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Trust, Conflict, and Cooperation: A Meta-Analysis

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Many theories of trust emphasize that trust is most relevant to behavior in situations involving a conflict of interests. However, it is not clear how trust relates to behavior across situations that differ in the degree of conflicting interest: Does trust matter more when the conflict of interest is small or large? According to an interdependence perspective, trust becomes an especially important determinant of behavior in situations involving larger, compared to smaller, degrees of conflicting interests. To examine this perspective, we conducted a meta-analysis involving 212 effect sizes on the relation between trust (both state and dispositional trust in others) and cooperation in social dilemmas—situations that involve varying degrees of conflict between self-interest and collective interest. Results revealed that the positive relation between trust and cooperation is stronger when there is a larger, compared to smaller, degree of conflict. We also examined several other possible moderators of the relation between trust and cooperation. The relation between trust and cooperation was stronger during individual, compared to intergroup, interactions but did not vary as a function of the situation being either a one-shot or repeated interaction. We also find differences across countries in the extent that people condition their own cooperation based on their trust in others. We discuss how the results support an emerging consensus about trust being limited to situations of conflict and address some theoretical and societal implications for our understanding of how and why trust is so important to social interactions and relationships.

Keywords: trust, expectations, cooperation, social dilemmas, meta-analysis

Trust is essential to initiate, establish, and maintain social relationships. Trust encourages the initiation of mutual cooperative relationships (Deutsch, 1958, 1960b; McKnight, Cummings, & Chervany, 1998) and results in greater relationship commitment and satisfaction (L. Campbell, Simpson, Boldry, & Rubin, 2010; Righetti & Finkenauer, 2011; Wieselquist, Rusbult, Agnew, & Foster, 1999), and broken trust may mark the demise of social relations (Lewicki & Bunker, 1996; Robinson, 1996). Trust also facilitates the flourishing of groups (de Jong & Elfring, 2010), organizations (Dirks & Ferrin, 2001; McEvily, Perrone, & Zaheer, 2003; Zaheer, McEvily, & Perrone, 1998), and nations (Knack & Keefer, 1997; Labonne & Chase, 2010). Trust can even promote the stability and quality of social networks, by strengthening norms that favor cooperation and catalyzing the inclusion of new members to existing social networks (Balliet & Van Lange, in press; Fukuyama, 1995; La Porta, Lopez-de-Silanes, Shleifer, & Vishny, 1997; Putnam, 1993). Indeed, trust permeates the range of possible social relationships.

Trust is a key concept to understanding multiple levels of social phenomena, from the neurophysiological, cognitive, and affective processes of individuals in social interactions (Adolphs, 2002;

Evans & Krueger, 2011; Lount, 2010), behavior in dyadic relationships (Rempel, Holmes, & Zanna, 1985; Shallcross & Simpson, 2012), behavior within groups (Yamagishi, 1988; Yamagishi & Cook, 1993), intergroup interactions (Insko, Kirchner, Pinter, Efaw, & Wildschut, 2005; Serva, Fuller, & Mayer, 2005), and the workings of institutions and markets (Bottazzi, Da Rin, & Hellmann, 2006; Fukuyama, 1995). For these reasons, trust has captured the attention of researchers across the biological and social sciences (for reviews, see A. Campbell, 2010; Hosmer, 1995; Kramer, 1999; Ostrom & Walker, 2003; Rousseau, Sitkin, Burt, & Camerer, 1998; Schoorman, Mayer, & Davis, 2007; Simpson, 2007a; Yamagishi, 2011b). Yet developments across disciplines have generated many diverse conceptualizations of trust.

Some definitions of trust emphasize expectations, predictability, and confidence in others' behavior (e.g., Dasgupta, 1988; McAllister, 1995; Sitkin & Roth, 1993). Yet other definitions emphasize that trust involves expectations of other's benevolent motives in situations that involve a conflict between self and collective interests (e.g., Holmes & Rempel, 1989; Mayer, Davis, & Schoorman, 1995; Rousseau et al., 1998; Yamagishi, 2011b). Our research is inspired by the latter conceptualizations. In particular, we emphasize that situations can vary dramatically in degree to which interests are conflicting, and therefore in the degree to which situations challenge people's concern for others. An interdependence perspective suggests that the degree of conflicting interests in a situation is essential to understanding the workings of trust—and, in particular, how strongly trust relates to own cooperative behavior. The key question we seek to address is, Does trust influence cooperation more when the conflict of interest is small or large?

This article was published Online First December 10, 2012.

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To answer this question, we utilize research on social dilemmas. While social dilemmas always possess some conflict between self-interest and collective interests (Dawes, 1980), the degree of conflict in the dilemma (i.e., the extent to which self-interest is opposed to collective interest) varies considerably across experimental social dilemmas. In general, prior research finds that both dispositional trust and expectations of other's behavior relate positively to cooperation in social dilemmas (e.g., Deutsch, 1960b; Ferrin, Bligh, & Kohlse, 2008; Yamagishi, 1988). Yet, to date, there is only indirect evidence that the degree of conflict moderates the relation between trust and cooperation. To examine this perspective, we conduct a meta-analytic review of studies of social dilemmas that relate state or dispositional trust with cooperation and test how this relation is moderated by the degree of conflict.

Trust, Interdependence, and Conflict

As alluded to earlier, trust is commonly defined as a belief (or expectation) about others' benevolent motives during a social interaction (e.g., Barber, 1983; Boon & Holmes, 1991; Holmes & Rempel, 1989; Hosmer, 1995; Rempel et al., 1985; Rousseau et al., 1998; Simpson, 2007b; Yamagishi, 2011b). To illustrate, trust has been defined as a "psychological state comprising the intention to accept vulnerability based upon positive expectations of the intentions or behavior of another" (Rousseau et al., 1998, p. 395). According to Yamagishi (2011b), trust includes "expectations of benign behavior from someone in a socially uncertain situation due to the beliefs about the person's dispositions (including his feelings towards you)" (p. 27).¹ Even though many definitions across disciplines generally agree that trust involves an assessment of other's benevolent motives, there is less consensus about the domain of social situations in which trust may be especially important in shaping cooperation.

We adopt an interdependence perspective on trust and suggest that trust is relevant to cooperation in situations of (a) social interdependence that (b) contain some degree of conflict of interest (e.g., Kelley & Thibaut, 1978; Kelley et al., 2003; Simpson, 2007b). Specifically, social interdependence occurs when two or more persons interact and the outcomes of those interactions depend in part on the actions of each person. This is likely the most agreed upon situational domain of trust. Yet, during social interdependent situations, conflict of interests may occur such that the behavior that results in the best outcome for each individual may actually harm or result in relatively less benefits for other(s). Several prominent theoretical perspectives on trust have forwarded the position that trust is a determinant of cooperation in situations that contain a conflict of interests (e.g., Holmes, 2004; Kelley, 1983; Kramer & Carnevale, 2001; Mayer et al., 1995; Rousseau et al., 1998; Simpson, 2007a; Yamagishi, 2011b).² According to an interdependence perspective, situations of conflict involve a tension between self-interest and benevolent motives, and so perceptions of others' benevolent motives may be a critical determinant of cooperation in these situations (Kelley et al., 2003; Simpson, 2007b; Van Lange & Rusbult, 2012; Yamagishi, 2011b). This is because although people might have a desire to cooperate, they are unwilling to cooperate unless they believe that others will not take advantage of their own cooperation (Pruitt & Kimmell, 1977; Yamagishi, 1986). Certainly, an abundance of research finds that

trust promotes cooperation in situations of conflicting interests (e.g., Ferrin et al., 2008; Holmes & Rempel, 1989; Wieselquist et al., 1999; Yamagishi, 1988).

Importantly, the degree of conflicting interests may affect the relation between trust and cooperation. Situations can vary substantially in the degree of corresponding versus conflicting interests (Kelley et al., 2003; Kelley & Thibaut, 1978; Rusbult & Van Lange, 2003). Rarely do situations either contain completely corresponding or conflicting outcomes but instead involve some varying degrees of noncorrespondence in outcomes (Deutsch, 1949). Indeed, situations may vary from completely corresponding interests (the preferences of both partners are completely aligned) to situations that involve some degree of conflicting interests (partner's preferences may conflict to some degree). In situations that contain a conflict of interest, each partner has some amount of selfish temptation to do something that is not in the relationship or group's best interest.

Trust may be even more predictive of behavior in situations involving a larger, compared to smaller, conflict of interests. In situations that contain a larger conflict of interest, people have a strong selfish temptation to behave against others' best interest, and in this context benevolent motives are stronger determinants of cooperation, compared to situations that contain less conflict (Balliet, Mulder, & Van Lange, 2011; Yamagishi, 1988, 2011b). Because benevolent motives are so important for determining people's cooperation in situations that involve a large divergence between self-interest and benevolent motives, these situations of high conflict make it especially likely that people will condition their cooperation based on beliefs about other's benevolent motives (Holmes, 2004; Simpson, 2007b). In contrast, in situations that contain less conflict of interests (e.g., the benevolent motives of a partner are less relevant to behavior), then trust becomes less important and cooperation is influenced by other more self-serving motives, such as impres-

¹ Several models of trust distinguish between beliefs about other's benevolent motives and selfish motives. For example, Yamagishi (2011b) defines *assurance* as an expectation that a person will cooperate because it is in their own self-interest but that *trust* includes expectations of other's benevolence. Assurance overlaps with the concepts of trust as prudence, instrumental trust, and calculus-based trust, while trust as expectations of others benevolence shares similarities with trust as hope, maxim-based trust, and relationship-based trust (see Fink & Kessler, 2010; James, 2002; Lau & Cobb, 2010).

² Several past conceptualizations of trust have stressed the importance of vulnerability as a feature of the situation that affords trust to influence behavior (e.g., Holmes & Rempel, 1989; Mayer et al., 1995; Rousseau et al., 1998). Vulnerability is often defined as a property of the situation, such as the potential of harm (e.g., Mayer et al., 1995). Yet theories on the structure of social interdependence have not discussed vulnerability as a fundamental feature of interdependence (e.g., Holmes, 2002; Kelley et al., 2003). Here, we discuss a property of situations (i.e., degree of conflicting interests) that may share important features with vulnerability. Often it is the conflict of interests that many researchers are referring to when they discuss vulnerability as a property of the situation (e.g., Bradach & Eccles, 1989; Gambetta, 1988; Rempel et al., 1985; Sabel, 1993; Simpson, 2007a). Yet we realize that certain conceptualizations of vulnerability may not simply reduce to a conflict of interests in the situation. For example, vulnerability may be influenced by other features of interdependence, such as asymmetrical dependence (lack of power; Holmes, 2002; Dirks, 2000) and social uncertainty (Yamagishi, 2011b). Future research is needed to fully understand the types of interdependence that define vulnerability and how they might illuminate the relation between trust and cooperation.

sion management and maintaining social ties (e.g., Powell & Van Vugt, 2003).

