

# Sex Differences in Cooperation: A Meta-Analytic Review of Social Dilemmas

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Although it is commonly believed that women are kinder and more cooperative than men, there is conflicting evidence for this assertion. Current theories of sex differences in social behavior suggest that it may be useful to examine in what situations men and women are likely to differ in cooperation. Here, we derive predictions from both sociocultural and evolutionary perspectives on context-specific sex differences in cooperation, and we conduct a unique meta-analytic study of 272 effect sizes—sampled across 50 years of research—on social dilemmas to examine several potential moderators. The overall average effect size is not statistically different from zero ( $d = -0.05$ ), suggesting that men and women do not differ in their overall amounts of cooperation. However, the association between sex and cooperation is moderated by several key features of the social context: Male–male interactions are more cooperative than female–female interactions ( $d = 0.16$ ), yet women cooperate more than men in mixed-sex interactions ( $d = -0.22$ ). In repeated interactions, men are more cooperative than women. Women were more cooperative than men in larger groups and in more recent studies, but these differences disappeared after statistically controlling for several study characteristics. We discuss these results in the context of both sociocultural and evolutionary theories of sex differences, stress the need for an integrated biosocial approach, and outline directions for future research.

*Keywords:* gender, sex differences, cooperation, social dilemmas, meta-analysis

Are women or men more cooperative? There is some evidence that women, relative to men, are kinder (Conway, Pizzamiglio, & Mount, 1996; Eagly & Steffen, 1984), more agreeable (Feingold, 1994), more supportive of their friends (Oswald, Clark, & Kelly, 2004), and more cooperative in same-sex work groups (Chatman & O'Reilly, 2004). In contrast, men provide more help to strangers in need (Eagly & Crowley, 1986), have a stronger preference for coordinated social play as children (Benenson, Apostoleris, & Parnass, 1997), and tend to cooperate more in larger groups (Gabriel & Gardner, 1999).

In a seminal review of sex differences, Maccoby and Jacklin (1974) examined the degree to which men and women differ in

a variety of social behaviors. Although they found some evidence for sex differences, in most behavioral domains—including cooperation—research findings were rather inconclusive. Recent behavioral economics research comparing men's and women's decisions in bargaining games (Eckel & Grossman, 2001; Solnick, 2001) and dictator games (Andreoni & Vesterlund, 2001; Bolton & Katok, 1995; Dufwenberg & Muren, 2006) also finds no systematic sex differences. Taken together, several decades of research suggest that overall women and men are equally cooperative.

Recent theorizing on sex differences suggests that rather than looking for main effects, it may be more productive to investigate the environment in which men and women make cooperative decisions (Hyde, 2005; Simpson & Van Vugt, 2009; Weber, Koppelman, & Messick, 2004). Depending on contextual factors, sometimes women may be more cooperative, and other times men. To investigate context-dependent sex differences in cooperation, we use a meta-analytic approach to analyze research on experimental social dilemmas, a decision environment that is highly controlled and allows us to test some potentially important moderators.

Although cooperation can be studied with a variety of methods, including ethnographies (e.g., Mauss, 1950/1990; Mead, 1961; Sahlins, 1972) and surveys (e.g., Major & Adams, 1983; Swap & Rubin, 1983), the social dilemma literature uses a standard experimental paradigm to investigate when and how individuals coop-

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erate (Pruitt & Kimmel, 1977). In social dilemmas, cooperative motives are pitted directly against selfish motives, and individuals must choose between these two motivations (Dawes, 1980).<sup>1</sup> In addition to offering an unambiguous and carefully controlled decision situation to study cooperation, two strengths of the social dilemma literature are its vastness—it spans over 50 years of research—and the fact that many important contextual variables, including the size and sex composition of the group, have been investigated. As we outline below, these contextual variables may be crucial in determining whether women or men are more cooperative.

The present research examines 50 years of empirical research on social dilemmas with three primary goals in mind. First, we provide a conclusive meta-analytic test to examine whether women or men are more cooperative. Second, we draw insights about potential sex differences in cooperation by utilizing two dominant frameworks on sex differences in social behavior: the evolutionary and the sociocultural perspective. Third, we examine several potential moderators of sex differences in cooperation (e.g., sex of the partner, one-shot vs. iterated interactions, group size, and year of publication).

### Social Dilemmas

Social dilemmas are situations in which two or more individuals interact with each other. Each person must decide between a behavioral option that results in a good outcome for themselves versus one that results in a good collective outcome (Dawes, 1980; Kollock, 1998; Komorita & Parks, 1994). If each individual chooses selfishly, then everyone in the group ends up with a worse outcome than if each individual acts in the interest of the group. The most commonly studied social dilemma is the prisoner's dilemma. In its most simplified version, this dilemma involves two individuals and presents each person with two options (cooperate or defect). If both individuals cooperate (the C-choice), each person receives a modest monetary reward (say \$10). However, if only one person cooperates, then the defecting partner (the D-choice) receives a large payoff (say \$40), and the cooperator receives the lowest payoff (\$0)—the so-called “sucker” payoff. If both individuals pursue their dominant strategy (to defect), then each receives a lower payoff (say \$2) than if both cooperated (\$10). It is a social dilemma because each individual gains more by defecting regardless of what the other person does, but they will both be better off if they both cooperate rather than defect.

Social dilemmas can involve two persons or more. Extensions of the prisoner's dilemma to larger groups include N-person prisoners dilemmas, public goods dilemmas (give-some games), and resource dilemmas (take-some games). In public goods dilemmas, the players can decide to cooperate with each other to provide the public good (e.g., public radio), but there is a temptation for each to not contribute. In resource dilemmas, the players can cooperate with each other to maintain a common resource (e.g., common fisheries), but there is a selfish temptation for each individual to consume as much as possible. There is much research both on public goods (Ledyard, 1995) and resource dilemmas (Kopelman, Weber, & Messick, 2002) that has reported the effect of sex on cooperation, which we include in our meta-analysis.

The social dilemma paradigm has both a high internal and external validity, which makes it very suitable for testing potential sex differences that can be generalized across a wide range of

cooperative situations, from helping complete strangers to cooperating in romantic relationships and from dyadic social dilemmas to group dilemmas. Furthermore, the social dilemma paradigm measures actual behavior rather than hypothetical decisions or behavioral intentions. Finally, the social dilemma literature is vast—spanning over 50 years—and one of the most commonly reported variables in research on social dilemmas is the participant's sex, which makes it ideally suited for a thorough meta-analytic review.

### Sex Differences in Cooperation

In one of the earliest research on sex differences in cooperation, Rapoport and Chammah (1965) compared male–male, female–female, and mixed-sex dyads behavior in an iterated (repeated) prisoner's dilemma lasting 300 trials. They found that, on average, the male–male pairings exhibited greater cooperation than the mixed-sex pairings, with the female–female pairings being least cooperative. Although this study failed to provide a convincing explanation for these results, it nevertheless sparked a great deal of interest in sex differences in cooperation in the late 1960s and early 1970s (e.g., Bedell & Sistrunk, 1973; Grant & Sermant, 1969). However, there was not a clear picture emerging from these studies (Maccoby & Jacklin, 1974).

Without a clear theory to work from, social psychologists' interest in sex differences in cooperation waned by the 1990s. Nowadays, it is primarily behavioral economists who study sex differences in social dilemmas (e.g., Brown-Kruse & Hummels, 1993; Cadsby & Maynes, 1998; Mason, Phillips, & Redington, 1991; Ortmann & Tichy, 1999). For instance, Croson and Gneezy (2009) recently provided a narrative review of the economics literature and concluded that the results on sex differences are inconclusive. Without doing a systematic meta-analysis, they observed a greater variation in women's cooperation across studies, suggesting that women are relatively more sensitive to the experimental context. However, they did not specify in which situations women and men respond differentially to social dilemmas. Thus, there is still no comprehensive picture of when sex differences in cooperation are likely to emerge in social dilemmas and, if so, why they are there.

A notable exception is Simpson and Van Vugt's (2009) recent theory arguing that men and women respond to different aspects of

<sup>1</sup> More specifically, social dilemmas involve a conflict between altruistic and cooperative (maximizing joint gain or equality) motives against individualistic, competitive, and aggressive motives (Van Lange, 1999). One prior meta-analysis examined sex differences in competition using social dilemmas (Walters et al., 1998). However, we believe that social dilemmas do not provide a strong test of sex differences in competitive motives because of at least two reasons. First, most individuals are driven by either cooperative or selfish motives during social dilemmas, with very few individuals adopting a competitive motivational orientation (Au & Kwong, 2004). Second, even when people are placed in matrix games that isolate competitive motives from self-interest, most everyone chooses to cooperate, presumably because cooperation is now aligned with self-interest (McClintock & McNeel, 1966). In fact, for the reasons outlined above, researchers label behavior either cooperative or non-cooperative in social dilemmas to avoid implying that non-cooperation was the result of being competitive (De Dreu, 2010; Pruitt & Kimmel, 1977). Therefore, in keeping with the literature on social dilemmas, we focus on sex differences in cooperation and not competition.

the social dilemma. Using an evolutionary approach, they argued that men defect primarily because they are motivated by personal greed, whereas women defect primarily because they are motivated by the fear of other's defection. Because prisoner's dilemmas, public goods dilemmas, and resource dilemmas involve both fear and greed components, there are no overall sex differences in cooperation showing up, but by manipulating fear and greed separately one can expect to find them (e.g., Simpson, 2003). Our research builds upon this idea by focusing on whether women and men respond differently to the social features of the social dilemma.

### Theoretical Perspectives on Sex Differences in Cooperation

There have been various theoretical advances in social psychology in recent decades contributing to the scientific understanding of sex differences in social behavior (Deaux & LaFrance, 1998; Eckes & Trautner, 2000). Recent theoretical progress on understanding sex differences has been made primarily through both sociocultural and evolutionary psychology theories. Each of these major perspectives has guided research on sex differences in many areas, including helping behavior (Eagly, 2009; Eagly & Crowley, 1986), aggression (Archer, 2004, 2009; Eagly & Steffen, 1986), leadership styles (Eagly & Johnson, 1990), mate preferences (Kenrick & Keefe, 1992), and sexual strategies (Buss & Schmidt, 1993). Yet, surprisingly little research on sex differences in cooperation has been guided by either of these theoretical perspectives (for exceptions, see Geary, Byrd-Craven, Haord, Vigil, & Numtee, 2003; Sell & Kuipers, 2009; Simpson & Van Vugt, 2009), and, to our knowledge, no research has systematically compared these perspectives. As we describe below, each perspective provides unique insights into the origins and manifestation of sex differences in social dilemmas.

#### The Sociocultural Perspective

The sociocultural theory of sex differences considers different social experiences between men and women as the origin of sex differences in social behavior (Cross & Madson, 1997; Eagly & Wood, 1999; Wood & Eagly, 2010). According to this perspective, social structural aspects of society—a different distribution of men and women in specific social roles and a gender hierarchy—are the main contributors to sex typical social behaviors (Eagly & Wood, 1999). For instance, because men are, on average, physically stronger and faster and because women bear the costs of pregnancy and childcare, men and women have historically taken on different social roles. Because of these biological differences, men and women acquire culturally different sets of skills to fulfill the duties of their social roles, and this affects the expectations associated with their gender. Women are expected to assume a domestic role (or occupational role) that involves a great deal of interpersonal relationship skills. Accordingly, women are—or at least are perceived as—more communal in orientation, less selfish, more caring, friendly, and emotionally expressive (Eagly, 2009). On the other hand, men assume social roles of high status and power and so they are—or are perceived as—more independent, assertive, ambitious, and dominant. As a result of different socialization experiences, women thus develop more interpersonal skills, and men develop more agentic skills. Moreover, women and men may

include their gender stereotype into their self-concept and self-regulate their behavior according to these standards (Witt & Wood, 2010). Indeed, previous research has found that stereotypes of men and women as agentic and communal, respectively, underlie many sex differences in social behavior, especially in contexts when these stereotypes are salient (Eagly & Wood, 2011).

What are the implications of sociocultural theory for understanding gender differences in social dilemmas? Cooperation in a social dilemma, by definition, conveys a concern for the welfare of others, which is what a communal orientation is all about (e.g., Conway et al., 1996; Deaux & Lewis, 1984; Eagly & Steffen, 1984). In contrast, an agentic orientation involves a concern for own outcomes over others outcomes (A. Campbell, Muncer, & Gorman, 1993; Pruitt, 1983), which should lead to greater defection in social dilemmas. Indeed, there is evidence that people with a communal orientation (Balliet, Parks, & Joireman, 2009; Probst, Carnevale, & Triandis, 1999) or who display communally oriented behaviors cooperate more in social dilemmas (Karremans & Van Lange, 2004; Rusbult, Verette, Whitney, Slovic, & Lipkus, 1991; Van Lange et al., 1997; Van Vugt & De Cremer, 1999). Women are expected to be more cooperative than men in social dilemmas (e.g., Orbell, Dawes, & Schwartz-Shea, 1994), which is consistent with gender stereotypes (e.g., Deaux & Lewis, 1984). Moreover, women are aware of these expectations in social dilemmas (e.g., Greig & Bohnet, 2009), so this may be considered a context when men and women may self-regulate their behavior according to these expectations.

