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Chapter 1

General Introduction

1 General Introduction

“In the long history of humankind (and animal kind, too) those who learned to collaborate and improvise most effectively have prevailed.”

— Charles Darwin (1809–1882)

“The only thing that will redeem mankind is cooperation, and the first step towards cooperation lies in the hearts of individuals.” (Russell, 1954, p. 212)

Individuals in dyadic relationships, groups, organizations, and the society at large often encounter social dilemmas—situations that involve conflicts between personal interest and collective interest (Dawes, 1980; Kollock, 1998; Van Lange, Joireman, Parks, & Van Dijk, 2013). In such mixed-motive situations, each individual is tempted to act selfishly and harvest the benefits created by others’ cooperative behavior, whereas the collective is worse off if everyone free rides (Dawes, 1980). Social dilemmas pose a major challenge to human society and are reflected in many pressing global issues, such as resource depletion, environmental pollution, and overpopulation. Indeed, resolving these issues requires all actors to engage in cooperation—behaviors that involve a personal cost but can benefit others and the collective (Rand & Nowak, 2013). A typical example of a real-world social dilemma concerns electricity blackouts. During periods of high electricity demand, the cost to produce electricity increases dramatically, whereas the price consumers pay remains constant. This mismatch between price and actual cost makes every consumer tempted to use energy excessively for their own benefits, but if everyone does so, the collective will run the risk of electricity blackouts. Thus, this situation requires everyone to cooperate by refraining from excessive energy use during high electricity demand. However, despite the importance of cooperation in such situations, free rider problems often occur, given the temptation to enhance one’s personal interest (Hardin, 1968). Thus, finding solutions that promote human cooperation is an important issue for both science and society.

Indeed, the puzzle of cooperation has inspired an enormous amount of research from scientists across disciplines. Researchers have examined why and when people tend to cooperate using diverse approaches, such as field research (Yoeli, Hoffman, Rand, & Nowak, 2013), lab experiments with economic games (Fehr & Gächter, 2002a), and agent-based simulation approach (Andrighetto et al., 2013). Moreover, different perspectives have been proposed to explain human cooperation. For example, evolutionary perspectives suggest that natural selection should favor competition that serves to maximize one’s own fitness, unless specific mechanisms are at work. Such mechanisms include (a) *direct reciprocity* during repeated interactions between the same two individuals, (b) *indirect reci-*

procity during repeated interactions within a population where people can observe others' behavior or gossip about others' reputation, (c) *spatial selection* in structured populations where cooperators form clusters and interact with other cooperators, (d) *multilevel selection* when ingroup and intergroup competitions co-exist and groups of cooperators outperform groups of defectors, and (e) *kin selection* that involves conditional cooperation based on kinship index (for reviews, see Nowak, 2006; Rand & Nowak, 2013). Social psychological perspectives mainly focus on characteristics of the person, situational factors, and interpersonal dynamics in social interactions (see Van Lange, Balliet, Parks, & Van Vugt, 2014). Such factors include, but are not limited to, dispositional preference in one's own and others' outcomes (i.e., social value orientation; see Balliet, Parks, & Joireman, 2009), change in payoff structures induced by monetary reward and punishment (Balliet, Mulder, & Van Lange, 2011; Fehr & Gächter, 2002a), situational cues of reputation (e.g., third-party observers or gossip; Beersma & Van Kleef, 2011; Simpson & Willer, 2008), and interpersonal trust or expectations of others' cooperation (Balliet & Van Lange, 2013).

Drawing on both evolutionary and social psychological perspectives, the present work mainly focuses on reputation that serves to promote cooperation. To be specific, this work extends previous research by addressing why, when, and how gossip (i.e., reputation transmission) can promote and maintain cooperation. Moreover, I apply life history theory to explain potential individual differences in cooperative strategies (Del Giudice, Gangestad, & Kaplan, 2015). Below I will briefly describe the theoretical background for reputation (and related concepts in social psychology) and the link between life history trade-offs and cooperation. In doing so, I integrate insights and concepts from evolutionary perspectives, economics, and psychology, with a particular focus on social psychology. A more detailed review on reputation, gossip, and cooperation is presented in Chapter 2.

The Definition, Formation, and Social Functions of Reputation

Being a fundamental element of our social lives, reputation is often conceptualized as a collective system of subjective beliefs or impressions about an individual among members of a social group (Bromley, 1993; Emler, 1990). As individuals in groups and social networks, people are concerned about what impressions they make on others, especially those whom they are closely connected to and regard as influential in their lives (Bromley, 1993). People also form beliefs about others' reputation based on their own knowledge, experience, or information received from third parties (i.e., gossip).