Past research on this issue has focused more on the communication of benevolent motives in situations of larger, compared to smaller, conflicts of interests. For example, people in close relationships are more likely to perceive that their partner has benevolent motives when their partner makes larger, compared to smaller, sacrifices for a relationship, which further develops trust and subsequent cooperation (e.g., Wieselquist et al., 1999). However, research has paid less attention to how trust may be more or less strongly related to own cooperation depending on the degree of conflict in the situation. Research across disciplines finds that it is in situations of larger, compared to smaller, conflicts (so called “strain test situations”), when trust more strongly influences own cooperation (e.g., Curşeu & Schrujjer, 2010; Parks & Hulbert, 1995; Shallice & Simpson, 2012). In situations containing larger amounts of conflict people think about the other’s benevolent motives and condition their own cooperation based on those beliefs, but such cognitions become less important for cooperation in situations containing less conflict. Here we provide a strong test of the perspective that the degree of conflict in a situation moderates the relation between trust and cooperation by examining cooperation across highly controlled laboratory social interactions that vary according to their degree of conflict—that is, in social dilemmas.

Trust in Social Dilemmas

Social dilemmas are mixed-motive situations that involve a conflict between self-interest and benevolent motives (Dawes, 1980; Kollock, 1998). In these situations, two or more people are interdependent and the behavior of each person affects the others outcomes. The “dilemma” results from the specific incentive structure of the social situation. To illustrate, in a two-person social dilemma (e.g., a prisoner’s dilemma) mutual cooperation always results in a greater outcome for each individual, relative to mutual defection. Yet individuals always receive a greater outcome, regardless of their partner’s behavior, when they choose to defect in the social dilemma. In fact, individuals may receive the greatest possible outcome by choosing to defect and their partner chooses to cooperate, leaving the cooperator with the worst possible outcome. Thus, a social dilemma results in a conflict between choosing to do what is best for the relationship or group and what is best for the individual.

Social dilemmas are pervasive in our social life, from interacting in close dyadic relationships, to individual behavior within groups, and among interactions between groups (Van Lange, Joireman, Parks, & Van Dijk, in press). Social scientists have devised several paradigms to model the real life social dilemmas people face on a daily basis, such as public goods dilemmas (Ledyard, 1995) and resource dilemmas (Kopelman, Weber, & Messick, 2002). In public goods dilemmas, people make a choice between how much to contribute to a group outcome that is shared among group members (regardless of their contribution), yet there is a selfish temptation to free-ride on the contributions of their group members. In resource dilemmas, on the other hand, people must choose how much to take from a common shared resource pool, knowing that over time, taking too much will result in collective disaster—the depletion of the resource. Yet there is a selfish temptation to

always consume as much as possible, and hope that others will restrain their consumption. Although social scientists have identified several features of the person and situation that affect behavior in these contexts (for reviews, see Gächter & Herrmann, 2009; Ledyard, 1995; Weber, Kopelman, & Messick, 2004), one feature of the person that has harnessed long-standing attention is trust that the other(s) will cooperate in social dilemmas and not take advantage of one’s own cooperation (Deutsch, 1958; Pruitt & Kimmel, 1977).

When studying the relation between trust and cooperation, prior research has operationalized trust as either peoples’ state expectations about their partner(s) behavior during the social dilemma (e.g., Buchan et al., 2011; Cohen & Insko, 2008; Deutsch, 1960b) or as a dispositional tendency to trust others in general (e.g., Parks & Hulbert, 1995; Yamagishi, 1988). Both lines of research converge on the perspective that trust relates positively to cooperation in social dilemmas. In the present research we use social dilemmas to test how the degree of conflict moderates the relation between trust and cooperation. Importantly, social dilemmas enable us to test this perspective by providing a standardized experimental context that varies systematically in their degree of conflict, a point we describe below.

Degrees of Conflict Across Social Dilemmas

In social dilemmas, such as a prisoner’s dilemma, there always exists a specific structure of possible outcomes for self and others that contain a conflict between self-interest and collective interest. Specifically, the largest possible outcome always results from choosing to defect and having one’s partner(s) choose to cooperate—the so-called *temptation outcome* (say 4\$). This outcome is always larger than the *reward outcome* for mutual cooperation (3\$), which itself is larger than the *punishment outcome* for mutual defection (2\$). The worst possible outcome occurs for an individual who chooses to cooperate, but their partner(s) choose to defect—the *sucker outcome* (1\$). Prisoner’s dilemmas vary across studies, but each dilemma possesses the same basic structure: *Temptation* (4) > *Reward* (3) > *Punishment* (2) > *Sucker* (1).

Rapoport (1967) identified that the magnitude of conflict can vary within the prisoner’s dilemma, which can be calculated using a simple equation that takes advantage of the similar underlying incentive structure of the prisoner’s dilemma, as mentioned above:

$$\text{Index of cooperation} = \frac{R - P}{T - S} \quad (1)$$

where R = reward outcome for mutual cooperation, P = punishment outcome for mutual defection, T = temptation outcome for defecting while the other cooperates, and S = sucker outcome for cooperating while the other defects. The values for each outcome can assume any value; however, the outcomes must conform to the structure of outcomes that define a social dilemma (T > R > P > S). By applying Equation 1 to the example above, this prisoner’s dilemma has an index of cooperation equal to .33 = (3 – 2)/(4 – 1). Although the outcomes of a prisoner’s dilemma can assume any value, when those values conform to the structure of outcomes outlined for the prisoner’s dilemma, then the *index of cooperation* can range between 0 to 1, with 0 equal to completely noncorrespondent outcomes (a nonzero sum game) and 1 representing

completely corresponding outcomes (a coordination game). The range of values between 0 and 1 may indicate prisoner's dilemmas that range from greater to lesser conflicts of interests in the dilemma.³

The index of cooperation represents the degree of conflict during a social interaction. In situations with a low index of cooperation, conflict is high because there is a relatively stronger temptation to behave opportunistically and/or there is little difference between the outcomes for mutual cooperation and mutual defection. However, conflict is low in situations with a high index of cooperation because there is a reduced temptation to behave opportunistically and/or the reward for mutual cooperation is much greater than the outcome for mutual defection. Past research has found that people expect less cooperation from others in situations with a low index of cooperation (e.g., Ferrin & Dirks, 2003; Krueger, DiDonato, & Freestone, 2012) and are actually less cooperative in both two-person and *N*-person prisoner's dilemmas that have a low, compared to high, index of cooperation (Acevedo & Krueger, 2005; Komorita, Sweeney, & Kravitz, 1980; Murnighan & Roth, 1983; Steele & Tedeschi, 1967; Tjosvold, 1987). Yet, beyond this main effect, the index of cooperation may moderate the degree to which people condition their behavior on trust in others. As mentioned before, situations that contain larger, compared to smaller, conflict between self and collective interests define an interdependent context that affords both benevolent motives and beliefs about other's benevolent motives (i.e., trust) to be especially strong determinants of cooperation. Therefore, according to this perspective, the relation between trust and cooperation will be strongest within dilemmas that have a lower index of cooperation, but less in contexts with a higher index of cooperation.

Additional Moderators

Although our primary focus is on the moderating role of the degree of conflicting interests, the meta-analysis can test other moderators of the relation between trust and cooperation. Some moderators relate to theoretical issues discussed in prior research while other moderators will be coded and used as control variables, to reduce the potential of confounds in our analyses. Below we briefly address a few of the more theoretically interesting moderators.

One-Shot Versus Iterated Dilemmas

Prior theory suggests that a function of trust is to establish and maintain reciprocal relations (e.g., Kurzban, 2003; Ostrom, 2003). According to perspectives on reciprocity, future possible interactions encourage people to cooperate, with hopes to initiate a mutually cooperative relationship (Axelrod, 1984). Therefore, the psychology of trust may be sensitive to cues of possible future interactions, with a greater willingness to condition behavior based on trust in the context of repeated versus one-shot interactions.

Individual Versus Intergroup Dilemmas

Much research finds that intergroup interactions are less cooperative than interactions between individuals (Wildschut, Pinter, Vevea, Insko, & Schopler, 2003). Insko et al. (2005) suggested that

this may be due to competitive goals being salient during intergroup interactions, which may reduce any effect that trust may have on behavior. We can examine this perspective in the meta-analysis by comparing the relation between trust and cooperation across individual and intergroup interactions.

Culture

An abundance of cross-cultural research finds that cultures vary in the belief that others are trustworthy (e.g., Huff & Kelley, 2003; Inglehart, Basanez, & Moreno, 1998). Yet these data have relied primarily on self-report surveys. Here we are able to test for cross-societal variation in the degree to which people condition their own cooperation based on their trust that others are also willing to cooperate. Such an analysis will complement existing research.

Overview of the Meta-Analysis

We conduct a meta-analysis on the relation between trust and cooperation in social dilemmas. We include a review of both state trust and dispositional trust. Dispositional trust is measured by self-report scales of a tendency to trust others in general. State trust, on the other hand, is measured by how much people expect their partner(s) to cooperate in an experimental social dilemma. The primary purpose of the meta-analysis is to examine if the relation between trust and cooperation is moderated by the degree of conflict in the dilemma. As mentioned earlier, Rapoport's (1967) "index of cooperation" allows us to quantify the degree of conflict in the dilemma. Specifically, we aim to examine if the index of cooperation moderates the relation between trust and cooperation. As mentioned above, we also test for several other potential moderators of the relation between trust and cooperation, including one-shot versus iterated dilemmas, individual versus intergroup interactions, and country of participants. Finally, we statistically control for other study characteristics (e.g., group size, participant payment, year of publication, and feedback of partner behavior) when conducting a multiple regression model testing the moderating role of the index of cooperation.

Method

Search and Criteria for Studies

We began our search for studies using several databases, including PsycINFO, PsycARTICLES, Econlit, Google Scholar, and the Social Sciences Citation Index. We searched for studies by crossing the terms *Trust* or *Expectations* by a *social dilemma related term* (e.g., *prisoner's dilemma*, *public goods dilemma*, *resource dilemma*, and *voluntary contributions mechanism*). The earliest

³ A modified equation can be applied to derive the index of cooperation for *N*-person prisoner's dilemmas. Specifically, Komorita (1976) noted that the index of cooperation for an *N*-person prisoner's dilemma can be calculated by the following equation; $K' = (C_N - D_0)/(D_N - 1 - C_1)$. In the equation, C_N equals the outcome when everyone cooperates and D_0 equals the outcome when everyone defects. $D_N - 1$ equals the outcome when a person defects and everyone else cooperates and C_1 is the outcome for when a person cooperates and everyone else defects. The value can range between 0 and 1.

study found was conducted in 1960 and our search of these databases lasted through August, 2011. We also searched the references of all relevant research and review articles. Additionally, we contacted over 150 researchers who attended the 2011 International Conference for Social Dilemmas for published and unpublished data. We searched the text of all articles included in prior meta-analyses on behavior in social dilemmas. We also posted a call for published and unpublished data on a widely used behavioral economic listserv at the Economic Science Association methods discussion group (<http://groups.google.com/group/esa-discuss>). Last, when a relevant article was published within the last 5 years but did not include the information necessary to calculate the effect size, then we contacted the author requesting data.