Although Wood and Eagly (2010) have suggested that women should primarily display communal oriented behaviors toward close others, there is reason to believe that the communal orientation of women extends to strangers. Prior research on gender stereotypes suggests that women are more able to devote themselves to others more generally (e.g., Conway et al., 1996; Deaux & Lewis, 1984; Eagly & Steffen, 1984). Women also self-report greater importance of universalism values than men, which suggests they extend concern to others beyond close relationships (Schwartz & Rubel, 2005). Although the sociocultural view suggests a main effect of sex on cooperation, gender role stereotypes may be more or less activated in specific social contexts, and so sex differences may only appear within these contexts (Deaux & Major, 1987). Thus, we can examine the implications of this perspective for context-dependent sex differences in cooperation.

#### The Evolutionary Perspective

Evolutionary psychology assumes that some sex differences in social behavior result from unique—but flexible—evolved male and female psychologies. The argument is that men and women faced many similar adaptive problems in their ancestral environments—such as selecting food and finding a safe shelter—but they also faced some unique adaptive problems that gave rise to sex-differentiated physical and psychological adaptations (Buss, 1995).<sup>2</sup> These sex-differentiated adaptations have been shaped both by the processes of natural and sexual selection.

<sup>2</sup> Although some researchers characterize evolved predispositions as rigid and inflexible, they are not. Social and ecological conditions are known to dampen or amplify the extent to which these evolved predispositions affect decision making (Flinn & Low, 1986; Geary, 2010).

Naturally selected traits or adaptations reflect strategies to increase one's survival by dealing with challenges of the natural environment, such as finding food and avoiding predators. Sexually selected traits or adaptations may not directly confer survival benefits but instead help individuals to attract sexual mates (Darwin, 1871). Sexual selection comes about through two separate processes. Whereas *intrasexual* selection involves members of the same sex competing among one another to gain access to members of the opposite sex, *intersexual* selection refers to external events or psychological processes that cause members of one sex to preferentially select characteristics in the opposite sex (Andersson, 1994). Both natural and sexual selection mechanisms have affected the psychologies of men and women, sometimes resulting in sex-typical adaptations (Geary, 2010; Geary et al., 2003).

For instance, the majority of modern day and ethnographically recent foragers maintain a sexual division of labor where men forage for large packaged resources through hunting, and women target low-variance resources through gathering (Wood & Eagly, 2002). It is hypothesized that our ancestors did the same, and this may have produced evolved sex differences in specific cognitive abilities associated with these roles that are due to natural (Silverman & Eals, 1992) or sexual selection (Hawkes & Bliege Bird, 2002). Hunting requires skills related to tracking and killing animals, whereas gathering requires skills related to locating and recalling food sources among an array of vegetation. Ancestral men and women who were successful in these domains provided more resources to themselves and their offspring and thus gained a reproductive advantage. Thus, an evolutionary perspective predicts that men and women possess different psychological adaptations to successfully accomplish these sex-differentiated tasks. Supporting this evolutionary hypothesis, across cultures women outperform men in the spatial recall of objects—an ability useful for foraging (Eals & Silverman, 1994; Silverman & Eals, 1992; Voyer, Postma, Brake, & Imperato-McGinley, 2007), whereas men outperform women on mental rotation tasks (Voyer, Voyer, & Bryden, 1995)—an ability relatively more useful for hunting.

When accounting for sex differences in cooperation, the evolutionary perspective assumes that women and men have evolved different context-specific decision rules that enable each sex to reap the benefits from interactions with other people in different environments. That is to say, the evolutionary perspective (like the sociocultural perspective) suggests that sex differences emerge in response to specific environmental inputs.

### Sex Differences in Cooperation: A Matter of Context?

Research on sex differences in social behavior, guided by each of these perspectives, supports the general proposition that men and women may respond differently in social interactions depending on specific contextual factors (Hyde, 2005). Our research fits in with these more sophisticated models of sex differences in social behavior by arguing that men and women show different cooperation levels in different social decision-making environments. Although social dilemma studies are conceptually similar in that they are all concerned with situations involving a conflict between self-interest and the collective interest, there are several contextual features that vary systematically between these studies that may be correlated with sex differences. We identify several of these in our meta-analytic review of the social dilemma literature

(e.g., sex of the interaction partner, one-shot vs. iterated dilemmas, group size, and year of publication) and apply both theories to advance predictions about how these moderators will impact sex differences in cooperation.

### Same-Sex Versus Mixed-Sex Interactions

Do sex differences in cooperation depend on whether interactions occur among same- versus opposite-sex partner(s)? The two perspectives make different predictions.

According to a sociocultural perspective, boys and girls spend a significantly greater amount of time interacting with same-sex others during childhood (Maccoby & Jacklin, 1987), and this has resulted in distinct sex-typical modes of interactions between boys and girls that may affect sex differences in social behavior even during adolescence and adulthood (Maccoby, 1990). As Maccoby (1990) has suggested, girls' same-sex interactions tend to be more cooperative and prosocial, whereas boys' same-sex interactions tend to place greater emphasis on social dominance. Thus, gender differences in communal and agentic orientations may be partly socialized in this context of same-sex peer relationships during childhood (Maccoby, 1990). If so, we might expect women to develop a particular style of interacting with other women that makes their same-sex interactions more cooperative than among men.

Alternatively, an evolutionarily informed hypothesis predicts that, compared to women, men are more cooperative during same-sex interactions. Specifically, men may have evolved a disposition toward male-to-male cooperation and bonding because cooperation with other men has had important consequences for their survival and reproductive success (at least in ancestral times). Specifically, two selective pressures in our ancestral environment may have selected for male cooperation to overcome social dilemmas: hunting and warfare/inter-group conflict (Bowles, 2006, 2009; Foley & Lee, 1989; Geary et al., 2003; Manson & Wrangham, 1991; Wrangham, 1999). The argument is that throughout human evolutionary history, male coalitions have been an effective strategy for men to acquire reproductively relevant resources such as food, territory, and access to mates (Alexander, 1987; Gat, 2006; Guilaine & Zammit, 2004; Keeley, 1996; LeBlanc & Register, 2003; Thayer, 2004; Tooby & Cosmides, 1988; Wrangham & Peterson, 1996). Because evolutionary theorizing suggests that men have evolved a male coalitional psychology that facilitates male cooperation, an evolutionary hypothesis predicts that male same-sex interactions are more cooperative than female same-sex interactions.

What do these theories suggest about cooperation in mixed-sex interactions? A sociocultural perspective suggests sex differences may be more pronounced in contexts when gender stereotypes are activated (Deaux & Major, 1987). Prior research has found that gender stereotypes are more activated while interacting with an opposite-sex partner (Hogg & Turner, 1987; Skrypnik & Snyder, 1982). Men and women may conform to these gender stereotypes to avoid being negatively evaluated by others (Costrich, Feinstein, Kidder, Marecek, & Pascale, 1975). Because women are perceived to be more cooperative than men (e.g., Eagly & Steffen, 1984), this stereotype may especially influence women to be more cooperative than men while interacting with an opposite-sex partner, compared to a same-sex partner (Deaux & Major, 1987). Thus,

women are expected to be even more cooperative than men in mixed-sex (vs. same-sex) groups.

From an evolutionary perspective, the prediction about mixed-sex interactions is not so clear. Sexual selection theory (Buss & Schmitt, 1993) hypothesizes that both sexes have evolved strategies to signal desirable traits to potential opposite sex partners. As in most mammalian species, women invest more resources in producing and caring for offspring and so they might signal to potential mates that they are kind and committed. Being the less investing sex, men compete more heavily with each other for mates, and they should therefore be more competitive in the presence of women. This leads to the prediction that when interacting with women, men may be motivated to signal their social dominance and therefore should cooperate less in mixed sex groups.

Yet, sexual selection theory also provides an argument for why men may be especially cooperative during mixed-sex interactions. In choosing a sexual partner, women selectively prefer men who possess resources yet are also committed to sharing these resources (Phillips, Barnard, Ferguson, & Reader, 2008). Thus, women also look for cues in men that they are generous and kind, and men might signal these prosocial qualities by making a cooperative choice in mixed-sex interactions (Barclay, 2010; Iredale, Van Vugt, & Dunbar, 2008). We test these different predictions by considering whether sex differences in cooperation are moderated by the partner's sex.

### One-Shot Versus Iterated Dilemmas

Do men and women behave differently in response to their partner's cooperation or defection? Studies of social dilemmas allow participants to interact either once with each other (i.e., one-shot games) or repeatedly for several trials (i.e., iterated games). If there is a difference between men's and women's tendencies in the way they respond to their partner's decisions, then sex differences should be more pronounced across several trials of the dilemma. We can examine this in the meta-analysis by comparing one-shot social dilemmas with iterated social dilemmas.

The sociocultural perspective suggests that because women are relatively more communal than men, women would be expected to be more accommodating and forgiving of a partner's defection in a social dilemma. On the other hand, men, as a result of their agentic roles, may possess a proclivity to exploit and dominate and, thus, would be expected to be less forgiving and more inclined to retaliate. This suggests that over the course of an interaction with the same partners, women will become more cooperative, whereas men will become less cooperative (sometimes ending up in a cycle of mutual defection).

Alternatively, according to an evolutionary perspective, men's survival and reproductive success were affected by their ability to form stable cohesive groups, and this may have implications for sex differences in response to other people's behavior. Male groups are maintained through dominance hierarchies (Geary, 2010). Although men may compete to acquire status within group hierarchies, such hierarchies evolved to facilitate social cohesion (Buss, 2005; de Waal, 2000; Hemelrijk & Gygas, 2004). Thus, although men can fight with each other, they may be more tolerant of defections because of the benefits of prolonged male coopera-

tion (Benenson, 2009; Geary et al., 2003). In fact, there is some evidence that boys (and men), compared to girls (and women), have greater tolerance for within-group interpersonal conflict (Benenson & Christakos, 2003; Benenson et al., 2009; Fehr, Bernhard, & Rockenbach, 2008; Whitesell & Harter, 1996). If men are less likely to respond to defection with subsequent defection, the level of cooperation over time among men should be higher than among women.

### Group Size

Do men or women differ in cooperation as a function of group size? The sociocultural perspective suggests that women find close interpersonal relationships more important for defining their self concept compared to men (Cross & Madson, 1997), whereas men tend to value groups in defining their self concept (Baumeister & Sommer, 1997)—and this perspective predicts relatively greater male cooperation in larger groups (Gabriel & Gardner, 1999). An evolutionary perspective suggests that men should be more cooperative than women in larger groups, because men have more to gain (and less to lose) from interacting with many other individuals for the purpose of trading and warfare (Van Vugt, 2009). Thus, both perspectives predict that men will cooperate more than women in larger groups (e.g., N-person games). Indeed, relative to women, men describe themselves more in terms of their group memberships (McGuire & McGuire, 1982), have larger social networks (Belle, 1989), and are more inclined to help a group than a friend (Gabriel & Gardner, 1999). Our meta-analytic review is the first to examine the possibility that sex differences in cooperation are moderated by group size.

### Year of Publication

Have sex differences in cooperation changed over time? Sociocultural theory suggests that sex differences in social behavior change over time as gender roles change culturally (Diekmann & Eagly, 2008; Eagly & Wood, 2011; Wood & Eagly, 2010). Eagly and Wood (2011) have argued that relatively recent societal changes in Western culture—such as an increase in women's education, a declining birth rate, and less physical work—remove obstacles for women to occupy high-status positions in society. Such societal changes could have influenced different cooperation rates of men and women over time. For example, there is evidence to suggest that women have become more similar to men in terms of their agentic (but not communal) orientation over the last 50 years (Twenge, 1997, 2001). This may reduce potential sex differences in cooperation over time. Therefore, we examined whether sex differences in cooperation have changed over the course of 50 years of research on social dilemmas.

### Overview of the Meta-Analysis

We conducted a meta-analytic review of sex differences in cooperation with 272 studies on social dilemmas, covering 50 years of research with over 30,000 participants. We first examine whether there is any overall sex difference in cooperation and then test for possible moderators. We examine the moderators identified above (e.g., sex of partner, iterations, group size, and year of publication), including a few additional moderators (e.g., type of

social dilemma and country of participants). Lastly, we consider the possibility that sex of partner influences cooperation, that is, we test whether people are generally more cooperative with a male or female partner.

## Method

### Selection of Studies

We searched the PsycINFO database for English written articles that contained either of the following social dilemma-related terms: *social dilemmas*, *prisoner's dilemmas*, *public goods*, or *resource dilemmas*. Next, we examined abstracts to identify relevant articles. We subsequently searched directly within the text of relevant articles for *gender* or *sex*. We also searched more generally for studies using several databases in the social sciences (e.g., ABI/INFORM, Business Source Elite, PsycARTICLES, Social Sciences Citation Index, Google Scholar, Sociological Abstracts, Web of Science, Worldwide Political Science Abstracts, Dissertations Online, and Econlit). We searched the entire text of English written articles by using the terms: *gender*, *sex*, *sex differences*, *with cooperation*, *social dilemmas*, *prisoner's dilemmas*, *public goods*, or *resource dilemmas*. We also searched the references of all review articles (e.g., Croson & Gneezy, 2009; Komorita & Parks, 1994; Ledyard, 1995; Maccoby & Jacklin, 1974; Simpson & Van Vugt, 2009; Walters, Stuhlmacher, & Meyer, 1998; Weber et al., 2004). Additionally, we searched the text of all articles reported in prior meta-analyses on behavior in social dilemmas (Balliet, 2010; Balliet, Mulder, & Van Lange, 2011; Balliet et al., 2009; Balliet & Van Lange, 2011; Sally, 1995). Also, we contacted several authors who published articles on social dilemmas over the past 5 years. Lastly, we contacted over 150 experts on social dilemmas for unpublished data.