Indeed, reputations are formed not only about people, but also about other things, such as organizations (i.e., corporate reputation; Barnett, Jermier, & Lafferty, 2006), and commercial products or services (i.e., brand reputation; Erdem & Swait, 2004). As consumers, people are concerned about the reputations of relevant organizations, products, or services, and prefer to choose reliable and trustworthy organizations or products based on these reputations (Purohit & Srivastava, 2001). For example, when shopping online

(e.g., on eBay or Amazon), one's choice to buy one product over another is often strongly influenced by other consumers' positive or negative reviews. Indeed, the density of both real-life and virtual social networks in the modern world makes information about cheaters or low-quality products spread quickly and widely among potential future partners or consumers.

Given the importance of reputation in social interactions and business transactions, people should automatically manage their reputation by behaving appropriately or following the group norms when their reputation is at stake. Notably, earlier work in social psychology has examined concepts that are similar to reputation management. One such concept is impression management (i.e., self-presentation), a process through which people control the impressions that others form of them (Leary & Kowalski, 1986). Another concept is public self-consciousness, representing one's disposition to be conscious of one's social self-aspects, such as how one appears to others or what impression one creates for others (Froming & Carver, 1981). Despite minor differences between these concepts (e.g., reputation involves collective impressions about not only people, but also groups, organizations, and products), they share the core idea that people vary in their concerns for reputation (or impression), and behave in ways to manage a good reputation or impression.

In social interactions, people form their impressions about someone based on either direct interactions or gossip received from third parties. These different impressions serve as building blocks of one's reputation (Anderson & Shirako, 2008; Bromley, 1993). Notably, individuals' reputation may or may not correspond with their personality traits or behavioral history. Discrepancies between one's reputation and one's past behavior or personality can be influenced by many social factors, such as unintended errors (i.e., "noise") in social interactions (Tazelaar, Van Lange, & Ouwerkerk, 2004), or one's social connections. For example, more socially connected people tend to develop a reputation that strongly relates to their past cooperative or uncooperative behavior, whereas the behavior of less connected people impacts their reputation to a lesser extent (Anderson & Shirako, 2008). Similarly, field research suggests that one tends to have a more cooperative reputation as the number of people one has cooperated with increases, but this reputation is not affected by the number of one's cooperative acts (Macfarlan, Quinlan, & Remiker, 2013).

Reputation serves many social functions and can be utilized to navigate the social world. First, people can attain a good reputation through a variety of prosocial behaviors, such as donations to charities (Milinski, Semmann, & Krambeck, 2002a) or altruistic punishment of free riders (Barclay, 2006). These good reputations can pay off in future interactions when one needs help, resources, or coalition partners to solve challenging tasks (Nowak & Sigmund, 2005). Second, knowing others' reputation helps people to select trustworthy partners and avoid being taken advantage of by potential cheaters or free riders (Dunbar, 2004). Third, reputation is less costly than punishment to promote coopera-

tion, and can efficiently prevent resource depletion or free riding problems without harming the individual or collective welfare (Feinberg, Cheng, & Willer, 2012; for a review, see Milinski, 2016). Thus, reputation is a fundamental route to human cooperation and drives the direction and consequences of future social interactions.

Life History Trade-offs and Cooperation

As noted earlier, social interactions often involve conflicts of interest that require people to make choices between investing in one's own welfare (i.e., defection) and investing in the collective welfare (i.e., cooperation; Van Lange et al., 2013). The underlying psychology of how people make such choices goes beyond this social context. Indeed, all organisms have to recurrently make decisions regarding how to allocate their time and energy to competing fitness-relevant activities over their life course (see Del Giudice et al., 2015). This is one of the assumptions underlying life history theory, which I briefly describe next.

Life history (LH) theory is a well-established theoretical framework from evolutionary biology that explains why, when, and how organisms make decisions to resolve the trade-offs between three major life functions, namely maintenance, growth, and reproduction (Del Giudice et al., 2015; Roff, 1992, 2002). Decisions to resolve these trade-offs constitute an individual's life history (LH) strategy that varies on a fast-to-slow continuum. Large differences in LH strategies have been observed across species: Those adopting faster strategies tend to prioritize mating and reproduction effort, and they mature rapidly, reproduce earlier, and have more offspring. On the contrary, those following slower strategies tend to prioritize prolonged development and delayed reproduction, and have fewer offspring (Promislow & Harvey, 1990). Humans tend to adopt relatively slower strategies given their prolonged period of growth before sexual maturation, but they may also possess mechanisms to adjust their LH strategies based on local socioecological conditions (Belsky, 2012; Belsky, Steinberg, & Draper, 1991). Notably, harshness (morbidity-mortality rates) and unpredictability (temporal variations in harshness) are the most fundamental environmental parameters that influence the development of LH strategies (Ellis, 2004; Ellis, Figueredo, Brumbach, & Schlomer, 2009).