There were several criteria for the selection of studies. First, studies had to be conducted on adult participants (age 18 years and above). Second, all studies had to examine the effect of either dispositional trust or state expectations of partner behavior predicting cooperation in a social dilemma. Third, cooperation had to be measured in the context of a social dilemma. The social dilemma could be either a prisoner's dilemma, public goods or give-some dilemma, resource or take-some dilemma, or other possible matrix game that included some degree of a conflict between individual and collective interests. Specifically, mutual cooperation had to yield higher outcomes than mutual defection, and according to the individual, defection always yielded a higher personal outcome than cooperation (Dawes, 1980). To keep consistency across the studies in the meta-analysis, the social dilemmas had to present each participant facing the dilemma the same amount of information about the payoffs, the payoffs had to be symmetrical across partners in the dilemma, and both parties had to make simultaneous choices about how to behave in the dilemma. The social dilemma could be a one-shot dilemma or iterated dilemma. Most studies that used an iterated dilemma report the relation between trust and cooperation during the first trial of the dilemma. However, a few studies report the relation between trust and cooperation across several trials of the dilemma. Since these studies include feedback about partner behavior, we code and control for any differences as a result of feedback.

We excluded games that deviated from the methods usually applied in experimental social dilemmas (e.g., simultaneous partner choice, common knowledge of the possible outcomes, and mutual dependence), including ultimatum bargaining games, negotiations, trust games, and dictator games. This was done to reduce unnecessary variability across experimental paradigms and ensures that the experimental studies employed in the present meta-analysis are directly comparable.⁴ When an article reported multiple studies, we coded an effect size for each study. Applying these criteria resulted in a total of 212 effect sizes (198 published, 14 unpublished).⁵

Coding of Studies

State trust versus dispositional trust in others. We coded effect sizes for the relation between both state expectations of one's partner(s) ($k = 147$) and dispositional trust ($k = 65$) and cooperation in social dilemmas. Expectations were most often measured by questions such as "what do you think your partner will choose" either before ($k = 38$) or after ($k = 75$) the person and their partner made their choice. These expectations of partner

behavior are considered operationalizations of state trust in others (e.g., Buchan et al., 2011; Cohen & Insko, 2008; Deutsch, 1960b). Trust is often defined as an expectation that another person will not behave opportunistically in a situation that contains a conflict of interests (e.g., Rousseau et al., 1998; Yamagishi, 2011b). Because social dilemmas are socially interdependent situations that involve some degree of conflict between self and collective interests, then expectations of others behavior in these situations may be considered operationalizations of trust. Dispositional trust was measured with several different scales across studies, such as the philosophy of human nature scale (Wrightman, 1966), Rotter's trust scale (Rotter, 1967), and the generalized trust scale (Yamagishi, 1988). These measures of trust often have people indicate how trustworthy people are in general, such as "If given a chance, most people would try to take advantage of you" and "Most people are basically honest" (Yamagishi, 1988).

Type of dilemma. This sample of studies includes several social dilemma paradigms, but the most common include the prisoner's dilemma ($k = 99$), public goods dilemma ($k = 77$), and resource dilemma ($k = 11$). We coded studies as "other" types of dilemmas ($k = 25$), which includes matrix games with a conflict of interest and hypothetical social dilemmas.

Index of cooperation. For the prisoner's dilemma games we calculated the index of cooperation for each study ($k = 99$). This value varies between 0 and 1 and is calculated by $(P - R)/(T - S)$. We coded studies that had an index of cooperation value between .16 and .95 ($M_k = .45$, $SD_k = .19$). A low index of cooperation indicates a stronger conflict between self-interest and collective interests.

Iterations and feedback. We coded if the study either involved a one-shot interaction ($k = 132$) or repeated iterations ($k = 76$). A few studies manipulated if the interaction was one-shot or iterated ($k = 2$). We coded the number of iterations, which ranged from 1 to 100 ($M = 6.07$, $SD = 13.54$). Most studies reported the relationship between expectations of partner behavior before trial one with cooperation on trial one ($k = 159$). However, some

⁴ We elected against including studies using the trust game in this meta-analysis because the trust game differs in several basic features from the social dilemmas included in this meta-analysis. First, in the trust game, the "players" are assigned different roles (of trustor and trustee), causing an asymmetry between the two people that is not present in most social dilemmas. Second, the trust game involves sequential decision making—an aspect of the situation that may alter the decision context. And finally, as the name suggests, the trust game has been primarily conceptualized in terms of trust (and related concepts such as assurance, investment, and risk-taking, e.g., Berg et al., 1995); in contrast, social dilemmas have been primarily conceptualized in terms of cooperation (e.g., Kelley et al., 2003; Komorita & Parks, 1994). Thus, to increase homogeneity of the studies in our data set, we remain focused on experimental social dilemmas.

⁵ The present sample of studies includes a small portion of unpublished studies. It is generally recommended that meta-analyses include as many unpublished findings as possible to reduce the effect of a possible publication bias. Publication biases occur because large effect sizes are more likely to be published than small effect sizes. However, in the present sample of published findings, the relation between expectations and cooperation was not a central relation under investigation and many studies did not directly report the relation between expectations and cooperation, but the statistics or data were directly provided to the first author of this article. Because publication of these studies did not hinge on the statistical relation between trust and cooperation, this effectively reduces our concern about a possible publication bias.

studies did report the relation between trust and cooperation across several trials of the social dilemma that also included feedback about partner choice ($k = 53$).

Individual versus intergroup interaction. We also coded if the study examined choice during interactions between individuals ($k = 192$) or interactions between groups ($k = 20$). Much work has examined differences between these types of interactions (e.g., Wildschut et al., 2003).

Country of participants. We coded studies that were conducted in 28 different countries. Most studies were conducted in the United States ($k = 76$), the Netherlands ($k = 35$), Belgium ($k = 17$), Japan ($k = 15$), Germany ($k = 8$), Canada ($k = 8$), Switzerland ($k = 8$), Singapore ($k = 6$), and the United Kingdom ($k = 6$). Other countries represented in the sample include Argentina, China, Columbia, Costa Rica, Denmark, Ethiopia, Finland, Hong Kong, India, Iran, Israel, Italy, New Zealand, Peru, Poland, Russia, South Africa, Uruguay, and Venezuela. The country of each effect size is labeled in Tables 1 and 2.

Group size, participant payment, and year of publication. We included these codings to primarily describe our data set. These studies either involved dyadic interactions ($k = 85$) or interactions between group members ($k = 94$). A few studies did not mention the size of the group to participants ($k = 33$). We also coded the number of persons in the group as a continuous variable that ranged from 2-person interactions to a study including a 27-person group ($M = 4.31$, $SD = 4.18$). We coded if participants were either paid for the outcomes of the dilemma ($k = 159$) or were asked to make hypothetical decisions without monetary consequences ($k = 49$). All of the studies were conducted between 1960 and 2011 ($M = 2,001$; $SD = 13$). For unpublished data, we coded either the year the data were collected (when available) or the date on the article.⁶

Analysis

We used the correlation as the measure of effect size. A positive correlation value indicates that higher levels of dispositional trust or greater expectations of partner cooperation relates to higher levels of cooperation in the social dilemma. When the correlation was not directly reported, this was calculated using the sample size along with the t value or χ^2 value. All effect sizes with resource dilemmas were reverse scored so that less taking equals greater cooperation.

Some studies allowed us to code multiple effect sizes. For example, some studies report the relation between trust or expectations with cooperation in each of several different experimental conditions. Such a study allows us to code multiple separate effect sizes for each experimental condition. However, the effect sizes are nonindependent because they share several methodological features, such as, for example, the same incentive structure. Therefore, we applied Cooper's (1998) shifting-units-of-analysis approach to manage nonindependent effect sizes when conducting analyses. Using this approach, we averaged over all the effects coded from a single study. This creates a single effect size for each study with multiple effect sizes. These combined effect sizes are then used in each analysis.

We used a random effects model to calculate the overall main effects of state and dispositional trust with cooperation. Then, for each separate effect size distribution, we report the 95% confi-

dence interval, 90% prediction interval, and several indexes of heterogeneity of variance (T , T^2 , and I^2). Next, we conduct several analyses for the possibility that the data contain a publication bias. In so doing, we formally examine the funnel plot where all studies are plotted according to their effect size and standard error. Specifically, we use Duval and Tweedie's (2000) trim and fill approach and Egger's regression intercept to assess symmetry in the funnel plot. We then employ a mixed effects model to conduct several univariate moderator analyses. Finally, we conduct a random effects multivariate moderator analysis that includes all the moderators predicting the effect size. Since we assume that the distributions of effect sizes contain both systematic and random variation, both random and mixed effects models are most appropriate for our analyses. However, one limitation of both random and mixed-effects models, relative to a fixed-effect model, is that they may be too conservative and result in type II errors (Lipsey & Wilson, 2001). Therefore, we report any discrepancies between the results of the random and mixed effects analyses with a fixed effect analysis. Analyses were conducted using the Hedges and Olkin (1985) approach with Comprehensive Meta-Analysis software.

Results

Overall Analyses

State expectations and cooperation. The effect sizes on the relation between state expectations and cooperation along with their study characteristics are displayed in Table 1. After collapsing nonindependent effect sizes the sample was reduced to 142 effect sizes. We found that there is a strong positive relation between expectations of other's behavior and cooperation, $r = .58$; 95% confidence interval (CI) lower limit (LL) = .54, upper limit (UL) = .62; 90% Prediction Interval LL = -.004, UL = 1.00. When people expect that their partner(s) will cooperate in a social dilemma and not take advantage of one's own cooperation, then people are more likely to cooperate themselves. There is also substantial variation in the effect size distribution ($T = 0.35$, $T^2 = .12$), much of which may be explained by between-study differences ($I^2 = 92.93$).

We also consider if this large effect size estimate is the result of a publication bias. Using Duval and Tweedie's (2000) trim and fill approach (with random effects); we found that zero effect sizes were added below the estimated average effect size. However, 23 studies were added above the average effect size, resulting in an adjusted estimated effect size slightly larger than the initial average effect size ($r = .63$), 95% CI LL = .60, UL = .67. This analysis indicates a possible bias in the data to underestimate the effect of expectations on cooperation. This bias is in the opposite direction than would be expected if the data contained a publication bias. Supporting this analysis, Egger's regression coefficient is significant, intercept = -1.37, $t(140) = 2.12$, $p = .03$, which indicates possible bias in the data. Taken together, these results

⁶ Although we included these codings to primarily describe our data set and control for possible confounding variables during the multiple regression analysis, we did explore the univariate effects of group size, participant payment, and year of publication on the effect sizes. Each factor had nonsignificant relation with the effect sizes ($ps > .20$).