There were several criteria for selection. First, all studies had to have either adolescent or adult participants. Second, all studies had to report the biological sex of the participants. Third, only studies using pure social dilemma paradigms were included (i.e., prisoner's dilemma, public good, and resource dilemma). Studies on related economic games—such as ultimatum, dictator, negotiation, or trust—were excluded. We coded effect sizes for studies that either involved participants interacting with a confederate, a pre-programmed strategy, or another participant. Importantly, in all studies, participants believed they were interacting with other participants. For articles with multiple studies, we coded an effect size for each study in the article. This resulted in a total of 203 articles that contained 257 published and 15 unpublished effect sizes ( $n = 31,462$ ).

### Coding of Studies

We had two researchers code each article for several study characteristics, including partner-sex, number of iterations, group size, year of publication, type of dilemma, and country of participants. Each variable was reliably coded (Cohen's  $k$ appas between .80 [number of iterations] and 1.00 [year of publication]). When discrepancies within codings did exist, the researchers read over each article together and were able to later agree on the coding. This resulted in 100% agreement for each coded variable.

**Same-sex or mixed-sex interactions.** Social dilemmas research examines behavior either in same-sex or mixed-sex dyads or groups. Therefore, we coded whether the study examined cooperation in same-sex interactions ( $k = 95$ ) or mixed-sex interactions ( $k = 145$ ). In same-sex studies, participants were always led to believe they were interacting with same-sex partners. However, in mixed-sex studies, researchers did not control the sex composition of dyads or groups. These studies involve a mixture of both same-sex and other-sex interactions. Importantly, in the mixed-sex studies, participants would come to the laboratory in groups composed of both men and women, and participants did not know who was assigned to their dyad or group. Studies that involved hypothetical scenarios (e.g., Gabriel & Gardner, 1999), observed donations to a charity (e.g., Iredale et al., 2008), or reported extensive procedures to keep participants unaware of their partners identity (e.g., Hartman, 1974) were coded as "other" ( $k = 32$ ).

**One-shot or iterated dilemma.** We coded whether participants either interacted in a one-shot dilemma ( $n = 93$ ) or an iterated-trial dilemma ( $k = 171$ ). In a few studies, the results comparing men and women were only reported for the first few trials ( $k = 4$ ) or the later trials ( $k = 1$ ) of an iterated interaction. We also coded the number of iterations as a continuous variable ranging from 2 to 400 ( $Mode = 18$ ,  $Mdn = 24$ ;  $M = 47$ ).

**Group size.** We coded whether participants were either in a dyadic social dilemma ( $k = 144$ ) or a dilemma involving three or more persons ( $k = 118$ ). There were a few studies that asked participants to donate to a charity or to contribute to a public good when the number of participants in the dilemma was unknown to the participant ( $k = 24$ ). These studies were excluded from the analysis of the effect of group size on the sex-cooperation relationship. Group size was also coded as a continuous variable. Groups ranged from two-person interactions to a 175-person group.

**Year of publication.** We coded year of publication. For unpublished data, we recorded either the date on the manuscript or the date when the data were collected (if reported). The range of the year of publication was 1961–2010, with the median date being 1993.

**Type of dilemma.** There are many types of social dilemmas, but the most common dilemmas in the current analysis include the prisoner's dilemma ( $k = 122$ ), public goods or give-some dilemma ( $k = 82$ ), and the resource or take-some dilemma ( $k = 21$ ). Other dilemmas were mostly matrix games (e.g., chicken) and were coded as a separate "other" category ( $k = 48$ ).

**Country of participants.** A total of 18 countries are represented in the sample. Most studies were conducted in the United States ( $k = 177$ ), followed by the Netherlands ( $k = 25$ ), Canada ( $k = 12$ ), England ( $k = 11$ ), and Japan ( $k = 10$ ). Other countries represented in the sample include Belgium, Germany, India, Israel, Kenya, Russia, Singapore, Sweden, Switzerland, and Taiwan.

**Age, anonymity, and communication.** In the current analysis, most studies were conducted on students ( $k = 247$ ), and of the studies that reported the average age of participants ( $k = 31$ ), the average age was 24 years. Also, the majority of studies were conducted with strangers in the laboratory ( $k = 256$ ), and only a few studies were done with friends, partners, or with a protocol that allowed individuals to choose their partner. Lastly, although most studies in the present sample did not allow any communication between participants ( $k = 231$ ), there were a few studies that

either allowed communication or manipulated communication in the experiment ( $k = 34$ ).<sup>3</sup>

### Overview of Analysis

We used the  $d$  value as the measure of effect size. The  $d$  value is the difference between two means divided by the pooled standard deviation and is corrected for sample size bias (Hedges & Olkin, 1985). The  $d$  value for each study was calculated by using the mean difference and standard deviations for men versus women, but when these descriptive statistics were unavailable we calculated  $d$  by using a  $t$  score,  $F$  score,  $\chi^2$  value, or rates of cooperation. When a study included a manipulated variable, we coded the overall main effect of gender across experimental conditions. Women were coded as 1, and men were coded as 2 so that a positive  $d$  value indicates greater cooperation by men, relative to women, whereas a negative  $d$  value is telling of greater cooperation by women compared to men. All results of resource or take-some dilemmas are reverse coded to indicate that less taking equals greater cooperation.

Several articles reported a null relationship between sex and cooperation, but failed to provide the statistics necessary to calculate the effect size. We estimated that these studies had an effect size of zero. This is a very conservative estimate, as several of these articles observed a mean difference between men and women, but lacked the statistical power to detect a small effect size (e.g., Gallo & Sheposh, 1971; Kershenbaum & Komorita, 1970; Mack, Auburn, & Knight, 1971; R. R. Miller, 1967; Voissem & Sistrunk, 1971). Therefore, for all analyses, we first report the results excluding the null findings coded as zero effect size, followed by an additional analysis including these estimated null findings. We report any discrepancies between the actual coded effect sizes and those analyses including the null estimated effect sizes.

Some studies allowed us to code several effect sizes. However, the effect sizes may be non-independent because they share several methodological features. Therefore, we applied Cooper's (1998) shifting-units-of-analysis approach to handling non-independent effect sizes when conducting moderator analyses. Using this approach, we averaged over all the effects abstracted from a single study that shared the same study characteristics. More specifically, this method creates a single effect size for a study with multiple effect sizes that share the same coding on a specific moderator. For example, Sell, Griffith, and Wilson (1993), in a single study, report two effects sizes based on mixed-sex interactions and one effect size based on same-sex interactions. When conducting the moderator analysis for same-sex versus mixed-sex interactions, we averaged the two mixed-sex effect sizes to create a single mixed-sex effect size for this study. We repeat this procedure for the other moderator analyses.

In our analysis, we first estimate the overall effect size using a random effects model, along with both the 95% confidence interval and the 90% prediction interval. We then consider the variation in the effect size distribution by using several indicators of heterogeneity of variance ( $T$ ,  $T^2$ ,  $I^2$ , and  $Q$ ). Next, we examine the possibility that the effect size distribution contains a publication bias. In so doing, we formally examine the distribution of studies in a funnel plot (plotted according to their effect size and standard error) using Egger's regression intercept and Duval and Tweedie's

(2000) Trim and Fill approach. Following these analyses, we then use a mixed-effects model to conduct several univariate moderator analyses of the effect size. We did not apply a fixed or random effects model to these analyses because (a) we did not assume that we had gathered all studies from the population of studies, and (b) we did assume that there would be both systematic and random variation in the effect size distribution. However, one limitation of random and mixed-effects models is that they increase the chance of Type II errors, relative to a fixed-effects model (Lipsey & Wilson, 2001). Thus, we reported any discrepancies between random or mixed-effects analyses and a fixed-effects analysis. Analyses were conducted using Hedges and Olkin's (1985) approach with the Comprehensive Meta-Analysis Software.

## Results

### Overall Analysis

Table 1 displays the distribution of effect sizes for sex differences in cooperation in a stem-and-leaf plot, whereas Table 2 presents the coding and effect size for each study included in the meta-analysis. As shown in the stem-and-leaf plot, there is a normal distribution of effect sizes. We found that the relationship between sex and cooperation in social dilemmas is not statistically different from zero ( $d = -0.05$ , 95% CI [-0.11, 0.001], 90% prediction interval [-0.52, 0.42]). There is also variation in the true effect size distribution ( $T = .29$ ,  $T^2 = .08$ ), and a substantial portion of this variation may be explained by between study differences ( $I^2 = 72.54$ ). Moreover, the effect size distribution contains greater variation than would be expected by chance alone,  $Q(175) = 637.21$ ,  $p < .001$ . Including the estimated null findings slightly reduced the estimated overall effect size ( $d = -0.04$ , 95% CI [-0.07, 0.000]).

It may be that the sample of studies contains a publication bias. To examine the possibility of a publication bias, we formally examined the funnel plot, where all studies were plotted according to their sample size and standard error, using Duval and Tweedie's (2000) Trim and Fill approach. This method examines the symmetry of the effect size in the funnel plot and removes the most extreme small studies from either side of the plot while recalculating the effect size at each iteration until symmetry is achieved. In taking this approach, there were no studies filled above the estimated effect size. However, two studies were filled below the estimated effect size. This resulted in an estimate of a small significant negative effect size ( $d = -0.06$ , 95% CI [-0.12, -0.001]). Moreover, Egger's regression analysis resulted in a non-significant intercept:  $Intercept = .09$ ,  $t(174) = 0.29$ ,  $p = .77$ ,

<sup>3</sup> Although we include these codings primarily to describe our data set, we did analyze these variables as potential moderators of the effects size. We did not find age, stranger, or communication to significantly moderate the sex-cooperation relationship. However, there is restriction in range of the age variable. Additionally, for the studies that were coded as using communication, the effect sizes were coded by averaging over both non-communication and communication conditions, and therefore this may have diluted any possible sex differences. Therefore, these analyses are limited, and future research is still encouraged to examine how age, communication, and the type of relationship may moderate sex differences in cooperation.

Table 1  
Stem-and-Leaf Diagram of the Overall Distribution of Effect Sizes for Sex Differences in Cooperation

<i>d</i> value	0.1 units of the <i>d</i> value
1.5	3
1.4	
1.3	0
1.2	
1.1	4 8
1.0	
0.9	8
0.8	0 6
0.7	0 0 0 3 5 5 7 8
0.6	0 5 7 9
0.5	0 2 3 3 4 5 7 7
0.4	0 0 7 7 7 9 9
0.3	0 1 3 5 5 6 6 8
0.2	0 0 0 2 3 5 5 6 6 6 6 7 8 9
0.1	0 0 1 1 2 3 4 5 6 6
0.0	0 0 0 0 2 2 3 3 4 5 5 5 6 6 7 7 7 7 8 8 8 8 8 9 9
-0.1	0 0 0 0 1 1 2 2 3 4 4 4 5 5 6 6 6 6 7 9 9
-0.2	0 0 0 1 1 1 1 1 3 3 3 4 6 7 8 8
-0.3	0 0 1 1 2 4 5 6 6 6 7 7
-0.4	0 3 3 3 5 6 6 6 7 7
-0.5	0 0 1 2 3 5 6 6 7 7
-0.6	0 0 1 2 3 5 8
-0.7	2 5 6 6
-0.8	5 7
-0.9	2 4 4 8
-1.0	4
-1.1	7
-1.2	
-1.3	
-1.4	
-1.5	3

Note. This plot omits three outliers: 1.65, -1.76, and -1.90. This plot only includes the 176 effect sizes that were coded and does not include the null effect studies that were estimated to have zero effect size.

which indicates an absence of bias in the data. Taken together, these analyses suggest that a publication bias is absent in our data.

We note, however, that the conclusions derived from the above random-effects estimate differ from the result of the fixed-effects analysis. Using a fixed-effects analysis, we found that women were significantly more cooperative than men ( $d = -0.04$ , 95% CI [-0.06, -0.02]). However, this is an exceptionally small effect size, and the analysis may have resulted in a Type I error. Additionally, we do not have all the studies in the population of studies, which violates an assumption of a fixed-effects analysis. Thus, we conclude that there is no meaningful overall sex difference in cooperation.

## Moderators

In the following section, we first conduct a series of univariate moderator analyses. For each moderator, we first examine the effect with only the coded effect sizes and then an additional analysis including the null findings that were estimated to be zero. After reporting the univariate tests, we report the correlations among some of the moderating variables and conduct a multiple regression model predicting the effect size.