Variations in LH strategies are expressed in a variety of behaviors. For example, people with faster strategies tend to show a stronger desire to have children sooner, and more risk taking and aggressive behaviors (Del Giudice, 2014; Figueredo et al., 2006; Griskevicius, Delton, Robertson, & Tybur, 2011; Hill, Ross, & Low, 1997). One important distinction between fast and slow LH strategies is that people pursuing slower strategies tend to value long-term benefits more than short-term gains (e.g., Griskevicius, Tybur, Delton, & Robertson, 2011). This trait difference between fast and slow LH strategies might also relate to one's cooperative strategies with others. Such a connection is plausible given that cooperation often involves paying an immediate cost to benefit others, and a cooperative reputation pays off in the long term, whereas selfish behaviors benefit oneself in the short

term but involve long-term reputational cost (Nowak & Sigmund, 2005). This logic would suggest that people following slower, compared to faster, strategies would be more cooperative than others in social interactions.

Overview of the Present Dissertation

The present dissertation contributes to the extant literature on effective solutions to cooperation problems. Specifically, it focuses on two important factors that may affect cooperation: (a) gossip and reputation, and (b) life history strategy that reflects individual differences in resource allocation decisions toward competing fitness-relevant activities (Del Giudice et al., 2015). This dissertation is built on one review chapter (Chapter 2) and four empirical chapters (Chapters 3, 4, 5, and 6) on different aspects of these two factors. Chapter 2 reviews the theoretical background and extant research on reputation as a key mechanism to promote cooperation. Chapters 3 and 4 investigate when gossip can promote generosity and cooperation, and test two potential psychological mechanisms (i.e., reputational concern and expected indirect benefits) that may explain this phenomenon of gossip-based cooperation. Chapter 5 tests the relative ability of gossip (i.e., reputation transmission) and punishment to promote and maintain cooperation. Chapter 6 provides some initial evidence on whether life history strategy relates to cooperation. Below I provide an overview of these chapters.

Chapter 2 aims to review the role of reputation in promoting human cooperation. Theories of indirect reciprocity, competitive altruism, and costly signaling suggest that a cooperative reputation brings about delayed indirect benefits, such as resources or attraction to potential partners (Nowak & Sigmund, 2005; Van Vugt, Roberts, & Hardy, 2007; Zahavi & Zahavi, 1997). This may explain why reputation serves to promote cooperation. Past multi-disciplinary research on reputation and cooperation mainly addressed three key questions: (a) *how* people adjust their cooperation when the situation contains explicit or implicit reputational cues (i.e., social visibility and gossip), (b) *when* reputational cues can promote cooperation, and (c) *who* cares more about their reputation. Three promising avenues for future research are outlined. First, intergroup competition may elicit variations in group stability (i.e., likelihood that groups will persist and survive), and further determine whether people cooperate and also monitor others' behavior (e.g., through gossip) to ensure mutual cooperation. Second, unintended errors or "noise" in social interactions may cause a mismatch between one's intended and actual behavior, or biased reputations (e.g., cooperators are perceived as free riders), and harm social interactions. Thus, it is important to find solutions to cope with noise and biased reputation. Finally, it is plausible that positive, compared to negative, reputation systems that encourage only (or mainly) positive evaluations about others may be more effective in promoting trust and cooperation.

Chapter 3 seeks to examine whether gossip and reputation only promote generosity

and cooperation when one perceives a “shadow of the future” (Axelrod, 1984, p. 126; Barclay, 2012). The prediction is that people will be more cooperative when they anticipate future interactions with the gossip recipient(s), and that proselves who tend to maximize their own interest may be more sensitive to such cues of gossip. This chapter also examines two potential mechanisms of the proposed effect: reputational concern *and* expected indirect benefits (i.e., expected benefits from one’s future partners who know one’s reputation). Across three studies, participants (i.e., allocator) first allocated an amount of resource between themselves and a recipient in a dictator game. Then they interacted with another person (i.e., investor) as a responder in a trust game. In Studies 3.1 and 3.2, participants were randomly assigned to one of three conditions in which the recipient could gossip about their behavior to either (a) their future partner in the trust game, or (b) an irrelevant person participating in another study, or (c) could not gossip. Study 3.3 further replicated these effects by increasing the number of gossip recipients to a group of five people. This extension resembles real-life situations in which people may often gossip about others with multiple others. Thus, Study 3.3 could also test whether people tend to adjust their levels of cooperation as the number of gossip recipients increases, even when they anticipate no future interactions with these recipients.