Table 1

Studies Reporting the Correlation Between Expectations of Partner Cooperation and Own Cooperation in a Social Dilemma

Study	N	CO	r	LL/UL	DV	K	GS	OS/IT
Balliet (2009a)	56	SG	.51	.28/.68	PGD		4	OS
Balliet (2009b)	56	SG	.43	.19/.62	RD		4	OS
Balliet (2010)	96	SG	.41	.23/.56	PD	.33	2	IT(1)
Study 2	49	SG	.61	.23/.56	O		2	IT(1)
Study 3	66	SG	.43	.21/.61	PD	.20	2	IT(1)
Boone et al. (2008)	84	DK	.63	.48/.78	O		2	IT(1)
Buchan et al. (2011)	179	IR	.60	.50/.69	PGD		12	OS
Study 2	159	RU	.57	.46/.67	PGD		12	OS
Study 3	201	ZA	.31	.18/.43	PGD		12	OS
Study 4	207	US	.51	.40/.60	PGD		12	OS
Study 5	205	AR	.54	.44/.63	PGD		12	OS
Study 6	171	IT	.51	.39/.61	PGD		12	OS
Cardenas et al. (2009)	567	CO	.54	.21/.76	PGD		12–29	OS
Study 2	498	AR	.30	–.11/.62	PGD		14–30	OS
Study 3	488	VE	.22	–.20/.56	PGD		14–28	OS
Study 4	541	PE	.52	.16/.76	PGD		14–32	OS
Study 5	580	UY	.35	–.02/.64	PGD		14–30	OS
Study 6	415	CR	.63	.21/.85	PGD		10–39	OS
Cohen et al. (2010)	172	US	.73	.65/.74	PD	.33	2	OS
Study 2	130	US	.58	.45/.68	PD	.33	2	OS
Cubitt et al. (2011)	42	UK	.76	.59/.86	PGD		3	OS
Study 2	45	UK	.75	.58/.85	RD		3	OS
Study 3	42	UK	.78	.63/.88	PGD		3	OS
Study 4	39	UK	.66	.43/.81	RD		3	OS
Dawes et al. (1977)	284	US	.60	.52/.67	PD	.16	8	OS
Study 2	32	US	.74	.57/.85	PD	.16	8	OS
Declerck & Kiyonari (2011)	124	BE	.33	.16/.48	PGD		4	OS
Study 2	121	BE	.42	.26/.56	RD		4	OS
De Dreu & McCusker (1997)	83	NL	.42	.26/.56	PD	.50	2	IT(4)
Study 2	97	NL	.42	.23/.57	PD	.50	2	IT(4)
Deutsch (1960b)	39	US	.45	.15/.67	PD	.90	2	OS
Study 2	34	US	.74	.53/.86	PD	.90	2	OS
Study 3	34	US	.24	–.10/.54	PD	.90	2	IT(10)
Dufwenberg et al. (2011)	66	DE	.58	.39/.72	PGD		3	OS
Study 2	51	DE	.73	.57/.84	PGD		3	OS
Study 3	72	DE	.44	.24/.61	RD		3	OS
Study 4	66	DE	.34	.11/.54	RD		3	OS
Study 5	24	UK	.64	.32/.83	PGD		3	OS
Study 6	24	UK	.74	.48/.89	PGD		3	OS
Ferrin et al. (2008)	68	US	.26	.02/.47	PD	.50	2	IT(1)
Study 2	204	US	.40	.31/.54	PD	.50	3	IT(1)
Fischbacher & Gächter (2010)	72	CH	.69	.54/.79	PGD		4	IT(1)
Study 2	68	CH	.60	.42/.73	PGD		4	IT(1)
Gächter & Herrmann (2009)	102	CH	.84	.77/.89	PGD		3	OS
Sample 1a	102	CH	.84	.77/.89	PGD		3	OS
Study 2	141	CH	.64	.53/.73	PGD		3	OS
Sample 2a	141	CH	.71	.62/.79	PGD		3	OS
Study 3	180	RU	.47	.35/.58	PGD		3	OS
Study 3a	180	RU	.51	.39/.61	PGD		3	OS
Study 4	180	RU	.54	.43/.63	PGD		3	OS
Study 4a	180	RU	.41	.28/.53	PGD		3	OS
Gächter & Renner (2010)	36	DE	.62	.37/.79	PGD		4	IT(1)
Study 2	16	DE	.49	–.01/.79	PGD		4	IT(1)
Study 3	32	UK	.69	.46/.84	PGD		4	IT(1)
Study 4	48	UK	.78	.64/.87	PGD		4	IT(1)
Goerg & Walkowitz (2010)	40	WB	.64	.41/.79	PD	.33	2	OS
Study 2	40	CN	.68	.47/.82	PD	.33	2	OS
Study 3	42	FI	.58	.34/.75	PD	.33	2	OS
Study 4	40	IL	.41	.11/.64	PD	.33	2	OS
Insko et al. (2005)	292	US	.37	.27/.46	O	.33	2–6	OS
Study 2	258	US	.18	.06/.30	O	.33	2–6	OS
Insko et al. (2001)	82	US	.73	.61/.82	PD	.50	2	M
Sample 2	65	US	.76	.64/.85	PD	.50		M
Jackson (2011)	192	US	.66	.57/.73	PGD		4	OS

Table 1 (continued)

Study	N	CO	r	LL/UL	DV	K	GS	OS/IT
Kiyonari & Barclay (2008)	97	CA	.51	.35/.64	PGD		4	OS
Study 2	80	CA	.50	.32/.65	PGD		4	OS
Study 3	116	CA	.50	.35/.63	PGD		4	OS
Kuwabara (2005)	124	US	.36	.19/.50	O	.78	2	IT(20)
Lacy (1978)	196	US	.27	.13/.39	PD		2	IT(1)
Liebrand et al. (1986)	48	NL	.81	.68/.89	PD	.65	8	IT(3)
Lodewijx et al. (1999)	8	NL	.66	-.09/.93	PD	.62	2	IT(2)
Sample 2	10	NL	.51	-.18/.86	PD	.62	2	IT(2)
Sample 3	6	NL	.50	-.52/.93	PD	.62		IT(2)
Messé & Sivacek (1979)	172	US	.48	.35/.83	PD	.47	2	OS
Miller & Holmes (1975)	35	CA	.41	.10/.65	PD	.50	2	IT(5)
Study 2	35	CA	.43	.13/.67	PD	.50	2	IT(5)
Mulder et al. (2006a)	50	NL	.65	.45/.78	PGD		4	IT(1)
Study 2	126	NL	.73	.64/.80	PGD		4	IT(1)
Study 3	100	NL	.64	.50/.76	PGD		4	IT(1)
Mulder et al. (2006b)	159	NL	.56	.44/.66	PGD		4	OS
Orbell et al. (1984)	62	US	.59	.42/.72	PD	.38	9	OS
Sample 2	61	US	.61	.45/.73	PD	.38	9	OS
Sample 3	71	US	.76	.66/.83	PD	.38	9	OS
Sample 4	51	US	.69	.54/.80	PD	.38	9	OS
Pinter & Wildschut (2011)	44	US	.60	.37/.76	PD	.50	2	IT(5)
Sample 2	30	US	.39	.03/.66	PD	.50		IT(5)
Sample 3	40	US	.46	.18/.69	PD	.50		IT(5)
Rustagi et al. (2010)	679	ET	.39	.32/.45	PGD		2	OS
Sen et al. (2001)	147	US	.23	.08/.38	O			OS
Study 2	166	US	.18	.04/.33	O			OS
Shinada et al. (2004)	90	JP	.48	.32/.62	O		4	IT(1)
Smeesters et al. (2003)	203	BE	.59	.49/.67	PD	.33	2	OS
Study 2	193	BE	.59	.49/.68	PD	.33	2	OS
Study 3	140	BE	.85	.80/.89	PD	.33	2	OS
Study 4	167	BE	.59	.48/.68	PD	.33	2	OS
Stouten (2005)	108	BE	.80	.72/.86	PGD		4	OS
Stouten et al. (2005)	108	BE	.41	.24/.56	PGD		4	IT(1)
Tanghe et al. (2010)	80	NL	.63	.47/.75	PGD		4	OS
Ten Holt (2011)	98	NL	.63	.49/.74	PD	.33	2	OS
Study 2	94	NL	.73	.62/.81	PD	.33	2	OS
Study 3	116	NL	.90	.85/.93	PD	.33	2	OS
Thöni et al. (2009)	1,488	DK	.77	.75/.79	PGD		4	OS
Tyszka & Grzelak (1976)	368	PL	.18	-.07/.40	PD	.88	5	OS
Van Lange (1992)	144	NL	.80	.72/.86	PD	.33	2	IT(4)
Van Lange & Kuhlman (1994)	334	US/NL	.67	.60/.72	PD	.33	2	OS
Van Lange & Liebrand (1989)	87	US	.61	.46/.73	PD	.33	2	OS
Van Lange & Liebrand (1991a)	55	NL	.38	.13/.59	PD	.33	2	OS
Study 2	60	US	.57	.36/.72	PD	.33	2	OS
Van Lange & Liebrand (1991b)	59	NL	.75	.60/.84	PD	.33	2	OS
Study 2	56	US	.53	.31/.69	PD	.33	2	OS
Volk et al. (in press)	72	DK	.84	.75/.90	PGD		4	OS
Wade-Benzoni et al. (2002)	192	US/JP	.17	.07/.26	RD		4	OS
Wade-Benzoni et al. (1996)	180	US	.38	.26/.50	RD		4	OS
Ward (1972)	36	US	.36	.04/.62	PD	.80	2	IT(30)
Wildschut et al. (2007)	36	US	.16	-.18/.46	PD	.50	2	OS
Sample 2	38	US	.21	-.12/.50	PD	.50		OS
Sample 3	36	US	.38	.06/.63	PD	.50		OS
Sample 4	35	US	.02	-.31/.35	PD	.50		OS
Wildschut et al. (2001)	32	US/NL	.70	.47/.84	PD	.57	2	IT(3)
Sample 2	29	US/NL	.46	.12/.71	PD	.57		IT(3)
Sample 3	29	US/NL	.63	.34/.81	PD	.57		IT(3)
Wildschut et al. (2002)	107	US	.22	.03/.39	O			OS
Study 2, sample a	79	US	.40	.20/.57	PD	.95		OS
Study 2, sample b	71	US	.27	.04/.47	PD	.50		OS
Study 3	64	US	.28	.03/.49	PD	.50		OS
Wilke & Braspenning (1989)	53	NL	.83	.73/.90	RD		3	IT(1)
Wit & Wilke (1992)	570	NL	.91	.90/.92	O		10	OS
Wolf et al. (2009)	542	US	.42	.35/.48	PD	.33	2-3	OS

(table continues)

Table 1 (continued)

Study	N	CO	r	LL/UL	DV	K	GS	OS/IT
Wolf et al. (2008)	14	US	.55	.03/.84	O		2	IT(5)
Study 1; Sample b	13	US	-.30	-.73/.30	O		2	IT(5)
Study 1; Sample c	13	US	.34	-.26/.75	O		2	IT(5)
Study 1; Sample d	14	US	.85	.59/.95	PD	.33		IT(5)
Study 1; Sample e	12	US	.73	.28/.92	O			IT(5)
Study 1; Sample f	12	US	.59	.03/.87	O			IT(5)
Study 1; Sample g	14	US	.73	.33/.91	O			IT(5)
Study 2; Sample a	10	US	.51	-.17/.86	O			IT(5)
Study 2; Sample b	10	US	.63	.01/.90	O			IT(5)
Wong & Hong (2005)	171	CN	.80	.74/.85	PD	.50	2	IT(5)
Yamagishi (2011a)	87	JP	.71	.59/.80	PD	.33	2	OS
Yamagishi (2011c)	197	JP	.74	.67/.80	PD	.33	2	OS
Yamagishi (2011d)	93	JP	.86	.80/.91	PD	.33	2	OS
Yamagishi & Mifune (2009)	131	JP	.57	.44/.68	PD	.33	2	OS
Yamagishi et al. (2008)	48	JP	.60	.59/.85	PD	.33	2	OS
Sample 2	55	NZ	.75	.39/.74	PD	.33	2	OS
Yamagishi & Sato (1986)	55	JP	.84	.74/.90	PGD		5	IT(6)
Study 2	55	JP	.70	.53/.81	PGD		5	IT(6)

Note. N = number of participants included in the effect size estimate; CO = Country; LL/UL = 95% confidence interval with lower limit/upper limit; DV = dependent variable; PGD = public goods dilemma; PD = prisoner's dilemma; RD = resource dilemma; O = other; GS = group size; OS = one-shot dilemma; IT(no.) = iterated dilemma (number of iterations); M = manipulated; SG = Singapore; DK = Denmark; IR = Iran; RU = Russia; ZA = South Africa; US = United States; AR = Argentina; IT = Italy; CO = Columbia; VE = Venezuela; PE = Peru; UY = Uruguay; CR = Costa Rica; UK = United Kingdom; BE = Belgium; NL = the Netherlands; DE = Germany; CH = Switzerland; WB = West Bank; CN = China; FI = Finland; IL = Israel; ET = Ethiopia; JP = Japan; PL = Poland; NZ = New Zealand.

suggest that the data may contain a slight bias to underestimate the effect size, but the data do not contain a publication bias by failing to include null effect sizes.