**Same-sex versus mixed-sex interactions.** The results of the categorical moderator analyses are presented in Table 3. There is a statistically significant difference between the effect size estimates in the mixed-sex studies compared to the same-sex studies,  $Q(1) = 41.16$ ,  $p < .001$ . During mixed-sex interactions, women were more cooperative than men ( $d = -0.22$ , 95% CI [-0.29, -0.15]). However, during same-sex interactions, men were more cooperative than women ( $d = 0.16$ , 95% CI [0.06, 0.25]). For many of the studies coded as mixed-sex dilemmas, researchers did not control for the sex of participants. In these studies, several individuals (strangers) came to the laboratory to participate in a social dilemma. As such, it is likely that some of these data contain interactions that are based on same-sex groups. Based on this concern, we conducted a separate analysis only on dyadic interactions, where we can be more certain that studies labeled as mixed-sex are indeed heterogeneous on sex. For dyadic, mixed-sex interactions, women were more cooperative than men ( $d = -0.30$ , 95% CI [-0.39, -0.21]), whereas for dyadic same-sex interactions, men were more cooperative than women ( $d = 0.22$ , 95% CI [0.12, 0.33]),  $Q(1) = 53.83$ ,  $p < .001$ . As displayed in Table 3, these conclusions do not change after introducing the null findings into the analysis.<sup>4</sup>

**Single versus repeated interactions.** We used the number of iterations as a continuous variable predicting the effect size in a meta-regression. In the overall sample, we found a statistically significant positive slope,  $b = .003$ ,  $Q(1) = 21.10$ ,  $p < .001$ , indicating that men, compared to women, tended to become more cooperative as iterations continued. To rule out the possibility that this was due to greater cooperation by women than men in one-shot interactions, we also examined this relationship excluding one-shot interactions. When we considered just the iterated interactions, there was still a significant positive effect of the number of iterations,  $b = .002$ ,  $Q(1) = 12.05$ ,  $p < .001$ . According to the overall analysis, the estimated effect size of the sex-cooperation relationship at 100, 200, and 300 iterations is  $d = 0.13$ , 0.38, and 0.63, respectively. Including the null findings in this analysis does not eliminate the effect of iterations on the sex-cooperation relationship. Therefore, these results suggest that as people interact during repeated social dilemmas, over time men become increasingly more cooperative than women.

**Group size.** We coded group size as a continuous variable and used meta-regression with group size predicting the effect size distribution. Group size had a negative relationship with the sex-cooperation effect size,  $b = -.02$ ,  $Q(1) = 4.00$ ,  $p = .045$ . This conclusion remains the same when including the null effect studies in the analysis.

**Year of publication.** We coded year of publication as a continuous variable and used meta-regression to examine its effect on the sex-cooperation relationship. The analysis indicated a

<sup>4</sup> We also examined whether partner gender moderated the sex-cooperation effect size in each of the separate social dilemma categories. We found a similar pattern across both the prisoner's dilemma and the "other" category: Men were more cooperative in same-sex interactions, but women were more cooperative in mixed-sex interactions. However, for public goods dilemmas, the nine same-sex studies ( $d = -0.07$ ) did not differ from the 33 mixed-sex studies ( $d = -0.06$ ). Unfortunately, the resource dilemmas only included mixed-sex studies.



Table 2  
*Studies Included in the Meta-Analysis*

Study	N	CO	DV	SAME/MIXED	GS	OS/IT	<i>d</i>	<i>LL, UL</i>
Ahmed (2008)	180	SE	PD	MIXED	2	OS	-0.21	-0.50, 0.09
Alcock & Mansell (1977)	60	CA	PD	MIXED	10	IT(30)	-0.11	-0.70, 0.46
Andersen et al. (2008)	80	IN	PGD	MIXED	N/A	OS	-0.20	-0.64, 0.24
Study 2	51	IN	PGD	MIXED	N/A	OS	-0.61	-1.68, -0.01
Study 3	61	IN	PGD	MIXED	N/A	OS	-0.21	-0.71, 0.70
Andreoni & Petrie (2008)	80	US	PGD	MIXED	5	IT(40)	0.29	-0.15, 0.73
Ando (1999)*	36	JP	PGD	MIXED	9	IT(3)	0.00*	-0.68, 0.68
Anthony & Horne (2003)	298	US	O	MIXED	6	N/A	-0.43	-0.66, -0.20
Aranoff & Tedeschi (1968)*	216	US	PD	SAME	2	IT(200)	0.00*	-0.27, 0.27
Baker & Rachlin (2001)*	48	US	PD	N/A	N/A	IT(100)	0.00*	-0.58, 0.58
Study 2	48	US	PD	N/A	N/A	IT(100)	0.00*	-0.58, 0.58
Study 3	48	US	PD	MIXED	2	IT(100)	0.00*	-0.58, 0.58
Balliet (2009)	55	SG	PGD	MIXED	4	OS	-0.09	-0.63, 0.46
Batson et al. (1995)*	120	US	PGD	MIXED	4	IT(2)	0.00*	-0.36, 0.36
Study 2*	45	US	PGD	SAME	4	IT(2)	0.00*	-0.61, 0.61
W. M. Becker & Miles (1978)	297	US	O	MIXED	2	OS	-0.87	-1.12, -0.62
Bedell & Sistrunk (1973)	60	US	PD	SAME	2	IT(100)	0.70	0.18, 1.22
Belianin & Novarese (2005)	24	RU	PGD	MIXED	6	IT(12)	-1.90	-2.87, -0.93
Belot et al. (2006)	138	NL	PD	MIXED	2	OS	-0.43	-0.80, -0.05
Belot et al. (2010)	138	NL	PD	MIXED	2	OS	-0.33	-0.67, -0.001
Bixenstine et al. (1964)	64	US	O	SAME	2	IT(160)	0.28	-0.26, 0.83
Bixenstine & Garebelein (1971)*	100	US	PD	SAME	2	IT(150)	0.00*	-0.40, 0.40
Bixenstine & O'Reilly (1966)	80	US	PD	SAME	2	IT(60)	0.54	0.09, 0.98
Bixenstine et al. (1963)	48	US	PD	SAME	2	IT(30/90)	0.05	-0.52, 0.61
Bixenstine & Wilson (1963)*	80	US	PD	SAME	2	IT(190)	0.00*	-0.45, 0.45
Black & Higbee (1973)*	72	US	O	SAME	2	IT(150)	0.00*	-0.47, 0.47
Bonacich (1972)	120	US	PGD	MIXED	5	IT(5)	-0.30	-0.79, 0.20
Boone et al. (1999)*	40	NL	PD	MIXED	2	IT(5)	0.00*	-0.64, 0.64
Boone et al. (2010)	112	BE	PD	MIXED	2	OS	-0.13	-0.50, 0.23
Brickman et al. (1979)	42	US	PD	SAME	2	IT(18)	-0.08	-0.69, 0.53
Sample b	42	US	PD	SAME	2	IT(18)	0.65	0.03, 1.27
Sample c	42	US	PD	SAME	2	IT(18)	1.53	0.85, 2.22
Sample d	42	US	PD	SAME	2	IT(18)	-0.94	-1.57, -0.30
Sample e	42	US	PD	SAME	2	IT(18)	-1.53	-2.22, -0.84
Sample f	42	US	PD	SAME	2	IT(18)	1.14	0.49, 1.79
A. Brown (2006)	61	US	TS	MIXED	4	OS	-0.20	-0.74, 0.33
A. Brown & Stasser (2004)	41	US	TS	MIXED	4	OS	-0.72	-1.37, -0.07
K. M. Brown & Taylor (2000)	242	US	PGD	N/A	N/A	OS	0.26	0.00, 0.51
Study 2	242	US	PGD	N/A	N/A	OS	0.33	0.07, 0.58
Brown-Kruse & Hummels (1993)	64	US	PGD	SAME	4	IT(6)	.50	0.00, 1.00
Buchan et al. (2009)	1,029	N/A	PGD	MIXED	12	IT	-0.04	-0.16, 0.08
Cadsby et al. (2007)	160	CA/JP	PGD	SAME	10	IT(25)	-0.14	-0.45, 0.17
Cadsby & Maynes (1998)	220	CA	PGD	SAME	10	IT(1/25)	-0.23	-0.49, 0.04
Caldwell (1976)*	130	US	PD	SAME	5	IT(80)	0.00*	-0.35, 0.35
W. K. Campbell et al. (2005)	232	US	TS	MIXED	4	IT(25)	-0.36	-0.63, -0.09
Study 2	166	US	TS	MIXED	4	IT(25)	-0.32	-0.64, -0.001
Carment (1974)	66	CA	O	SAME	2	IT(100)	0.31	-0.24, 0.87
Charness & Rustichini (2010)	160	US	PD	SAME	2	OS	-0.01	-0.26, 0.24
Study 2	74	US	PD	MIXED	2	OS	-0.23	-0.61, 0.12
M. L. Clark (1983)	40	US	PD	MIXED	2	IT(30)	-0.96	-0.29, -2.83
Sample 2	40	US	PD	MIXED	2	IT(30)	0.70	1.33, 2.14
K. Clark & Sefton (2001)*	120	UK	PD	MIXED	2	OS	0.00*	-0.36, 0.36
Cohen et al. (2010)	172	US	PD	SAME	2	OS	-0.02	-0.32, 0.28
Study 2	130	US	PD	SAME	2	OS	0.00	-0.36, 0.36
Conrath (1972)	84	US	O	SAME	4-6	IT(32)	-0.10	-0.19, -0.02
Corfman & Lehmann (1994)	227	US	PD	N/A	2	OS	-0.47	-0.74, -0.20
Crosen et al. (2008)*	150	US	PGD	MIXED	5	IT(25)	0.00*	-0.32, 0.32
Crowne (1966)	34	US	PD	SAME	2	IT(20)	0.80	0.12, 1.50
Dawes et al. (1977)	284	US	O	MIXED	8	OS	-0.17	-0.42, 0.08
Study 2	160	US	O	MIXED	8	OS	-0.30	-0.62, 0.01
Declerck et al. (2010)	131	BE	PD	MIXED	2	OS	-0.10	-0.45, 0.24
Study 2	128	BE	PD	MIXED	2	OS	-0.15	-0.51, 0.19

(table continues)

Table 2 (continued)