Chapter 4 adopts an evolutionary psychology perspective to understand why and how gossip and reputation promote generosity and cooperation. According to this perspective, natural selection may have shaped psychological mechanisms for people to identify opportunities to secure a good reputation. Two properties of social networks might inform people when to adjust their behavior. First, the “small” and densely connected social networks make it easy for people to transmit information from one end of a social network to another. Second, the uneven distribution of social connections suggests that more socially connected people may have greater potential to spread others’ reputation. Thus, an evolutionary perspective would assume that people should condition their cooperation on others’ social connections and gossip capacity. Thus, it is predicted that people will be more cooperative when their interaction partner or a third-party observer is connected with and can gossip to (a) at least one (vs. no one) or (b) many others (vs. fewer others) with whom they anticipate future interactions. To test these hypotheses, Chapter 4 used the same paradigm as the previous chapter, with a different manipulation: participants learned that their interaction partner (Studies 4.1 and 4.3) or an observer (Study 4.2) was connected and could gossip to 0, 1, 4, or 8 of their eight potential partners in the subsequent trust game. Study 4.3 also varied the stake size in the trust game (i.e., high-stake vs. low-stake) to test an alternative rational choice account—people cooperate more in response to gossip to maximize their material outcome. Two psychological mechanisms (i.e., reputational concern and expected indirect benefits) for this gossip-based cooperation were assessed across three studies.

Chapter 5 seeks to further investigate the social functions of gossip and reputation to

promote and maintain cooperation by comparing it with monetary punishment. While both reputation and punishment have been suggested to promote within-group cooperation (Balliet et al., 2011; Fehr & Gächter, 2002a; Nowak & Sigmund, 2005), no behavioral research has directly compared them. This chapter aims to address this issue by testing the relative ability of gossip and punishment to promote cooperation, increase individual welfare, and maintain cooperation when these incentives no longer exist. Participants interacted with others online in a four-round public goods game (PGG) and a subsequent two-round trust game (TG). They interacted with different partners in each round to guarantee no opportunities for direct reciprocity or retaliation. I applied a 2 (gossip vs. no gossip) \times 2 (punishment vs. no punishment) between-participants design with four conditions (*control*, *gossip*, *punishment*, *gossip-and-punishment*). Gossip and punishment options were manipulated in the PGG, such that participants could either (a) send notes about their group members in each round to these members' partners in the next round (*gossip* option), or (b) assign deduction points to other group members to reduce their outcomes, with each point reducing three points from others (*punishment* option). In the two-round TG, half of the participants first acted as an investor, then as a responder, while the other half first acted as a responder, then as an investor. I measured their contribution and earnings in each round of the PGG, and their levels of trust and trustworthiness in the TG. This paradigm enables me to test both overall and relative effectiveness and efficiency of gossip and punishment to promote and maintain cooperation.

Chapter 6 seeks to examine the relation between life history strategy and human cooperation. Life history theory predicts that people following slower, compared to faster, strategies, are more willing to invest in long-term cooperation and reciprocity (e.g., Del Giudice, 2014; Del Giudice et al., 2015), yet no empirical research has directly tested this. This final chapter addresses this question using both correlational and experimental methods across five studies. Studies 6.1 and 6.2 used two life history strategy measures and correlated them with cooperation in various economic games (e.g., dictator game, prisoner's dilemma game). Studies 6.3 to 6.5 measured participants' childhood environments (i.e., childhood socioeconomic status and unpredictability), manipulated resource scarcity through either a slideshow of pictures that indicated resource scarcity (vs. resource abundance or control) or different relative initial endowments in an economic game, and then measured cooperation in this game. Four potential psychological mechanisms (i.e., temporal discounting, concern for reputation, social value orientation, and trust in others) that may explain the relation between life history strategy and cooperation were also assessed across studies.

Each chapter represents an independent research article on the theme of human cooperation. All chapters have been published in peer-reviewed academic journals or are currently submitted for publication. Because the review and empirical chapters are a result of collaboration, I chose to use "we" instead of "I" throughout the dissertation.