Dispositional trust and cooperation. The sample of effect sizes and their respective codings are displayed in Table 2. Collapsing nonindependent effect sizes into a single effect size resulted in a total of 60 effect sizes on the relation between dispositional trust and cooperation. We found that dispositional trust had a small to moderate positive relation with cooperation ($r = .26$), 95% CI LL = .22, UL = .31, 90% Prediction Interval LL = .02, UL = .53. People with a high dispositional trust in others are generally more cooperative than low trust individuals. The distribution of effect sizes contains variability ($T = 0.17$, $T^2 = .03$) and much of this variation may be explained by between-study differences ($I^2 = 75.17$).

The overall effect size estimation may be influenced by a publication bias since a majority of the studies are published. Using Duval and Tweedie's (2000) trim and fill approach (with random effects), zero studies were added above the estimated average effect size. However, nine studies were added below the estimated effect size, which resulted in an estimated average effect size smaller than the original estimated effect size ($r = .21$), 95% CI LL = .16, UL = .26. Egger's regression intercept, however, was nonsignificant, Intercept = 1.30, $t(59) = 1.86$, $p = .07$, which indicates a lack of bias in the data. Taken together, the results of these analyses suggest that this sample either lacks a publication bias or contains a slight publication bias by underrepresenting small effect sizes.

Moderator Analyses

We now report the results of several univariate moderator analyses. For each moderator, we report its relation to the expectations and dispositional trust effect sizes separately. Last, we report the

results of a random effects multivariate regression model predicting the effect size.

Index of cooperation. We coded the index of cooperation as a continuous moderator variable and used a random effects metaregression with method of moments estimation to analyze the relation between the index of cooperation and the effect size. After collapsing nonindependent effect sizes, we were able to code the index of cooperation for a total of 70 effect sizes on the relation between state expectations and cooperation. For state expectations, the index of cooperation had a negative relation with the effect size ($b = -.60$, $p = .004$). This indicates that as the degree of conflict of interests increase in the dilemma, the expectations of one's partner(s) had a stronger relation with one's own behavior in the dilemma. For studies that reported the relation between expectations and cooperation, most studies used a social dilemma with an index of cooperation at .33 ($k = 31$) or .50 ($k = 18$). Supporting the above mentioned analyses, studies with an index of cooperation at .33 had a stronger positive effect size ($r = .65$), compared to studies with an index of cooperation at .50 ($r = .45$), $Q(1) = 9.32$, $p = .002$.

For dispositional trust, however, only 25 studies allowed us to code the index of cooperation. The random effects metaregression analysis resulted in a nonsignificant negative relation between the index of cooperation and the effect of dispositional trust on cooperation ($b = -.14$, $p = .49$). A fixed effect analysis, however, resulted in a marginally significant negative relation between the index of cooperation and the effect size ($b = -.16$, $p = .09$). Unfortunately, this small set of studies lack the statistical power to provide a sufficient test of this potential moderator of the effect size.

Using a random effects multiple regression approach and including both state and dispositional trust effect sizes into a single analysis (95 effect sizes), after controlling for the variance ex-

Table 2

Studies Reporting the Correlation Between Dispositional Trust and Cooperation in Social Dilemmas

Study	N	CO	r	LL/UL	DV	K	GS	IT(no.)
Boone et al. (2010)	322	BE	.18	.07/.28	PD	.36	2	OS
Declerck (2011)	38	BE	.21	-.11/.50	PD	.33	2	OS
Declerck & Kiyonari (2011)	124	BE	.13	-.05/.30	PGD		4	OS
Study 2	121	BE	.08	-.10/.26	RD		4	OS
De Cremer & DeWitte (2002)	46	BE	.41	.15/.67	PD	.33	2	OS
De Cremer & van Knippenberg (2005)	117	NL	.30	.13/.46	PGD		5	OS
Study 2	198	DE	.32	.19/.44	O			
De Cremer, Snyder, & Dewitte (2001)	78	NL	.45	.26/.60	PD	.33	2	OS
Study 2	169	NL	.43	.45/.64	PGD		7	OS
De Cremer & Stouten (2003)	76	NL	.45	.25/.61	PGD		4	OS
Deutsch (1960a)	55	US	.50	.27/.68	PD	.90	2	OS
Emonds et al. (in press)	28	BE	.21	-.24/.52	PD	.33	2	OS
Gächter et al. (2004)	782	RU	.10	.03/.16	PGD		3	OS
Hempel et al. (2009)	560	CN	.30	.22/.37	O			
Holloway et al. (1977)	108	CN	.60	.44/.73	PD	.50	2	OS
Ishii & Kurzban (2008)	50	JP	.30	-.03/.52	PGD		5	IT(10)
Jackson (2008)	48	US	.62	.41/.77	PGD		6	OS
Study 2	68	US	.19	-.06/.41	PGD		6	OS
Study 3	48	US	.24	-.05/.49	PGD		6	OS
Kimmerle et al. (2007)	119	DE	.23	.06/.39	O		6	OS
Kyonari & Barclay (2008)	97	CA	.10	-.10/.29	PGD		4	OS
Study 2	80	CA	.31	.10/.50	PGD		4	OS
Study 3	116	CA	.07	-.11/.25	PGD		4	OS
Lokhorst et al. (2009)	122	NL	-.08	-.25/.10	PGD		5	OS
Messick et al. (1983)	60	US	.28	.04/.49	RD		6	IT(10)
Misra & Kalro (1979)	249	IN	.21	.09/.32	PD	.90	2	OS
Mulder et al. (2006a)	159	NL	.10	-.06/.25	PGD		4	OS
Mulder et al. (2006b)	50	NL	.05	-.23/.32	PGD		4	IT(1)
Study 2	123	NL	-.06	-.24/.12	PGD		4	IT(1)
Study 3	95	NL	.31	.12/.48	PGD		4	IT(1)
Ng & Chua (2006)	166	CN	.40	.21/.56	PGD		13	OS
Oskamp & Kleinke (1970)	100	US	.08	-.12/.27	O		2	IT(50)
Parks (1994)	91	US	.25	.05/.43	PGD		5	IT(8)
Parks & Hulbert (1995)	94	US	.37	.19/.53	O		4	IT(20)
Parks et al. (1996)	111	US	.48	.33/.60	PD	.33	2	IT(20)
Study 2	108	US	.47	.32/.60	PD	.33	2	IT(20)
Schlenker et al. (1973)	40	US	.27	-.03/.52	PD	.80	2	IT(30)
Stouten (2005)	108	BE	.20	.01/.38	PGD		4	OS
Stouten et al. (2005)	108	BE	-.01	-.18/.19	PGD		4	OS
Stouten et al. (2006)	80	BE	-.01	-.22/.22	PGD		4	OS
Study 2	108	BE	.01	-.18/.20	PGD		4	OS
Tanghe et al. (2010)	80	NL	.27	.07/.46	O		2	OS
Study 2	78	NL	.14	-.08/.35	PGD		4	OS
Tazelaar et al. (2004)	94	NL	.45	.27/.60	PD	.33	2	IT(53)
Tedeschi et al. (1969)	40	US	.30	-.01/.56	PD	.69	2	IT(100)
Uejio & Wrightsman (1972)	80	US/JP	.13	-.09/.34	PD	.40	2	IT(50)
Wrightsmen (1966)	84	US	.26	-.02/.50	PD	.33	2	OS
Study 2	56	US	.29	-.02/.55	PD	.33	2	OS
Wrightsmen, Davis, et al. (1972)	20	US	.15	-.31/.56	PD	.80	2	IT(30)
Sample 2	20	US	.30	-.17/.65	PD	.80	2	IT(30)
Sample 3	20	US	-.09	-.51/.37	PD	.80	2	IT(30)
Sample 4	20	US	.11	-.53/.35	PD	.80	2	IT(30)
Wrightsmen, Lucker, et al. (1972)	48	US	-.06	-.34/.23	PD	.80	2	IT(50)
Sample 2	48	US	.19	-.10/.45	PD	.80	2	IT(50)
Sample 3	48	US	.28	.00/.52	PD	.80	2	IT(50)
Yamagishi (1988)	192	US	.45	.27/.68	PGD		4	IT(16)
Yamagishi (2011a)	87	JP	.52	.35/.66	PD	.33	2	OS
Yamagishi (2011c)	184	JP	.05	-.10/.20	PD	.33	2	OS
Yamagishi (2011d)	83	JP	-.10	-.31/.20	PD	.33	2	OS
Yamagishi & Cook (1993)	72	US	.45	.27/.60	PGD		4	IT(48)
Study 2	256	US	.53	.32/.69	PGD		8	IT(48)
Yamagishi & Kakiuchi (2000)	40	JP	.45	.19/.65	PD	.33	2	IT(48)
Sample 2	40	JP	.12	-.19/.41	PD	.33	2	IT(48)
Study 2	80	JP	.41	.14/.63	PD	.33	2	IT(48)

Note. N = number of participants included in the effect size estimate; CO = country; LL/UL = 95% confidence interval with lower limit/upper limit; DV = dependent variable; PGD = public goods dilemma; PD = prisoner's dilemma; RD = resource dilemma; O = other; GS = group size; OS = one-shot dilemma; IT(no.) = iterated dilemma (number of iterations); BE = Belgium; NL = the Netherlands; DE = Germany; US = United States; RU = Russia; CN = China; JP = Japan; CA = Canada; IN = India.

plained by the type of trust measure (state or dispositional), we find that the index of cooperation has a significant negative relation with the effect size ($\beta = -.26, p = .003$). Trust is a stronger predictor of cooperation in situations involving larger, compared to smaller, conflict of interest.

Type of dilemma. We now consider if the effect sizes differ based on the type of social dilemma, coded as the prisoner's dilemma, public goods dilemma, resource dilemma, or other. The results of these analyses, along with the remaining results of the univariate categorical analyses, are reported in Tables 1 and 2, for state expectations and dispositional trust, respectively. The type of dilemma did not moderate the relation between either state expectations with cooperation, $Q(3) = 3.00, p = .39$, or dispositional trust and cooperation, $Q(3) = 3.20, p = .36$. Thus, the effect sizes were similar across the different types of social dilemmas.