Study	N	CO	DV	SAME/MIXED	GS	OS/IT	d	LL, UL
De Cremer & Van Dijk (2009)*	148	NL	PGD	MIXED	4	OS	0.00*	-0.33, 0.33
Study 2*	114	NL	PGD	MIXED	4	OS	0.00*	-0.37, 0.37
Study 3*	110	NL	PGD	MIXED	4	OS	0.00*	-0.38, 0.38
Dolbear et al. (1969)*	46	US	PD	MIXED	2	N/A	0.00*	-0.60, 0.60
Drouvelis et al. (2010)	54	UK	PGD	MIXED	3	OS	-0.55	-0.47, 0.16
Eek & Biel (2003)*	68	SE	PGD	MIXED	4	IT(33)	0.00*	-0.49, 0.49
Enzle et al. (1992)*	134	CA	PD	MIXED	2	IT(40)	0.00*	-0.34, 0.34
Evans & Crumbaugh (1966)	20	US	PD	SAME	2	IT(100)	0.20	-0.81, 1.20
Farrelly et al. (2007)*	231	UK	PD	MIXED	2	OS	0.00*	-0.26, 0.26
Ferguson & Schmitt (1988)	40	US	PD	SAME	2	IT(30)	-0.12	-0.84, 0.60
Ferrin et al. (2008)	68	US	PD	SAME	2	IT(3)	0.10	-0.38, 0.57
Study 2	68	US	PD	SAME	3	IT(3)	0.40	-0.08, 0.88
Fisher & Smith (1969)	120	US	PD	SAME	2	IT(100)	-0.46	-0.98, 0.05
Fleishman (1988)*	170	US	PGD	SAME	5	IT(5)	0.00*	-0.30, 0.30
Fox & Guyer (1978)	80	CA	PD	SAME	4	IT(30)	-0.05	-0.67, 0.57
Frank et al. (1993)	207	US	PD	MIXED	2	OS	-0.52	-0.81, -0.25
Fundenberg et al. (2010)	274	US	PD	MIXED	2	IT(8)	-0.40	-0.64, -0.16
Gabriel & Gardner (1999)	137	US	PGD	N/A	N/A	OS	0.25	-0.08, 0.59
Study 2	137	US	O	N/A	2	OS	-0.35	-0.69, -0.01
Gallo et al. (1969)	20	US	PD	SAME	2	IT(50)	0.15	-0.98, 1.28
Gallo & Sheposh (1971)*	120	US	PD	SAME	2	IT(20)	0.00*	-0.36, 0.36
Garza & Borchert (1990)	84	US	PGD	MIXED	6	IT(20)	-0.46	-0.89, -0.03
Gillis & Woods (1971)	98	CA	PD	N/A	2	IT(20)	-0.46	-0.86, -0.06
Goehring & Kahan (1976)	60	US	PD	SAME	3	IT(150)	0.03	-0.48, 0.53
Granberg & Stevens (1975)	96	US	O	SAME	2	IT(60)	0.30	-0.10, 0.70
Grant & Sermat (1969)	48	CA	O	MIXED	2	IT(60)	0.00	-0.57, 0.57
Greig & Bohnet (2009)	270	KE	PGD	MIXED	4	OS	0.22	-0.08, 0.51
Hamburger et al. (1975)*	160	US	PD	SAME	5	IT(150)	0.00*	-0.31, 0.31
Hardy & van Vugt (2006)	62	UK	PGD	MIXED	3	IT(25)	0.49	-0.02, 0.99
Hartman (1974)	128	US	PD	N/A	2	IT(50/100)	0.09	-0.30, 0.47
Hartman (1980)*	128	US	PD	SAME	2	IT(25)	0.00*	-0.35, 0.35
Hemesath & Pomponio (1998)	30	US	PD	MIXED	2	OS	-0.59	-1.33, 0.13
Holm (2000)	87	SE	O	SAME	2	IT(2)	0.35	-0.15, 0.84
Sample b	58	SE	O	MIXED	2	IT(2)	-0.76	-1.42, -0.10
Study 2	85	SE	O	SAME	2	IT(2)	0.00	-0.47, 0.47
Sample b	86	SE	O	MIXED	2	IT(2)	-0.98	-1.50, -0.46
Study 3	40	US	O	SAME	2	IT(2)	0.07	-0.43, 0.50
Sample b	86	US	O	MIXED	2	IT(2)	-0.76	-1.33, -0.22
Hopthrow et al. (2007)*	158	UK	PD	MIXED	4	IT(4)	0.00*	-0.32, 0.32
Horai & Tedeschi (1969)*	90	US	PD	SAME	2	IT(150)	0.00*	-0.42, 0.42
Horai & Tedeschi (1975)*	60	US	PD	MIXED	2	IT(60)	0.00*	-0.52, 0.52
Hottes & Kahn (1974)	60	US	PD	SAME	2	IT(180)	0.86	0.33, 1.38
Hu & Liu (2003)	255	TW	PD	MIXED	2	OS	-0.47	-0.73, -0.22
Huntoon (2006)	333	US	PGD	MIXED	5	OS	0.02	-0.20, 0.24
Insko et al. (1987)*	260	US	O	MIXED	N/A	IT(10)	0.00*	-0.25, 0.25
Insko et al. (1993)*	77	US	O	SAME	N/A	OS	0.00*	-0.46, 0.46
Insko et al. (2005)*	292	US	O	SAME	N/A	OS	0.00*	-0.23, 0.23
Study 2*	258	US	O	SAME	N/A	OS	0.00*	-0.26, 0.26
Iredale et al. (2008)	30	UK	PGD	N/A	N/A	OS	-0.26	-1.00, 0.49
Jackson (2001)*	200	US	PGD	MIXED	7	OS	0.00*	-0.28, 0.28
Jackson (2008)*	66	US	PGD	MIXED	6	OS	0.00*	-0.49, 0.49
James et al. (2001)	33	CA	PD	MIXED	3	OS	-1.17	-1.95, -0.39
Jaster & Arrow (2010)	324	US	PGD	MIXED	N/A	IT(6)	-0.20	-0.42, 0.03
Kahn et al. (1971)*	40	US	PD	SAME	2	IT(75)	0.00*	-0.64, 0.64
Study 2*	80	US	PD	SAME	2	IT(75)	0.00*	-0.45, 0.45
Kamas et al. (2008)	162	US	PGD	MIXED	N/A	OS	-0.62	-0.94, -0.31
Kanouse & Wiest (1967)	187	US	PD	MIXED	2	OS	-0.13	-0.43, 0.15
Kennelly & Fantino (2007)	238	US	O	N/A	2	IT(20)	0.38	0.05, 0.70
Study 2	156	US	O	N/A	2	IT(20)	0.36	0.04, 0.68
Kershenbaum & Komorita (1970)*	96	US	PD	SAME	2	IT(40)	0.00*	-0.41, 0.41
Kiesler et al. (1996)*	86	US	PD	N/A	2	IT(6)	0.00*	-0.43, 0.43
Knight (1980)*	96	US	PD	MIXED	2	IT(100)	0.00*	-0.41, 0.41
Komorita (1965)	74	US	PD	SAME	2	IT(80)	0.73	-1.10, -0.02
Study 2	54	US	PD	SAME	2	IT(80)	-0.56	-1.10, -0.02
Komorita & Mechling (1967)*	64	US	PD	SAME	2	IT(4/10)	0.00*	-0.50, 0.50
Kortenkamp & Moore (2006)	112	US	TS	MIXED	N/A	OS	-0.65	-1.07, -0.23

Table 2 (continued)

Study	N	CO	DV	SAME/MIXED	GS	OS/IT	d	LL, UL
Kramer & Brewer (1984)*	58	US	TS	MIXED	6	IT(12)	0.00*	-0.53, 0.53
Study 2*	48	US	TS	MIXED	6	IT(24)	0.00*	-0.58, 0.58
Study 3*	66	US	TS	MIXED	6	IT(24)	0.00*	-0.49, 0.49
Kube & Traxler (2009)*	96	DE	PGD	MIXED	4	IT(11)	0.00*	-0.41, 0.41
Kuhlman & Marshello (1975)*	167	US	PD	SAME	2	IT(30)	0.00*	-0.31, 0.31
Kümmerli et al. (2007)	30	CH	PD	MIXED	2	IT(12)	-1.04	-1.84, -0.24
Kurzban (2001)	57	US	PGD	SAME	6	IT(10)	-0.10	-0.33, 0.13
Kurzban & Houser (2001)	72	US	PGD	MIXED	4	IT(15)	0.47	0.96, 1.91
Kuwabara (2005)	122	US	PD	MIXED	2	OS	0.11	-0.29, 0.51
Lacy (1978)	236	US	PD	SAME	2	IT(1/20)	-0.11	-0.42, 0.20
Liebrand (1984)	261	NL	TS	MIXED	7	IT(5)	-0.36	-0.70, -0.01
Study 2	132	NL	TS	MIXED	20	IT(5)	-0.62	-1.03, -.22
Liebrand & Van Run (1985)	270	US/NL	TS	MIXED	6-7	IT(5)	-0.31	-0.55, -0.06
Lindsfold et al. (1986)*	128	US	PD	SAME	2	IT(40)	0.00*	-0.35, 0.35
Study 2*	57	US	PD	SAME	2	IT(40)	0.00*	-0.53, 0.53
Lindsfold et al. (1977)	54	US	PD	SAME	2	IT(50)	-0.31	-0.59, -0.03
Sample b*	135	US	PD	SAME	2	IT(50)	0.00*	-0.34, 0.34
Study 2*	168	US	PD	SAME	2	IT(50)	0.00*	-0.31, 0.31
List (2006)	134	US	PD	MIXED	2	OS	-0.24	-0.53, 0.04
Lutzker (1961)	40	US	O	MIXED	2	IT(30)	0.00	-0.12, 0.13
Mack et al. (1971)	48	US	PD	SAME	2	IT(100)	0.78	0.19, 1.36
Mack et al. (1979)	20	UK	PD	N/A	2	IT(100)	-1.75	-2.79, -0.72
Majolo et al. (2006)*	20	UK	PD	SAME	2	IT(15)	0.00*	-0.95, 0.95
Marwell et al. (1971)	32	US	O	SAME	2	IT(12)	0.75	-0.07, 1.57
Study 2	22	US	O	SAME	2	IT(12)	1.65	0.68, 2.62
Mason et al. (1991)	82	US	O	MIXED	2	IT(25)	-0.23	-0.69, 0.23
McCallum et al. (1985)*	180	US	PD	SAME	2	IT(10)	0.00*	-0.30, 0.30
Study 2*	124	US	O	SAME	4	IT(10)	0.00*	-0.36, 0.36
McClintock et al. (1965)*	36	US	O	SAME	2	IT(30)	0.00*	-0.68, 0.68
McClintock & Liebrand (1988)*	129	US	PD	MIXED	2	IT(30)	0.00*	-0.35, 0.35
McKeown et al. (1967)*	60	US	O	MIXED	2	IT(100)	0.00*	-0.52, 0.52
McNeel et al. (1972)	96	BE	O	SAME	2	IT(100)	-0.21	-0.61, 0.19
Meeker (1984)	18	US	PD	SAME	2	IT(400)	1.30	0.26, 2.34
Meier (2005)	532	CH	PGD	N/A	N/A	OS	0.27	0.10, 0.44
Meux (1973)*	170	US	O	MIXED	12	IT(50)	0.00*	-0.30, 0.30
Miermin (1976)	90	US	O	SAME	3	IT(30)	0.16	0.10, 0.23
R. R. Miller (1967)*	120	US	O	SAME	2	IT(25)	0.00*	-0.36, 0.36
G. H. Miller & Pyke (1973)	82	CA	O	MIXED	2	IT	-0.60	-1.05, -0.16
Millet & Dewitte (2007)*	173	BE	PGD	MIXED	4	IT(3)	0.00*	-0.30, 0.30
Mitani & Flores (2007)	45	JP	PGD	MIXED	5	IT(10)	-0.50	-1.10, 0.09
L. B. Mulder (2008)	114	NL	PGD	N/A	4	OS	0.08	-0.41, 0.88
L. B. Mulder (2010)	50	NL	TS	N/A	4	OS	-0.11	-0.68, 0.46
L. B. Mulder & Nelissen (2010)	133	NL	TS	MIXED	N/A	OS	-0.16	-0.51, 0.18
Study 2	119	NL	TS	MIXED	N/A	OS	-0.28	-0.66, 0.10
L. B. Mulder et al. (2006a)	50	NL	PGD	N/A	4	OS	-0.13	-0.79, 0.51
Study 2	113	NL	PGD	N/A	4	OS	0.53	0.16, 0.91
Study 3	100	NL	PGD	N/A	4	OS	0.16	-0.25, 0.56
L. B. Mulder et al. (2006b)	52	NL	PGD	N/A	4	OS	0.41	-0.14, 0.95
Study 2	78	NL	PGD	N/A	4	OS	0.20	-0.25, 0.64
L. B. Mulder et al. (2009)	36	NL	PGD	N/A	4	OS	0.35	-0.31, 1.01
Murnighan & Roth (1983)*	252	US	PD	MIXED	2	N/A	0.00*	-0.25, 0.25
Nowell & Tinkler (1994)	44	US	PGD	SAME	4	IT(13)	-0.75	-1.98, 0.45
Oberholzer-Gee et al. (2010)	188	NL	O	MIXED	3	OS	-0.15	-0.47, 0.16
Oda (1997)	70	JP	PD	MIXED	2	OS	-0.16	-0.64, 0.32
Orbell et al. (1994)	108	US	PD	MIXED	2	OS	-0.19	-0.59, 0.22
Study 2	68	US	PD	MIXED	2	OS†	-0.10	-0.57, 0.36
Ortmann & Tichy (1999)	96	US	PD	MIXED	2	OS	-0.27	-0.44, -0.09
Orwant & Orwant (1970)	165	US	PD	MIXED	2	OS	-0.28	-0.60, 0.04
Oskamp & Kleinke (1970)	100	US	PD	SAME	2	IT(50)	0.57	0.18, 0.58
Oskamp & Perlaman (1965)	32	US	PD	SAME	2	IT(30)	1.18	0.43, 1.93
Patterson & Boles (1974)*	72	US	PD	MIXED	2	IT(16)	0.00*	-0.47, 0.47
Perugini et al. (2005)	108	DE	PGD	MIXED	3	IT(10)	-0.43	-0.82, -0.05
Pilisuk et al. (1968)	176	US	PD	MIXED	2	IT(25)	0.08	-0.24, 0.39
Poppe (2005)*	91	US	PGD	MIXED	175	IT(9)	0.00*	-0.42, 0.42
Poppe & Utens (1986)*	90	NL	TS	MIXED	6	IT(16)	0.00*	-0.42, 0.42
Pruitt (1967)	100	US	O	SAME	2	IT(1/20)	0.69	0.23, 1.15
Putterman et al. (2010)*	80	US	PGD	MIXED	5	IT(24)	0.00*	-0.45, 0.45

(table continues)

Table 2 (continued)

