma in 2001 at the St.-Odulphus Lyceum, he started studying psychology in Nijmegen. In 2005, after having completed his thesis on social dilemmas under supervision of Roos Vonk and Jaap Ouwerkerk, he received a Master's degree in Social Psychology. The research that is reported in this dissertation was supervised by David De Cremer and Eric van Dijk, and conducted at Tilburg University from September 2005 to December 2008 and at the Rotterdam School of Management from December 2008 to September 2009. Maarten currently also works there as a postdoctoral researcher and member of the Erasmus Centre of Behavioural Ethics.

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SOCIAL FUNCTIONS OF EMOTIONS IN SOCIAL DILEMMAS

Cooperation is both one of the fundamental organizing principles and one of the major problems of contemporary society. On the one hand, most people readily act in the collective interest by donating to charity, helping out their co-workers or voting during elections, even when they could easily get away with not engaging in these time-, money- and energy-consuming acts. On the other hand, societal issues such as organizational misconduct, loutish behaviour and global warming arise exactly because people do not always cooperate, but often pursue their self-interest instead. These type of situations where the collective and self-interest collide have become known as *social dilemmas*.

It has been established for decades that social dilemmas elicit strong emotions in people – even to the extent that threats and curses are no exception. Yet that these emotions are not just remarkable, intrapersonal phenomena but that they may actually lead others to cooperate is an idea that has long been alien in psychology. Only recently have scholars started to accept that emotions generally fulfil clear functions in social interactions. However, it has never been investigated directly whether this also means that expressing emotion helps to establish cooperation in social dilemmas. This dissertation is a first step to fill this empirical vacuum and a test of whether cooperation truly is a human talent.

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