Iterations. We coded iterations as both a dichotomous (one-shot vs. iterated) and a continuous variable (the number of iterations). The relation between state expectations and cooperation were unaffected by either if the dilemma was a one-shot dilemma or iterated dilemma, $Q(1) = .00, p = .96$, or by the number of iterations in the dilemma ($b = -.005, p = .51$). Similarly, the relation between dispositional trust and cooperation did not differ between one-shot and iterated dilemmas, $Q(1) = 1.40, p = .24$, or by the number of iterations in the dilemma ($b = .002, p = .18$). Thus, if the dilemma was a single trial dilemma or occurred for several trials did not affect the relation between trust and cooperation.

Individual versus intergroup interactions. We coded if the study involved interactions between individuals or groups. For this analysis we are only able to consider the relation between state expectations of others cooperation and own cooperation, because no studies reported the relation between dispositional trust and cooperation for intergroup dilemmas. There is a stronger relation between expectations and cooperation for interactions between individuals ($r = .60$), compared to interactions between groups ($r = .43$), $Q(1) = 10.18, p = .001$. This finding supports the position that trust matters less for behavior during interactions between groups compared to interactions between individuals.

Measurement of expectations. We coded if expectations of partner(s) behavior was measured before or after a participant's behavior in the social dilemma. There was no significant effect of time of measurement on the effect size, $Q(1) = .48, p = .49$.

Country of participants. We coded the country where the study was conducted and considered if the relation between trust and cooperation differs across countries. For the sample of effect sizes on the relation between state expectations and cooperation, we only included countries in the analysis that were represented by four or more effect sizes. This resulted in a total of nine countries (as displayed in Table 3). There was a significant difference between countries, $Q(8) = 66.83, p < .001$. Although there was a strong relation between expectations and cooperation in the Netherlands ($r = .70$), Belgium ($r = .61$), Switzerland ($r = .71$), the United Kingdom ($r = .75$), and Japan ($r = .72$), other countries had a moderate positive relation between expectations and coop-

Table 3
Results of the Categorical Univariate Moderator Analyses on the Expectations and Cooperation Effect Size

Variable and class	Between-class effect (Qb)	k	r	95% CI for d (lower, upper)	T
Index of cooperation	9.32*				
.33		31	.65	.58, .71	.29
.50		18	.45	.33, .56	.28
Type of dilemma	3.00				
Prisoner's dilemma		68	.58	.53, .62	.28
Public goods dilemma		46	.62	.57, .67	.25
Resource dilemma		9	.51	.35, .65	.29
Other		19	.53	.28, .71	.62
Iterations	0.00				
One-shot		94	.58	.52, .63	.36
Iterated		46	.58	.52, .64	.25
Individuals versus intergroup	10.18*				
Individuals		122	.60	.55, .64	.34
Intergroup		20	.43	.33, .53	.21
Measured expectations	0.48				
Before behavior		34	.58	.51, .65	.29
After behavior		70	.55	.49, .60	.29
Country of participants	66.82*				
Belgium		8	.61	.46, .72	.29
Canada		4	.49	.41, .57	.00
Switzerland		6	.71	.61, .79	.17
Germany		6	.54	.41, .66	.16
Japan		8	.72	.63, .80	.24
Netherlands		21	.70	.59, .78	.42
Singapore		5	.44	.34, .52	.00
United Kingdom		6	.75	.68, .80	.00
United States		50	.48	.42, .54	.24

Note. CI = confidence interval.

* $p < .05$.

Table 4
Results of the Categorical Univariate Moderator Analyses on the Dispositional Trust and Cooperation Effect Size

Variable and class	Between-class effect (Qb)	k	r	95% CI for d (lower, upper)	T
Type of dilemma	3.20				
Prisoner's dilemma		25	.31	.23, .38	.17
Public goods dilemma		27	.23	.15, .31	.20
Resource dilemma		2	.16	-.03, .35	.10
Other		6	.28	.21, .34	.04
Iterations	1.40				
One-shot		34	.24	.17, .30	.18
Iterated		24	.30	.22, .37	.16
Country of participants	21.63*				
Belgium		9	.12	.05, .18	.00
Japan		7	.26	.06, .43	.24
Netherlands		14	.28	.16, .40	.22
United States		21	.34	.26, .41	.16

Note. CI = confidence interval.

* $p < .05$.

eration, including Canada ($r = .49$), Singapore ($r = .44$), Germany ($r = .54$), and the United States ($r = .48$).

When analyzing the relation between dispositional trust and cooperation across countries, only four countries in the sample were represented by four or more effect sizes (as shown in Table 4). We found that there was a significant difference across countries in the relation between dispositional trust and cooperation, $Q(3) = 21.63$, $p < .001$. Here, the strongest relation between dispositional trust and cooperation was represented by the United States ($r = .34$), followed by the Netherlands ($r = .28$), Japan ($r = .26$), and Belgium ($r = .12$). Thus, the present analysis finds variation across countries in the extent that people condition their behavior on the trust they have in others.

Multiple Regression Model

We now report the results of a random effects multiple regression model predicting the effect size. It may be that the index of cooperation relates to the effect size because it relates systematically to other study characteristics. Importantly, as displayed in Table 5, the index of cooperation relates significantly to the year of publication ($r =$

$-.52$, $p < .05$) and feedback ($r = -.22$, $p < .05$). Recent studies were more likely to include prisoner's dilemmas with a lower index of cooperation. Additionally, studies that included some feedback about partner behavior prior to measuring trust tended to use prisoner's dilemmas with a higher index of cooperation. Therefore, we consider if the index of cooperation predicts variance in the effect size after controlling for the year of publication and feedback, as well as several additional study characteristics (the type of effect size—state expectations or dispositional trust, number of iterations, participant payment, dyads versus groups, and individual dilemmas versus intergroup dilemmas).

Table 6 reports the results of the multiple regression model. In the multiple regression model we include only the effect sizes for the prisoner's dilemmas that allowed for us to code the index of cooperation and all the study characteristics noted above. This resulted in a total of 92 effect sizes. The model explains a significant amount of variation in the effect size ($R^2 = .37$, $p < .001$). Supporting earlier analyses, the effect size is stronger for state expectations, compared to dispositional trust ($\beta = .53$, $p < .001$). The year of publication,

Table 5
Correlations Between the Study Characteristics of All the Studies Included in the Multiple Regression Model ($k = 92$)

Study characteristic	1	2	3	4	5	6	7
1. Index of cooperation							
2. Number of iterations	.15						
3. Group size	-.06	-.22					
4. Year of publication	-.52*	-.29*	.04				
5. Participant payment	-.01	-.09	.22*	.10			
6. Trait or state trust	-.01	-.57*	.35*	.23*	.06		
7. Intergroup	.14	-.15	.71*	.22*	.10	.26*	
8. Feedback	.22*	.57*	-.07	.23*	-.06	-.31*	.08

Note. Group size = dyads (1) versus groups (2); Participant payment = not paid (1) versus paid (2); Trait or state trust = trait trust (1) versus state trust (2); Intergroup = individual dilemmas (1) versus intergroup dilemmas (2); Feedback = trust measured before (1) versus after (2) feedback.

* $p < .05$.

Table 6
Random Effects Multiple Regression Model Predicting the Effect of Trust on Cooperation

Variables	β	p
Index of cooperation	-.26	.014
Iterations	-.03	.826
Group size	.00	.986
Year of publication	-.05	.657
Participant payment	-.11	.198
Trait or state trust	.53	.001*
Intergroup	-.23	.083
Feedback	.00	.971
		$R^2 = .37^*$

Note. $k = 92$ studies. Trust = state (1) versus dispositional trust (2); Group size = Dyad (1) versus groups (2); Participant payment = not paid (1) versus paid (2); Intergroup = individual dyads (1) versus intergroup dilemmas (2); Feedback = no feedback (1) versus feedback (2).

* $p < .001$.

participant payment, number of iterations, feedback, and group size did not have significant relations with the effect size. Supporting the earlier analysis, the effect size tended to be somewhat stronger in studies including social dilemmas between individuals, compared to intergroup social dilemmas ($\beta = -.23$, $p = .083$). Importantly, after controlling for these variables the index of cooperation continues to have a significant negative relation with the effect size ($\beta = -.26$, $p = .014$). In conclusion, the relation between trust and cooperation is stronger in social dilemmas with a low index of cooperation (larger conflict of interests) compared to social dilemmas with a high index of cooperation (smaller conflict of interests).⁷

Discussion

During the past decades, trust has been studied in a multitude of ways across the social and biological sciences. Many of these conceptualizations of trust tend to emphasize that trust involves beliefs about other's benevolent motives during social interactions that involve a conflict of interest. However, past research has largely overlooked that situations can vary dramatically in the amount of conflict they contain and that this may hold important implications for understanding the relation between trust and cooperation. According to an interdependence perspective, the degree of conflict of interests during situations affords both benevolent motives and beliefs about other's benevolent motives (and so trust) to more strongly influence cooperation. The primary goal of the present research was to examine this perspective on trust.

Overall, dispositional trust had a weak positive relation with cooperation ($r = .26$), but expectations of other's behavior had a strong positive relation with cooperation ($r = .58$). We coded the degree to which the social dilemmas, notably the prisoners' dilemmas, varied according to the degree of conflict of interests in the dilemma. We found that the degree of conflict in the dilemma moderated the relation between trust and cooperation. Trust exhibits a stronger positive association with cooperation during situations that contain relatively stronger conflict of interests. Thus, trust matters in situations of conflicting interests, and it matters less in situations of corresponding interests. Below, we outline some theoretical, empirical, and societal implications of the present findings for the conceptualization, understanding, and the workings of trust in everyday life.

When Does Trust Matter for Cooperation?

The present research provides a clear answer: Trust matters most in situations that contain greater amounts of conflicting interests. Although conceptualizations vary across disciplines, one common thread across many conceptualizations of trust is that trust involves beliefs about other's benevolent motives (Holmes & Rempel, 1989; Mayer et al., 1995; Rousseau et al., 1998; Simpson, 2007a; Yamagishi, 2011b). Here we argued from an interdependence perspective, that trust is most relevant to situations of interdependence that contain a conflict of interests. According to this perspective, the workings of benevolent motives and trust can be understood in relation to the interdependence structure that underlies the situations in which people find themselves (Holmes, 2004; Kelley et al., 2003). Specifically, situations that contain a larger, compared to smaller, conflict between self-interest and benevolent motives afford both benevolent motives and trust to affect cooperation. The meta-analysis resulted in a stronger posi-

tive association between trust and cooperation in situations that contain a larger, compared to smaller, conflict of interests. In situations that contain relatively less conflict, then there is a weaker association between trust and cooperation—and as we argued earlier, in these situations other more self-serving motives may influence cooperation.