Study	N	CO	DV	SAME/MIXED	GS	OS/IT	d	LL, UL
Rapoport (1988)	69	CA	PD	MIXED	2	OS	0.03	0.03, -0.45
Rapoport & Chammah (1965)	140	US	PD	SAME	2	IT(300)	0.57	0.19, 0.94
Reich & Purbhoo (1975)*	57	CA	PD	MIXED	2	IT(50)	0.00*	-0.53, 0.53
Rooney et al. (2005)	1,409	US	PGD	N/A	N/A	N/A	-0.20	-0.31, -0.10
Ruffle & Sosis (2007)	212	IL	TS	N/A	2	OS	0.23	-0.04, 0.50
Sanna et al. (2003)*	110	US	TS	MIXED	2	IT(5)	0.00*	-0.38, 0.38
Study 2*	83	US	TS	MIXED	2	IT(5)	0.00*	-0.44, 0.44
Study 3*	75	US	PD	MIXED	2	IT(10)	0.00*	-0.46, 0.46
Study 4*	94	US	TS	MIXED	2	IT(5)	0.00*	-0.41, .041
Seguino et al. (1996)	139	US	PGD	MIXED	5-52	OS	-0.51	-0.87, -0.17
Sell (1997)	82	US	PGD	N/A	4	IT(18)	0.25	-0.18, .067
Study 1b	83	US	PGD	SAME	4	IT(18)	-0.45	-0.88, -.10
Study 1c	79	US	PGD	MIXED	4	IT(18)	0.47	0.02, 0.92
Sell et al. (1993)	22	US	PGD	N/A	4	IT(18)	-0.09	-0.92, 0.75
Study 1b	26	US	PGD	SAME	4	IT(18)	0.55	-0.23, 1.33
Study 1c	25	US	PGD	MIXED	4	IT(18)	0.52	-0.28, 1.32
Study 1d	26	US	PGD	MIXED	4	IT(18)	-0.15	-0.92, 0.63
Study 2	25	US	PGD	N/A	4	IT(18)	0.53	-0.27, 1.33
Study 2b	26	US	PGD	SAME	4	IT(18)	0.70	-0.10, 1.49
Study 2c	25	US	PGD	MIXED	4	IT(18)	0.98	0.15, 1.82
Study 2d	30	US	PGD	MIXED	4	IT(18)	0.63	-0.08, 1.42
Sell & Wilson (2001)	96	US	PGD	MIXED	4	IT(10)	0.49	0.06, 0.93
Sermat (1967)	32	US	O	SAME	2	IT(200)	0.26	0.20, 0.31
Setzman (1974)	40	US	PD	SAME	2	IT(50)	-0.11	-0.83, 0.61
Sheldon (1999)*	90	US	PD	MIXED	2	IT(15)	0.00*	-0.42, 0.42
Sheldon & McGregor (2000)*	80	US	TS	N/A	4	OS	0.00*	-0.45, 0.45
Study 2*	152	US	TS	MIXED	4	IT(N/A)	0.00*	-0.32, 0.32
Shinada & Yamagishi (2007)*	157	JP	PD	MIXED	3	OS	0.00*	-0.32, 0.32
Study 2*	144	JP	PD	MIXED	3	OS	0.00*	-0.33, 0.33
Shomer et al. (1966)	64	US	O	SAME	2	IT(15)	0.60	0.10, 1.10
Sibley et al. (1968)	24	US	PD	SAME	2	IT(100)	-0.84	-1.68, -0.01
Simpson (2003)	82	US	PD	MIXED	2	OS	0.00	-0.49, 0.49
Study 2	70	US	PD	MIXED	2	OS	0.14	-0.39, 0.67
Simpson & Macy (2004)*	114	US	O	MIXED	4	IT(15)	0.00*	-0.37, 0.37
Skotko et al. (1974)	134	US	PD	SAME	2	IT(50)	0.36	0.02, 0.70
Small & Loewenstein (2005)*	140	US	PGD	MIXED	10	OS	0.00*	-0.34, 0.34
E. R. Smith et al. (2003)	143	US	PGD	MIXED	7	OS	0.13	-0.20, 0.46
Study 2	209	US	PGD	MIXED	7	OS	0.10	-0.17, 0.37
Study 3	155	US	PGD	MIXED	7	OS	0.06	-0.26, 0.39
N. S. Smith et al. (1975)	96	US	PD	MIXED	2	IT(60)	-0.50	-1.08, 0.07
Solow & Krikwood (2002)	125	US	PGD	MIXED	5	IT(10)	0.47	0.11, 0.82
Speer (1972)	60	US	PD	MIXED	2	IT(75)	0.11	0.04, 0.17
Steele & Tedeschi (1967)	84	US	O	SAME	2	IT(300)	0.75	0.28, 1.21
Study 2*	84	US	O	SAME	2	IT(300)	0.00*	-0.44, 0.44
Stockard et al. (1988)	594	US/CA	PGD	MIXED	9	OS	-0.08	-0.54, 0.39
Study 2	100	US/CA	PGD	MIXED	7	OS	-0.23	-0.67, 0.21
Surbey & McNally (1997)	150	CA	PD	MIXED	2	OS	-0.36	-0.69, -0.04
Swingle (1970)*	60	US	O	SAME	2	IT(150)	0.00*	-0.52, 0.52
Swope et al. (2008)	48	US	PD	N/A	2	OS	-0.07	-0.75, 0.62
Takahashi et al. (2006)	99	JP	PD	MIXED	2	OS	-0.07	-0.46, 0.33
Tedeschi et al. (1970)	30	US	PD	MIXED	2	IT(150)	-0.92	-1.67, -0.17
Tedeschi et al. (1968)	64	US	PD	MIXED	2	IT(10)	-0.50	-1.00, -0.01
Tedeschi et al. (1969)	50	US	PD	MIXED	2	IT(20)	-0.68	-1.25, -0.11
Van Egeren (1979)	16	US	PD	SAME	2	IT(45)	0.12	0.00, 0.23
Study 2	16	US	PD	SAME	2	IT(45)	0.05	-0.07, 0.12
Van Lange (1999)*	196	NL	PD	MIXED	2	OS	0.00*	-0.28, 0.28
Van Vugt et al. (2007)	93	UK	PGD	MIXED	6	OS	-0.37	-0.79, 0.05
Study 2	120	UK	PGD	MIXED	6	OS	0.26	-0.10, 0.63
Study 3	90	UK	PGD	MIXED	6	IT(6)	-0.57	-1.00, -0.13
Vinacke et al. (1974)	144	US	PD	SAME	3	IT(10)	-0.74	-1.08, -0.40
Voissem & Sistrunk (1971)*	96	US	PD	SAME	2	IT(101)	0.00*	-0.41, 0.41
Wiley (1973)	64	US	PD	SAME	2	IT(20)	-0.04	-0.17, 0.07
Willer (2009)*	72	US	PGD	MIXED	6	IT(5)	0.00*	-0.47, 0.47
Study 2*	41	US	PGD	MIXED	6	OS	0.00*	-0.64, 0.64
Study 3*	97	US	PGD	MIXED	6	IT(10)	0.00*	-0.40, 0.40
Study 4*	86	US	PGD	MIXED	6	IT(5)	0.00*	-0.43, 0.43

Table 2 (continued)

Study	N	CO	DV	SAME/MIXED	GS	OS/IT	d	LL, UL
Wit & Kerr (2002)*	60	US	O	N/A	6	OS	0.00*	-0.52, 0.52
Study 2*	120	US	O	N/A	6	OS	0.00*	-0.36, 0.36
Study 3*	100	US	O	N/A	6	OS	0.00*	-0.40, 0.40
Wit & Wilke (1992)*	570	NL	PGD	MIXED	100	OS	0.00*	-0.17, 0.17
Wit & Wilke (1998)*	104	NL	PGD	N/A	100	OS	0.00*	-0.39, 0.39
Yamagishi (1986)*	192	JP	PGD	SAME	4	IT(12)	0.00*	-0.29, 0.29
Yamagishi et al. (2005)*	106	JP/AU	PD	N/A	2	OS	0.00*	-0.39, 0.39
Yamagishi & Mifune (2009)	131	JP	PD	SAME	2	OS	-0.21	-0.56, 0.12
Yamagishi et al. (2007)	105	JP	PD	N/A	2	OS	0.77	0.20, 1.34

*Note.* N = number of participants in study. An asterisk indicates that a study reported a null finding and that the effect size is estimated as zero. CO = country; DV = dependent variable; SAME = same-sex pairs or groups; MIXED = mixed-sex pairs or groups; GS = group size in social dilemma; OS = one-shot dilemma; IT(##) = iterated dilemma (number of iterations); LL = lower limit; UL = upper limit; SE = Sweden; CA = Canada; IN = India; US = United States; JP = Japan; SG = Singapore; RU = Russia; NL = the Netherlands; BE = Belgium; KE = Kenya; UK = United Kingdom; TW = Taiwan; DE = Germany; CH = Switzerland; IL = Israel; AU = Australia; PD = prisoner's dilemma; PGD = give-some game or public goods dilemma; O = Other; TS = take-some game or resource dilemma; N/A = not applicable.

statistically significant negative relationship between year of publication and the effect size,  $b = -.005$ ,  $Q(1) = 6.30$ ,  $p = .01$ . This continued to be significant after including the null findings. This result indicates that sex differences in cooperation significantly diminished over time. Specifically, the tendency for men to be more cooperative than women during the 1960s has significantly diminished, if not reversed. To illustrate, in studies conducted between 1960 and 1975, men were slightly more cooperative than women ( $d = 0.11$ ), but between 1976 and 1999 and between 2000 to 2010, women were more cooperative than men ( $d = -0.12$ , and  $d = -0.09$ , respectively).

**Type of dilemma.** We found a statistical difference between the three types of dilemmas,  $Q(2) = 11.96$ ,  $p = .003$ . First, there was no sex difference in the public goods dilemma ( $d = 0.01$ , 95% CI [-0.08, 0.10]). Second, women were marginally more cooperative than men in the prisoner's dilemma ( $d = -0.08$ , 95% CI [-0.16, 0.007]). However, women displayed a statistically greater amount of cooperation than men in the resource dilemma ( $d = -0.30$ , 95% CI [-0.45, -0.14]). As displayed in Table 3, including

the null effects did not change the qualitative conclusions of this analysis.

**Country of participants.** We examined whether there were any differences between countries that were represented by at least seven studies in the sample. There were no statistically significant difference between countries,  $Q(4) = 8.61$ ,  $p = .07$ . As displayed in Table 3, men and women displayed equal levels of cooperation in the United States, Netherlands, Japan, and England. However, women were more cooperative than men in Canada ( $d = -0.26$ , 95% CI [-0.45, -0.06]). The comparison between Canada and the United States is significant,  $Q(1) = 5.51$ ,  $p = .02$ . These findings were the same after including the null results in the analysis.

**Multiple regression model.** It could be that gender composition and iterations predict the sex-cooperation effect size because these variables are confounded with other methodological features. In fact, as displayed in Table 4, gender composition has a significant correlation with the number of iterations, year of publication, and the type of dilemma. Number of iterations is also correlated with the year of publication. To examine whether gen-

Table 3  
Results of the Univariate Categorical Moderator Analyses

Variable and class	k (k with null estimates)	d (d with null estimates)	T (T with null estimates)
Sex of partner(s)			
Same	58 (89)	0.16* (0.09)*	.27 (.19)
Mixed	90 (144)	-0.22* (-0.14)*	.25 (.19)
Sex of partner (dyads only)			
Same	44 (66)	0.22* (0.13)*	.25 (.19)
Mixed	42 (62)	-0.30* (-0.20)*	.22 (.19)
Type of dilemma			
Public goods dilemma	58 (81)	0.01 (0.01)	.26 (.20)
Prisoner's dilemma	74 (115)	-0.08 (-0.05)	.29 (.21)
Take-some dilemma	12 (21)	-0.30* (-0.18)*	.19 (.15)
Country of participants			
United States	108 (172)	0.02 (0.003)	.32 (.23)
Canada	10 (12)	-0.26* (-0.21)*	.20 (.19)
Japan	6 (10)	-0.10 (-0.05)	.24 (.11)
United Kingdom	7 (11)	-0.18 (-0.15)	.25 (.30)
Netherlands	15 (25)	-0.11 (-0.05)	.25 (.14)

\*  $p < .05$ .

der composition and number of iterations are no longer significantly related to the sex-cooperation relationship after controlling for the variance explained by these other methodological features, we conducted a random-effects multiple regression analysis in SPSS using the syntax provided by Lipsey and Wilson (2001). The model predicting the effect size included the variables, mixed (coded as 1) versus same-sex interactions (coded as 2), number of iterations, group size, year of publication, and type of dilemma (public goods and prisoner's dilemmas were coded as 1, and resource dilemmas were coded as 2). To conduct a relatively conservative analysis, we included the null findings that were coded as zero effect. The overall model explained a significant amount of variation in the effect size distribution,  $R^2 = .10$ ,  $Q(5, 173) = 41.75$ ,  $p < .001$ . Supporting the prior analyses, gender composition was significantly positively related to the sex-cooperation relationship ( $\beta = .18$ ,  $p = .003$ ). The positive relationship between the number of iterations and the effect size also remained significant ( $\beta = .18$ ,  $p = .004$ ). As before, this analysis suggests that men were more cooperative than women in same-sex groups and over several iterations, whereas women were more cooperative than men in mixed-sex groups. However, when we controlled for the variance explained by these two variables, then group size, year of publication, and type of dilemma were no longer significantly related to the effect size. This is likely due to some confounding between the study characteristics.<sup>5</sup>

### Sex of Partner and Cooperation: Ruling Out an Alternative Explanation

Lastly, we note that the greater cooperation between male-male dyads versus female-female dyads as well as greater female than male cooperation in mixed dyads might be due to people being generally more cooperative with men than women. To tease apart whether partner sex could be underlying such sex differences, we examined whether both men and women are more generally inclined to cooperate with either male or female partners. Of the studies that reported sex differences in cooperation, only 10 studies reported the main effect of sex of partner on cooperation. The effect sizes of these studies are reported in Table 5. The overall effect indicates that individuals were more cooperative while interacting with women compared to men ( $d = -0.38$ , 95% CI [-0.002, -0.75]). Although there is heterogeneity in the effect size distribution ( $T = .57$ ,  $T^2 = .32$ ), which can potentially be explained by between study differences ( $I^2 = 91.23$ ), we refrain from

Table 4  
Correlations Between Study Characteristics

Study characteristic	1	2	3	4	5
1. Gender composition	—				
2. No. of iterations	.42*	—			
3. Group size	-.13	-.09	—		
4. Year of publication	-.51*	-.55*	.08	—	
5. Type of dilemma	-.20*	-.09	-.02	.10	—

Note. Gender composition: mixed-sex studies = 1, same-sex studies = 2; type of dilemma: prisoner's dilemma and public goods dilemmas = 1, resource dilemmas = 2.

\*  $p < .05$ .

Table 5  
Studies Reporting the Relationship Between Partner Sex and Cooperation in Social Dilemmas

Study	<i>n</i>	<i>d</i>	<i>LL, UL</i>
Carment (1974)	66	-0.71	-1.23, -0.19
M. L. Clark (1983)	120	0.35	-0.01, 0.71
Ferguson & Schmitt (1988)	40	-2.65	-3.25, -2.05
Grant & Sermat (1969)	48	-0.76	-1.35, -0.18
Orbell et al. (1994)	94	-0.18	-0.56, 0.20
Study 2	68	-0.04	-0.42, 0.34
Pilisuk et al. (1968)	176	-0.13	-0.44, 0.19
N. S. Smith et al. (1975)	96	0.07	-0.07, 0.21
Takahashi et al. (2006)	99	-0.58	-0.99, -0.18
Wiley (1968)	96	0.41	0.01, 0.81

Note. *LL* = lower limit; *UL* = upper limit.

exploring moderators of this relationship due to the low sample size.

This effect, however, may be due to a publication bias. In fact, several statistics raise our concerns about a possible publication bias. First, Egger's regression intercept is marginally significant,  $t(8) = 1.95$ ,  $p = .08$ . Second, applying Duval and Tweedie's (2000) Trim and Fill approach, two studies were trimmed below the mean and this resulted in a larger estimated effect size ( $d = -0.59$ , 95% CI [-1.02, -0.16]). There were no studies trimmed above the mean. Lastly, calculating Orwin's fail-safe *N* suggests only 33 studies with a value of  $d = -0.05$  would reduce the effect size to non-significance. According to Hedges and Olkin (1985), to ensure confidence in the results, Orwin's fail-safe *N* should be 5 times the number of studies (here,  $5 \times 10 = 50$ ) plus 10 ( $50 + 10 = 60$ ). Because this small sample of effect sizes may contain a publication bias, the current results are relatively inconclusive regarding the main effect of partner sex on cooperation. Nevertheless, they reduce our concern that our earlier analyses can be explained by people being more cooperative with men than women.

### Discussion

This meta-analytic review examined sex differences in cooperation using the extant literature on social dilemmas—situations

<sup>5</sup> We also examined the interactions between partner sex with either the number of iterations, group size, or year of publication. We found statistically significant two-way interactions between partner sex and both group size and year of publication predicting the effect size. Follow-up analyses suggested that among same-sex interactions, both group size and year of publication were negatively related to the effect size ( $\beta = -.19$ ,  $p = .005$ ;  $\beta = -.19$ ,  $p = .002$ , respectively). However, for mixed-sex interactions, both group size and year of publication were unrelated to the effect size ( $\beta = .06$ ,  $p = .33$ ;  $\beta = .02$ ,  $p = .71$ , respectively). Among all the same-sex studies, however, the moderators are still correlated. Therefore, we conducted a multiple regression model using only the studies coded as same-sex to see whether both year of publication and group size remain significant predictors of the effect size after controlling for the number of iterations. After controlling for the number of iterations, both year of publication and group size were non-significant predictors of the same-sex study effect sizes, whereas the number of iterations continued to predict the effect size ( $\beta = .28$ ,  $p = .002$ ).

involving a conflict between maximizing personal versus collective interests (“mixed motive” games). Previous reviews examined sex differences in prosocial behaviors such as helping (Eagly, 2009; Eagly & Crowley, 1986) and heroism (S. W. Becker & Eagly, 2004), whereas other reviews have considered sex differences in competitive behaviors such as aggression (Archer, 2004, 2009; Bettencourt & Miller, 1996; Eagly & Steffen, 1986) and negotiations (Stuhlmacher & Walters, 1999; Walters et al., 1998). Yet, these results do not necessarily generalize to mixed-motive settings such as social dilemmas, which are psychologically unique because there is a tension between personal and collective interests in deciding whether people want to cooperate. Furthermore, the social dilemma paradigm has a high internal validity and is applicable to many real-world problems, which adds to the credibility of the results.

Our meta-analytic review of 50 years of experimental research on social dilemmas including 272 effect sizes and 31,462 participants revealed a number of interesting results. First, we found no overall difference between the sexes in cooperation in social dilemmas ( $d = -0.05$ ). This result confirms previous narrative reviews of the literature (e.g., Croson & Gneezy, 2009; Ledyard, 1995; Maccoby & Jacklin, 1974; Walters et al., 1998; Weber et al., 2004), and we can now conclude that this is a robust finding. This result is aligned with Hyde’s (2005) perspective that men and women are equal on most psychological phenomena. Importantly, however, Hyde acknowledged that gender differences can vary according to features of the situation. Examining context-specific sex differences in cooperation, we find that men are more cooperative in same-sex interactions ( $d = 0.16$ ), whereas women are more cooperative in mixed-sex interactions ( $d = -0.22$ ). Also, as the game continues for several rounds, men become increasingly more cooperative than women. Finally, sex differences in cooperation are largely unaffected by group size, year of publication, or the type of dilemma. Below, we discuss these findings in the context of both sociocultural and evolutionary perspectives on sex differences in social behavior.

### Are Women or Men More Cooperative?

The sociocultural perspective suggests that women are socialized more into communal roles and men into agentic roles. This produces sex differences in communal and agentic oriented behaviors (Wood & Eagly, 2010), which can be explained by the proximate mechanisms of gender stereotypes that reflect these orientations (Eagly & Steffen, 1984) as well as men and women regulating their behaviors according to standards consistent with these orientations (Wit & Wood, 2010). As we argued earlier, a relatively greater communal orientation and less agentic orientation of women would predict that women are more cooperative (and therefore less selfish) than men in social dilemmas. It is equally important to note, however, that these predicted sex differences in cooperation emerge in particular when these gender stereotypes or standards are salient (Deaux & Major, 1987).

Similarly, an evolutionary perspective does not make a strong claim about a main effect of sex on cooperation. Humans are thought to have evolved context-dependent decision rules for determining whether or not they should cooperate. For instance, whereas it is adaptive for men and women to defect in one-shot interactions both men and women should be more cooperative in

repeated games with the same partners. Thus, it is unlikely that sex-differentiated adaptations would have emerged in our evolutionary history that incline either women or men to be *generally* more cooperative—that is, indiscriminately across a wide range of situations.

As it turns out, there were no meaningful overall sex differences in cooperation in our meta-analytic review. Future research may look at when gender-based communal and agentic stereotypes and/or standards are activated in specific social dilemma situations and whether such gender stereotypes are evolved or learnt through socialization.

### Cooperation in Same-Sex Interactions

The sociocultural perspective suggested that female same-sex interactions would be more cooperative than male same-sex interactions. This is because boys and girls learn at a very young age distinct forms of social interactions with same-sex others, and these forms of interactions share features characteristic of agentic and communal orientations, respectively (Maccoby, 1990; Maccoby & Jacklin, 1987). Although this hypothesis finds support in a single study (Moskowitz, Suh, & Desaulniers, 1994), our meta-analytic findings indicate just the opposite: Men are actually more cooperative than women during same-sex interactions.

This finding is more in tune with an evolutionary perspective. According to an evolutionary perspective, two selective pressures in our ancestral environments may have selected for male cooperation to overcome social dilemmas: hunting large packaged prey and warfare/inter-group conflict (e.g., Bowles, 2009; Foley & Lee, 1989; Geary et al., 2003; Manson & Wrangham, 1991; Wrangham, 1999). The argument is that throughout human evolutionary history, male coalitions have been an effective strategy for men to acquire reproductively relevant resources (e.g., Gat, 2006; Guislaine & Zammit, 2004; Keeley, 1996; LeBlanc & Register, 2003; Thayer, 2004; Wrangham & Peterson, 1996). Both hunting and warfare are social dilemmas in that they firmly pit individual and group interests against each other. For instance, each individual is better off enjoying the spoils of hunting or war without actually having to do the work or take any risks. Yet, if everyone acts upon their immediate self-interest, then no food will be provided, and wars will be lost. To overcome such social dilemmas requires strategies to cooperate with each other, and the evidence suggests that this has produced a suite of male coalitional adaptations, including male bonding and male-to-male cooperation. For example, men display increased levels of cooperation during inter-group competition (Van Vugt, De Cremer, & Janssen, 2007; Yuki & Yakota, 2009), show greater amounts of ingroup favoritism in same-sex groups (Yamagishi & Mifune, 2009), have greater levels of cooperation in same-sex dyads (Rapoport & Chammah, 1965), and tend to be more accommodating during interpersonal conflict (Benenson et al., 2009; Eckel & Grossman, 1996). In contrast, there were no specific pressures on ancestral women to provide these highly salient public goods and the physical risks involved in contributing to hunting and warfare selected against women’s participation in such tasks. Consistent with this view, the anthropological evidence suggests that both hunting large packaged resources and warfare are all-male activities in modern day and ethnographically recent foraging societies—which is the best available model of the way our ancestors lived—as they still are

today (Dunbar, 1996; Kruger & Nesse, 2004; Potts & Hayden, 2008; Sidanius & Pratto, 1999; Wrangham & Peterson, 1996).

As a side issue, several researchers have proposed that the evolution of male cooperation has likely been facilitated by a history of male kin co-residency, whereby ingroups consist of genetically related men, such as brothers and cousins, with unrelated women (Dunbar, 1996; Geary et al., 2003; Lovejoy, 2009; Van Vugt & Ahuja, 2010; Wrangham & Peterson, 1996).<sup>6</sup> Because there was a high degree of genetic relatedness among the men in these ancestral groups, there were clear genetic benefits associated with male cooperation (Hamilton, 1964; Pasternak, Ember, & Ember, 1997). Such an ancestral environment would have made it easier for men to evolve a male coalitional psychology.

Conversely, because women usually migrated between groups, they would have been interacting mostly with non-kin women. These women tended not to be relatives, and many were co-wives. Indeed, ancestral hunter-gatherer societies were mildly polygynous, as they are today, which means that social dynamics among women would have been rife with sexual competition (Dupanloup et al., 2003; Flinn & Low, 1986; Hammer, Mendez, Cox, Woerner, & Wall, 2008; Josephson, 2002; M. B. Mulder, 1992; Sellen, 1999; Strassman, 1997). Thus, in an ancestral group environment that was mildly polygynous with men controlling access to resources and providing offspring care, women may have evolved dispositions to be less cooperative with other women (Benenson, Markovits, Thompson, & Wrangham, 2011; Geary, 2009). Hence, one would expect less cooperation among women, and this is what our meta-analytic findings show.

### Cooperation in Mixed-Sex Interactions

The sociocultural perspective suggests that as a result of social roles, women are actually more kind and cooperative and that female stereotypes reflect these behavioral dispositions—a stereotype relevant to social dilemmas. In fact, women are expected to cooperate more than men in a social dilemma (e.g., Orbell et al., 1994), and this belief especially exists among women (Aguar, Branas-Garza, Cobo-Reyes, Jimenez, & Miller, 2009; Greig & Bohnet, 2009; Lacy, 1978). Because women (and men) are evaluated negatively when they engage in counter-stereotypical behaviors (Costrich et al., 1975), they may be motivated to conform to their stereotypes. Furthermore, such gender stereotypical beliefs are likely to be stronger in interactions with the opposite sex because such situations activate the gender roles (Deaux & Major, 1987). Accordingly, if men and women possess agentic and communal self-concepts, then this should be especially salient in mixed-sex interactions (Hogg & Turner, 1987; Skrypnik & Snyder, 1982). Thus, a salient stereotype in mixed-sex social dilemmas may lead to communally oriented women to be more cooperative, and agentic oriented men to become less cooperative. This is indeed what we find: Women are more cooperative than men in mixed-sex interactions.

An evolutionary perspective offers an alternative explanation for these findings. Although the social dilemma context is not a mating context per se, one could argue that in mixed-sex interactions, mating motives are nevertheless sometimes salient (Li, Halterman, Cason, Knight, & Maner, 2008). Sexual selection theory asserts (Buss & Schmidt, 1993) that men and women have evolved to pay attention to different qualities in potential mates. Whereas

men tend to prefer a mate who is prosocial and kind, women tend to prefer a high-status mate who is socially dominant because it conveys the man's success in resource competitions with other men (Buss, 1989; Gangestad, Simpson, Cousins, Garver-Apgar, & Christensen, 2004; Kelly & Dunbar, 2001; Li, Bailey, Kenrick, & Linsenmeier, 2002; Sadalla, Kenrick, & Vershure, 1987). Thus, if such mate preferences are salient when men and women interact, women would be motivated to cooperate more and men less.

Subsequent experimental research could pit the sociocultural and evolutionary predictions against each other by further examining situational cues eliciting sex differences in cooperation in mixed-sex interactions. An evolutionary hypothesis predicts that when men and women are being primed with mating motives—for example, imagining going on a date with an attractive opposite sex partner (Griskevicius et al., 2007)—this should exacerbate sex differences in cooperation. The sociocultural perspective predicts no such effect. In contrast, gender role primes—for example, imagining working in a traditional gender role job—would enhance sex differences in cooperation (and this effect might be larger among people strongly endorsing gender stereotypes).