The present findings have strong implications for the conceptualization of trust (for reviews, see Castaldo, Premzzi, & Zerbini, 2010; Das & Teng, 2004; Ebert, 2009; Hosmer, 1995; Kee & Knox, 1970; McKnight & Chervany, 2000; Rousseau et al., 1998). As noted earlier, several definitions of trust emphasize that trust is an ability (and confidence in the ability) to predict others' behavior (e.g., Dasgupta, 1988; Luhmann, 1979; McAllister, 1995; Sitkin & Roth, 1993; Zucker, 1986). These are broad definitions of trust that suggest trust is equally relevant to a broad domain of social interactions. In contrast, alternative conceptualizations of trust have emphasized that trust involves a specific type of expectation about the benevolence of another person, thereby focusing on expectations that are relevant to behavior in situations with a conflict of interests (e.g., Barber, 1983; Bradach & Eccles, 1989; Deutsch, 1960b; Mayer et al., 1995; Rousseau et al., 1998; Yamagishi, 2011b).

While these later conceptualizations recognize that expectations of other's behavior is central to understanding trust, they go further to suggest that the content of these expectations involve specific information about the benevolence (as well as ability and integrity) of others in situations involving a conflict of interests (see Mayer et al., 1995; Miller & Rempel, 2004).⁸ Our data fall clearly in line with these latter conceptualizations of trust. Trust becomes an even stronger predictor of cooperation when the situation involved larger, compared to smaller, amounts of conflict. As such, the present findings underscore the importance of defining trust in terms of beliefs about other's benevolent motives and how these beliefs shape our cooperative behavior, especially in social dilemmas involving a strong conflict of interests.

Although our meta-analysis focused on social dilemmas, it is important to note that our findings may well generalize to other domains in which conflicts of interest are essential. For example, prior research has studied the relation between trust and behavior in situations that involve a conflict of interests, such as bargaining and negotiation (Kimmel, Pruitt, Magenau, Konar-Goldband, &

⁷ We also tested the two-way interactions between the index of cooperation with iterations, group size, and participant payment predicting the effect size. In a series of analyses we computed the interaction term and added it to the model displayed in Table 6. Each interaction term was a nonsignificant predictor of the effect size ($ps > .30$). Moreover, when we added the interaction terms to the model, this did not affect the statistical relation between the index of cooperation and the effect size.

⁸ Mayer et al. (1995) theorized that the perceived trustworthiness of others is influenced by perceptions of others benevolence, integrity, and ability. Clearly, in the context of experimental social dilemmas, perceptions of others benevolence (and possibly integrity) may be key perceptions of others that influence perceptions of trustworthiness. Ability, however, may be less involved in informing people's state expectations of their partner's behavior during the experimental social dilemmas included in the meta-analysis. This is not to suggest, however, that integrity and ability are unimportant for informing trust in others. Prior research clearly demonstrates that each of these perceived characteristics of others influence perceived trustworthiness (Colquitt, Scott, & LePine, 2007; Mayer & Davis, 1999; Yakovleva et al., 2010).

Carnevale, 1980; Naquin & Paulson, 2003; Zaheer et al., 1998), the provision of monetary loans (Ferrary, 2002), practicing safe sex (Hattori, Richter, & Greene, 2010), complying to tax laws (van Dijke & Verboonk, 2010), commuting with public transportation (Van Lange, Van Vugt, Meertens, & Ruiter, 1998), organizational citizenship behaviors (Deluga, 1994), sustainable resource consumption (Messick et al., 1983), and volunteering (Uslaner & Brown, 2003), to name a few. Additionally, recent paradigms developed to study trust in behavioral economics are situations that involve conflict (Berg, Dickhaut, & McCabe, 1995). The conclusion that emerges from this research is that trust enables people to effectively manage conflict in relationships and establish mutually cooperative interactions.

In fact, two different empirical traditions add credence to the claim that trust matters most for behavior in situations with a larger, compared to smaller, conflict of interests. First, at least two studies on cooperation in social dilemmas have found that the degree of conflict moderates the relation between trust and cooperation. For example, Parks and Hulbert (1995) revealed that high-trust individuals were more cooperative than low-trust individuals during a social dilemma with greater costs associated with a partner taking advantage of one's own cooperation. In contrast, when a partner's noncooperative behavior caused less harm to one's own outcomes, then high and low trust individuals cooperated to the same extent. As another example, Yamagishi and Sato (1986) measured the relation between state trust (as measured by expectations of others) and cooperation across three types of public goods that varied according to the degree of conflict. They found evidence that the positive correlation between state trust and cooperation was weakest when conflict was low, but relatively stronger in other dilemmas that contained a larger degree of conflict.

We should acknowledge that experimental social dilemmas are unique situations in that they involve laboratory decision contexts between strangers with barely any knowledge about each other. Although this may be a limitation for generalizing the present research findings, research on close relationships—a context when people do possess an abundance of knowledge about their partner—also has supplied evidence in support for the position that the amount of conflict may moderate the relation between trust and cooperation. As a recent case in point, Shallcross and Simpson (2012) studied the behavior of couples while discussing situations that involved varying degrees of conflict. They found that trust in a partner positively related to a relationship partners' willingness to accommodate their partner's request to make a sacrifice. More specifically, people with high trust in their partner tended to be even more accommodating of their partners when asked to make a major, compared to relatively minor, sacrifice. Individuals with low trust in their partner, on the other hand, became even less accommodating of their partners when asked to make a major sacrifice, compared to a more minor sacrifice.

These conclusions are also supported in other research on ongoing relationships. For example, Murray, Bellavia, Rose, and Griffin (2003) found that the degree to which people perceive that their partner cares about them (and so an index of trust) moderated how they responded to varying degrees of conflict in the relationship. People who believed their partner did not value them, felt more hurt and rejected by their partner after high, compared to low, conflict situations. In contrast, those who felt their partner did care about them actually felt closer and less hurt by their partner after situations of high conflict. And last but not least, research on

attachment styles in close relationships finds similar results. Ambivalent attachment styles that have relatively low levels of trust in their partner, reacted less positively to their partners when they attempted to resolve a relatively major, compared to minor, relationship problem (Simpson, Rholes, & Phillips, 1996; for additional evidence, see Campbell, Simpson, Boldry, & Kashy, 2005).

Taken together, the results of the meta-analysis and past research are consistent with conceptualizations of trust as beliefs about other's benevolent motives that inform behavior during situations of conflict. Additionally, this research supports that trust is even more influential for behavior in situations involving larger, compared to smaller, amounts of conflict. Moreover, research on close relationships suggests that conflict may be critical for understanding trust beyond the confines of the social dilemma paradigm employed in the meta-analysis. Although the meta-analysis provides compelling evidence for this perspective, we should acknowledge some alternative interpretations of these results.

Alternative Theoretical Accounts

As noted earlier, one common thread across several conceptualizations of trust is the focus on other's benevolent motives. Another common thread in these conceptualizations is that trust can exist both as a trait and state. In the present study, we operationalized state trust as state specific expectations of one's partner(s) in a social dilemma. Several researchers have argued similarly that expectations of cooperation are a measure trust (e.g., Buchan et al., 2011; Cohen & Insko, 2008; Deutsch, 1960b). Here we discuss three potentially competing accounts of the findings that state trust is more strongly related to behavior in situations involving relatively larger degrees of conflict.

One potential explanation of this finding is that in social dilemmas that involve a high index of cooperation (k) most everyone cooperates and expects others to cooperate, and the reduced variability in expectations and cooperation would lower the correlation between these variables. Although the degree of conflict across situations does have a main effect on trust and cooperation, there is evidence against this alternative account of our findings. First, this perspective implies that there should be lower variances in expectations and cooperation (and so correlations) in studies with a very low and high k value. This suggests a nonlinear quadratic relation between k and the effect size. However, we find a negative linear relation between the k and the effect size. We tested for a nonlinear relation but find that this more complex relation does not account for additional variation beyond the linear relation. Second, most studies report a k value at .33 or .50, and comparing these studies reveal that studies with k at .33 have a stronger effect size than studies with a k at .50. This analysis reduces our concern that it is the very high and/or low values of k that are responsible for our findings. Third, although the degree of conflict can have a main effect on trust and cooperation, this does not completely reduce variability in trust and cooperation. This conclusion is broadly supported in the social dilemma literature, in that even under conditions that are very supportive of cooperation and expected cooperation, the levels of cooperation hardly exceed 80% (Komorita et al., 1980). Studies reported in the meta-analysis that report high (and low) levels of k also find variation in mean levels of expectations and cooperation (see Dawes, McTavish, & Shaklee, 1977; Komorita et al., 1980; Schlenker, Helm, & Tedeschi, 1973; Wildschut, Insko, & Gaertner, 2002). Thus, social dilemmas with very high and low

levels of k remain mixed-motive situations that involve variation in behavior.

Yet theory and research on the relation between expectations and cooperation may inform the present results in two additional ways, most notably peoples' tendencies toward self-projection and the rationalization of choice. Specifically, people might use their own social motivations (or behavioral intentions) to form expectations about the other's behavior, and this process of self-projection may account for the positive relation between expectations and cooperation (Dawes et al., 1977; Kuhlman & Wimberley, 1976; Van Lange, Liebrand, & Kuhlman, 1990). For example, research suggests that people with prosocial motives tend to think others are like themselves (i.e., prosocial), while individuals with prosocial motives are less confident in their expectations of others (Van Lange, 1992). Moreover, tendencies toward self-projection (or assumed similarity) can be affected by the degree of conflict in the dilemma, such that people reduce both their own and expected other's cooperation with greater degrees of conflict in the dilemma (Krueger et al., 2012; Malhotra, 2004). Although this perspective does suggest that expectations are both influenced by people's dispositional motives and the degree of conflict in the social dilemma, the self-projection perspective has difficulty explaining why the relation between expectations and cooperation is moderated by the degree of conflict in the dilemma.

One possibility is that the role of individual differences in cooperation is more strongly related to behavior in social dilemmas containing a high conflict of interest, compared to social dilemmas that possess a relatively weaker conflict of interest. That is, when conflict of interest is low, most people cooperate because their own interests are served by doing so. For example, it is possible that under low conflict of interest, most people cooperate, whereas under high conflict of interest the number of cooperators versus noncooperators might be more evenly distributed—and more likely determined by individual differences in social motives. If so, this may explain how the link between expectation and choice is more pronounced in situations with a stronger conflict of interests.

A second possibility is that people have a tendency to rationalize their expectations after they have made the choice—and this explains the link between expectations and behavior. After having made a cooperative choice, people might be motivated to rationalize their cooperative choice by strengthening the belief that other people cooperate as well (to avoid the self-image that one is willingly a sucker). Likewise, people might be motivated to rationalize their noncooperative choice by strengthening the belief that other people are unlikely to cooperate (to avoid the self-image that one is seeking to exploit the other person, or to free-ride on other people's efforts). Similarly, it is possible that under high conflict of interest, people are more strongly motivated to rationalize their behavior (e.g., "I was not greedy, but thought that others would not cooperate, so I did not either"; cf. Messé & Sivacek, 1979). Thus, from those perspectives (i.e., projection and rationalization) we do not exclude the possibility that choice (or intended choice) influences expectations or that these perspectives may explain the results of the meta-analysis.

At the same time, there are at least three reasons that support the view that expectations in the form of state trust influence cooperation. First, Balliet (2012) has conducted a quantitative review of 26 studies on the relation between social motives and expectations of others cooperation and found that this is a small positive effect ($r = .32$).⁹ It seems implausible that this modest correlation may comprehensively explain the strong link between expectations and cooperation ($r =$

.58). Second, studies in which expectations about other's cooperation are experimentally manipulated have revealed strong and robust effects of expectations on cooperation in various social dilemmas (e.g., Lanzetta & Englis, 1989; Liebrand, Wilke, Vogel, & Wolters, 1986)—which suggests that expectations may not be merely a post hoc rationalization of own behavior. Third, the present meta-analysis did not reveal any evidence that the relation between expectations and cooperation was moderated by whether the expectations were measured before or after own behavior in the dilemma. A rationalization account of our findings might suggest that expectations would have a stronger link to behavior when measured after the behavior, but we find no evidence to support such a perspective. Thus, although expectations of cooperation may be affected by psychological processes unrelated to trust, these perspectives do not readily provide an explanation that can comprehensively account for the present findings. Nonetheless, we regard it important to illuminate the precise mechanisms that help explain why expectations exert such a strong impact on cooperation in various social dilemmas.

Implications for the Workings of Trust in Society

The results of the meta-analysis hold important implications for increasing trust and facilitating cooperation in a broader sense—beyond the specifics of the social dilemma paradigm. To begin with, past theory has suggested that one solution to increase trust during social interactions is through mechanisms that reduce the conflict of interests in the dilemma, such as the provision of incentives or the use of hostage-taking (Raub & Weesie, 2000; Shapiro, Sheppard, & Cheraskin, 1992). Hostage-taking involves providing some form of collateral to avoid losses during social exchange. For example, when a person rents a bike in Amsterdam, the bike owner requires that the renter leaves behind some valuable personal belonging. This essentially reduces the risk of defection by increasing the cost of opportunistic behavior. People are willing to exchange during the context of hostage-taking, not because they trust that the other is concerned about their well-being, but because they have a self-interest to behave cooperatively (Yamagishi, 2011b). This has important implications for the development of trust.

Although game theory predicts and research does find that hostage-taking (and incentives) induce people to behave more cooperatively, and less opportunistically (Balliet et al., 2011; Raub & Keren, 1993; Raub & Weesie, 2000; Weesie & Raub, 1996), this finding is not very surprising. People tend to behave more cooperatively when their interests are more strongly aligned (Kollock, 1998; Olson, 1965). However, when hostage-taking is present, trust becomes a less relevant determinant of behavior, and this creates an environment that curbs the development of a mutually trusting and cooperative relationship. Much prior research has suggested that exercising trust in a relationship and having that trust repaid by trustworthy behavior of a partner results in an increased level of mutual trust—both on behalf of the trustor and trustee (e.g., Ferrin et al., 2008; Wieselquist et al., 1999). Moreover, although the use of incentives in social dilemmas may increase assurance that others will cooperate, research finds that

⁹ Balliet (2012) found that a random effects analysis of 26 studies testing the relation between social value orientation and expectations of others cooperation resulted in a significant positive correlation ($r = .32$, 95%CI LL = .27, UL = .37), indicating that prosocials tended to think others were more likely to cooperate, compared to prosocials.

when the incentives are removed from the dilemma there is actually a decrease in trust and cooperation (X. Chen, Pillutla, & Yao, 2009; Mulder et al., 2006a). Thus, although hostage-taking may be an effective solution to promoting cooperation during one-shot anonymous interactions between strangers with no future, by reducing the conflict of interests in relationships, these strategies may create an environment that curbs the development and effective growth of trust.

These lines of reasoning are also important to understanding social processes in organizations—and might help resolve some recurring debate. As a case in point, Dirks (2000) suggested that trust may have a stronger impact on behavior for relations in an organizational context that contain greater amounts of conflict. Yet other organizational researchers have claimed that conflict in this context may hinder the development of trust (Lau & Cobb, 2010). Our findings not only support the position of Dirks (2000), they are also consistent with existing research on trust and organizational behavior. For example, trust in collocated fellow employees has a stronger positive relation with prosocial behaviors at work, compared to the relation between trust and prosocial behaviors amongst coworkers in a virtual environment (Yakovleva, Reilly, & Werko, 2010). Yakovleva and colleagues speculated that this difference may be because collocated employees are relatively more interdependent with the possibility of entering situations containing stronger conflicts of interests, compared to coworkers in a virtual environment. Similarly, trust in an immediate supervisor is more strongly and positively related to task performance, compared to trust in a more distant, top manager (for whom an employee may have less interdependence and conflicts of interests; Mayer & Gavin, 2005).

Beyond economic exchanges and the organizational context, trust has important implications for the initiation, commitment, and longevity or dissolution of close relationships (see Fletcher, Simpson, & Thomas, 2000; Larzelere & Huston, 1980; Mikulincer, 1998; Miller & Rempel, 2004; Rempel, Ross, & Holmes, 2001; Simpson, 1990). Specifically, the present findings support the conclusion of past research that has suggested that situations where partners face a strong conflict of interests (so called strain-test situations) enables partners to communicate trust and trustworthiness that can result in a multitude of positive outcomes for a relationship (e.g., Holmes & Rempel, 1989; Van Lange et al., 1997; Wieselquist et al., 1999). As such, relationships may benefit from openly and constructively discussing or confronting conflicting interests, and certain relationships may suffer from an active avoidance of such situations (Holmes, 2002). Indeed, one might speculate that relationship therapy may consider developing strategies for constructively confronting such strain-test situations, because this may be fertile ground for relationships to develop trust in an effective manner.

Individual-Intergroup Discontinuity and Trust

The present findings also revealed that state trust is more strongly linked to own cooperation in social dilemmas among individuals than in social dilemmas between groups. In this latter paradigm, it is often that representatives of a group make a decision, either by themselves or simply inform the group decision. A strong program of research reveals that intergroup interactions are less cooperative than interpersonal interactions in social dilemmas (for a review, see Wildschut et al., 2003). Moreover, people tend to expect less cooperation from groups compared to individuals—and so may be considered to be less trusting of

groups (Cohen & Insko, 2008; Insko & Schopler, 1998). Yet the fact that people are less trusting of groups and tend to be less cooperative toward groups, compared to individuals, does not explain why the link between trust and cooperation is relatively less strong for groups. Why might trust be somewhat less important to intergroup interactions than to interindividual interactions, even for similar or identical structures of interdependence?

One answer may be that an intergroup context activates competitive motives. Interestingly, even in contexts that encourage a group to believe that another group will cooperate, the group may behave competitively and choose to take advantage of that cooperation. A clever experimental design by Insko et al. (2005) manipulated perceived similarity between groups and then placed groups in a context where they could either cooperate, withdraw (and receive a small payment), or defect. They found that groups who perceived themselves to be more similar tended to expect greater amounts of cooperation from the other group, compared to groups that were not induced to perceive similarity. However, instead of increasing their cooperation in response to an increased level of trust (as individuals often do), similar groups tended to compete with each other and attempt to take advantage of the other groups expected cooperation. This research suggests that competitive motives may be salient in the context of intergroup interactions, and this reduces cooperation—regardless of the level of trust.

Culture and Trust

Our meta-analysis revealed that the relation between trust and cooperation varied according to the country of participants. For some countries, trust had a strong positive relation with cooperation (e.g., the Netherlands, Switzerland, and the United Kingdom), but in other countries there was a weaker relation between trust and cooperation (e.g., Canada, Singapore, and the United States).¹⁰ These findings complement prior survey and behavioral research that has also found that trust varies considerably across countries (Buchan & Croson, 2004; Cardenas, Chong, & Nopo, 2009; Huff & Kelley, 2003; Inglehart et al., 1998; Takahashi et al., 2008). Prior research on culture and cooperation has mainly focused on differences in cultural values (C. C. Chen, Chen, Meindl, 1998; Parks & Vu, 1994) or social norms (Henrich et al., 2006). We encourage research to address the important cultural differences in beliefs (see Bond et al., 2004)—among which trust may be a key belief for understanding cultural differences in social behavior. Moreover, theory suggests that values and beliefs may relate systematically to determine culture specific forms of social behaviors (Doney, Cannon, & Mullen, 1998; Leung, Au, Huang, Kur-

¹⁰ We would like to note that there are some differences in the relative standings of countries across the two types of effect sizes. While Japan and the Netherlands have a relatively consistent high correlation for both trait and state trust, the United States and Belgium show somewhat inconsistent relations. The United States shows a strong relation between dispositional trust and cooperation, but compared to the other countries has a relatively weak correlation between state trust and cooperation. Belgium shows a relatively weak association between dispositional trust and cooperation, but a relatively stronger association between state trust and cooperation, compared to the rest of the countries. It is possible that these differences are the result of a small sample size of studies and the studies employing different methodologies. For these reasons we refrain from speculating about these differences but note the possibility for future research.

man, Niit, & Niit, 2007)—a perspective that has not been directly examined in prior research.

In a seminal book, Putnam (1993) suggested that high-trust societies contain dense social networks that individuals can use as a means to create value and prosper, while low-trust societies do not possess such well-established social networks. According to this perspective, trust may have important consequences for the workings of organizations, institutions, and markets. Research on cross-societal differences in trust has discovered that trust—as measured by the world values survey—predicts the growth of organizations (Fukuyama, 1995) and even a nation's wealth (Knack & Keefer, 1997; La Porta et al., 1997). Trust also has important consequences for norm enforcement in promoting cooperation. In high-trust societies, the use of informal peer punishment to promote cooperation is more effective, compared to low-trust societies (Balliet & Van Lange, in press). Although testing reasons for cultural differences in our sample of studies was beyond the scope of the present article, these findings, along with the research reported above, provide convincing evidence that cross-societal variation in trust truly exists and may have important consequences for understanding cross-societal variation in social behavior to the broader workings of institutions and markets—a topic worthy of future research.

Concluding Remarks

Trust and cooperation constitute one of the most classic topics in the social and behavioral sciences, spanning more than five decades of theorizing and research. Despite these longstanding efforts, one key question that is essential to theories of trust has not been answered: Does the degree of conflicting interests in a situation moderate the relation between trust and cooperation? To date, there has been no conceptual or quantitative review that has harnessed research on social dilemmas to provide strong conclusions regarding the role of conflict in trust.

Our meta-analytic review provides a relatively clear answer. Trust matters the most when there is a larger conflict of interest. In situations that contain a larger conflict of interests, benevolent motives matter a lot for determining behavior, and people become more likely to condition their own behavior based on beliefs about others concern for their welfare. Although the results of the present research supports this perspective, future research is necessary to more closely examine the various psychological perspectives about how beliefs about others motives interact with features of interdependence to affect cooperation.

We have also outlined the implications of the present findings for understanding social interactions as they unfold not only in the laboratory but also in several important life domains. Most people readily agree that the development of trust is crucial to well-functioning relationships, organizations, and even societies. The present findings contribute to this vast literature by suggesting that people are most capable of building trust in situations in which preferences tend to conflict rather than align. This insight is essential to our theoretical understanding of when people are able to build trust. As Yamagishi (2011b) keenly noticed, there is a paradox of trust: When it is most difficult to trust—and when there is a stronger conflict of interests in a situation—this is when trust is most needed to form a cooperative, well-functioning relationship. Unless proven otherwise, we suspect that this logic holds not

only for interactions in social dilemmas but also for interactions in relationships, organizations, and society at large.

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Received March 8, 2012

Revision received October 9, 2012

Accepted October 15, 2012 ■