### Cooperation During Repeated Interactions

The sociocultural perspective suggests that because women are expected to be generally kinder and more concerned about others, they are more likely to accommodate a partner's defection. Men, however, as a result of their agentic roles may be more dominant and be inclined to retaliate in response to a partner's defection. This suggests that over the course of an interaction with the same partners, women will become more cooperative, whereas men will become less cooperative (sometimes ending up in a cycle of mutual defection). The meta-analysis results show the opposite: Over time, men became more cooperative than women during repeated social dilemmas.

<sup>6</sup> Three lines of evidence suggest men tended to reside throughout life among close consanguineal kin, whereas women transferred residence away from kin at sexual maturity or marriage. First, human's closest living ancestors, chimpanzees, bonobos, and gorillas, all practice male philopatry with moderate female dispersal (e.g., Boesch & Boesch-Achermann, 2000; Bradley, Doran-Sheehy, Lukas, Boesch, & Vigilant, 2004; Chapais, 2008; Goodall, 1986; Nishida et al., 2003; Watts, 1996), and phylogenetic analyses suggest that primate co-residential patterns are conservative over time (Chapais, 2008; Thierry, Iwaniuk, & Pellis, 2000). Second, behavioral studies on modern forager populations suggest they disproportionately practice sex-biased affiliation among male kin, with a tendency for brothers to co-reside (Hill et al., 2011). Moreover, cross-cultural research, finds that the majority of current human societies are normatively patrilocal (Murdock & Wilson, 1980). Lastly, some human population genetic studies show evidence of an evolutionary history of female-biased dispersal patterns (Balaesque, Manni, Dugoujon, Crousau-Roy, & Heyer, 2006; Seielstad, Minch, & Cavalli-Sforza, 1998; Wilson et al., 2001). Recently, the traditional position in anthropology that foragers practiced male philopatry (e.g., Ember, 1975; Foley, 1995) has been challenged in both the ethnographic literature (e.g., Marlowe, 2004) and in human population genetics (e.g., Wilder, Kingan, Mobasher, Pilkington, & Hammer, 2004). However, an adaptation for relatively stronger male same-sex cooperation may still exist regardless of sex-biased co-residency and dispersal patterns. For example, male inter-group competition may have been an enduring social challenge that could alone place enough selective pressure for the emergence of an adaptation for male intragroup cooperation.



This finding, however, supports an evolutionary line of reasoning. In male groups, cooperation is maintained primarily through dominance hierarchies (Geary, 2010). Although such hierarchies tend to involve some degree of interpersonal conflict, they evolved specifically to facilitate social cohesion (Buss, 2005; de Waal, 2000; Hemelrijk & Gygax, 2004). Thus, although men can fight with each other, they may be more tolerant of defections because of the benefits of prolonged male cooperation (Benenson, 2009; Geary et al., 2003). Indeed, developmental research finds that boys and adult men are more tolerant of interpersonal conflicts than girls and adult women (Benenson et al., 2009; Eckel & Grossman, 1996; Vigil, 2007).

There is other evidence too that women adhere to a strict tit-for-tat strategy in social dilemmas and are less tolerant of defection, especially when interacting with the same partner over time. Ben-Ner, Putterman, Kong, and Magan (2004) found that for women, more so than men, the amount given to another person in a dictator game hinged on how much the other person gave them on a previous trial. Behavioral economics findings suggest that women are more inclined to reciprocate the other person's trust or distrust (Buchan, Croson, & Solnick, 2008; Chaudhuri & Gangadharan, 2003; Croson & Buchan, 1999; Schwieren & Sutter, 2008; Snijders & Keren, 2001) and are more punitive of unfair behavior. A strict tit-for-tat strategy can result in prolonged periods of mutual defection (Kelley & Stahelski, 1970; Kuhlman & Marshello, 1975). Thus, if women are inclined to mirror others' actions, they may, compared to men, show less cooperation over time with the same partners.

### Group Size and Cooperation

The sociocultural perspective suggests that sex differences in social roles may result in sex differences in the importance of close relationships and group memberships in defining women's and men's self-concepts, respectively (Baumeister & Sommer, 1997; Cross & Madson, 1997). An implication of this perspective is that women may be more cooperative in social dilemmas involving close interpersonal dyadic interactions, and men may be more cooperative than women in larger group social dilemmas. From an evolutionary perspective, it has also been suggested that men may possess social cognitive adaptations that support relatively greater amounts of male cooperation in larger groups (Markovits & Benenson, 2010; Van Vugt, 2009). Although one study has found that men are more cooperative than women in larger groups (Gabriel & Gardner, 1999), this study asked participants about their intentions to cooperate. Our review, which is based on actual behavior, does not support this hypothesis: After controlling for several study characteristics, group size did not affect sex differences in cooperation.

### Year of Publication

According to the sociocultural perspective, if women assume more agentic roles or gain greater status, then this should subsequently change gender roles (Diekmann & Eagly, 2008; Eagly & Wood, 2011; Wood & Eagly, 2010). In fact, there is evidence that women have become more agentic over time but still remain more communally oriented than men (Twenge, 1997, 2001). Although our initial analysis of year of publication suggested that women

became relatively more cooperative than men in more recent years, after controlling for several study characteristics that were correlated with the year of publication, the effect of year of publication disappeared. These findings suggest that societal changes and their corresponding effects on social roles and gender stereotypes do not seem to have impacted sex differences in cooperation—at least in the laboratory studies examined in this meta-analysis. An evolutionary perspective, on the other hand, forwards the position that some sex differences in social behavior are the result of sex-specific adaptations that should be persistent over time in the population. However, adaptations tend to be sensitive to changes in social environments including, for example, reduced gender inequality or changes in sex ratios. Although research has suggested that sex-specific cooperative propensities are modulated by unique socio-ecologies (Macfarlan & Quinlan, 2008), there have been no theoretical developments about how specific features of a culture (e.g., marriage or residential rules) systematically affect sex-typical adaptations for cooperation. Also, we do not know how such sex-typical adaptations may interact with changes in recent culture over the past 50 years. In this regard, an integrative approach that seeks to understand how adaptations and culture mutually constrain and influence each other may be useful (Kenrick, Li, & Butner, 2003).

### Summary of Findings

Although we found that women and men were similarly cooperative in general, the evolutionary and sociocultural perspectives put forward separate hypotheses about and explanations for context-specific sex differences in cooperation. Consistent with a sociocultural perspective, women were more cooperative in mixed-sex social dilemmas. Stereotypes of men and women are more likely to be activated in mixed-sex interactions. To match these stereotypes, women may become more cooperative and men less cooperative. Alternatively, an evolutionary perspective suggests that men may desire to signal social dominance to potential mates, leading to less cooperation by men than women. Also consistent with an evolutionary approach, which assumes that men have evolved specialized mechanisms for same-sex cooperation and greater tolerance for another's defection, men were more cooperative in same-sex groups, including dyads, and men became more cooperative over several iterations of the dilemma. These findings were contrary to a sociocultural perspective that predicted greater female same-sex cooperation and women being relatively more cooperative in response to another's defection. Additionally, the meta-analysis showed no support for either a sociocultural or evolutionary perspective that suggests men would be more cooperative in larger groups. Finally, although sex differences in social behavior were hypothesized from a sociocultural perspective to have changed over the last 50 years, our analysis did not indicate any significant change in sex differences in cooperation during this time.

Taken together, our meta-analytic review finds some support for both the evolutionary and sociocultural accounts of sex differences in cooperation. Indeed, we believe future research on sex differences in cooperation would be best served by the development of an integrated evolutionary and sociocultural perspective.

### Theoretical Implications: Integrating Evolutionary and Cultural Perspectives

Sex differences in cooperation are perhaps better understood as a function of both evolutionary and cultural processes. Although a full theoretical integration of these perspectives is beyond the scope of this article (for previous attempts, see Archer, 1996, 2009; Kenrick et al., 2003), we briefly address two features of this integration and their importance for future research on sex differences.

First, evolved psychological sex differences may constrain the influence of the current social environment. For example, sex-typical adaptations may affect both the socialization process of boys and girls (Low, 1989) and the emergence of sex differentiated cooperative institutions (Kenrick & Luce, 2000; Kenrick, Trost, & Sundie, 2004). In this regard, an evolved male coalitional psychology explains why across all cultures there is an overrepresentation of men in business, politics, and warfare (Van Vugt, 2009; Wood & Eagly, 2002; Whyte, 1978) and why men are more cooperative especially under conditions of intergroup threat (Bugental & Beau-lieu, 2009; Van Vugt et al., 2007; Yuki & Yokota, 2009) and in repeated interactions with the same partners (Benenson et al., 2011; Geary et al., 2003). In the absence of such ancestrally relevant cues, sex differences in cooperation are less likely to appear. Future research may extend this analysis by examining how cultural influences can exacerbate or diminish the influence of sex-typical adaptations for cooperation.

Second, values and behavior are influenced by cultural factors. Through cultural transmission processes, humans learn what is socially appropriate (D'Andrade, 1989), including stereotypical beliefs associated with sex roles. Two important cultural variables that may affect sex differences in cooperation are the family context (Belsky, Steinberg, & Draper, 1991; Flinn & Ward, 2005) and institutional structures (e.g., marriage and residence rules; Low, 1989). These cultural factors systematically affect socialization processes that may in turn reinforce or diminish the manifestation of sex differences in cooperation. Low's (1989) cross-cultural research shows that parents in patrilocal societies (a marriage rule specifying men and their brides reside among kinsmen after marriage, as such power is shared among male kin) teach boys to cooperate with each other and to obey authority figures, which facilitates the emergence of male cooperative groups headed by older men. In cultures in which male-male coalitions have less functional importance and male-female coalitions are more important (feminine cultures; Hofstede, 2001), socialization processes are likely to be less sex differentiated.

In general, the cultural environment likely provides important informational inputs for the evolution and the processing of adaptive decision rules, which operate at the individual level (Cosmides, Tooby, & Barkow, 1992; N. Henrich & Henrich, 2007; Kenrick et al., 2003). In turn, individuals interacting with one another, each with their evolved decision rules for adaptively processing information, dynamically comprise culture. Thus, cultural and evolutionary processes are likely intertwined, and an integrative approach, which seeks to understand how adaptations and culture mutually constrain and influence each other, may be most useful in understanding complex social phenomena such as sex differences in cooperation.

### Social Dilemmas as a Paradigm to Examine Sex Differences in Cooperation

Social dilemma studies provide an exceptional context to study sex differences in cooperation, because these experiments are highly controlled situations that directly pit self against collective interests. Because these conflicts of interests are pervasive in our day-to-day social lives (Van Lange & Joireman, 2008), our findings generalize to a myriad of contexts involving dyads and groups. Furthermore, the diversity of studies in our sample enabled us to zoom in on key situational features affecting sex differences in cooperation. For instance, each study either allowed same-sex or mixed-sex interactions, had a predetermined number of group members, and had a predetermined number of iterations. However, the studies were limited in that they did not compare interactions between ingroup versus outgroup members, friends versus strangers, and kin versus non-kin. Future research on sex differences in cooperation will benefit by constructing experimental social dilemma contexts that manipulate these and other features of the situation that are hypothesized—based on an integrated evolutionary and cultural theory—to affect sex differences in cooperation (Van Vugt et al., 2007).

Do social dilemmas enable us to test for sex differences in competition and aggression? Theoretically, the social dilemma is not a test of cooperation versus competition (aggression) but of cooperation versus defection (i.e., *not* cooperating). There are many reasons why people may defect in social dilemmas, and only one of them is having a competitive motivation—normally only about 5% of participants have a competitive orientation (Au & Kwong, 2004; Komorita & Parks, 1994). Moreover, prior research suggests that people defect in social dilemmas—at least in the laboratory contexts we include in our meta-analysis—because of a concern for self-interest, not competition (Komorita & Parks, 1994). Hypotheses about sex differences in competition (or aggression) should be tested in competitive economic games, such as zero-sum or maximizing difference games.

Our meta-analytic findings extend previous work on social dilemmas in important ways. Walters et al. (1998) conducted a quantitative review of sex differences in two-person social dilemmas and also failed to find an overall main effect of sex. Our analysis goes further in several ways. First, whereas Walters et al. only examined behavior in prisoner's dilemma games, we examined behavior in all types of social dilemmas. In doing so, we found that men's and women's behavior in dilemmas are affected not only by the sex of the interaction partners but also the number of iterations of the dilemma. Second, whereas Walters et al. only considered dyadic interactions, we examined behavior in both dyads and larger groups. Third, their sample included many null findings that were estimated as zero effect sizes relative to actual coded effect sizes. This is problematic because several of these estimated null findings likely observed a mean difference between men and women but lacked the statistical power to detect a small effect size. In summary, our research overcomes some of the limitations of previous research by examining sex differences in cooperation in a much wider range of dilemmas with a much larger sample of studies ( $k = 51$  vs.  $k = 272$ ).

## Practical Implications

Our meta-analytic findings are relevant to several disciplines in psychology. For example, research in developmental psychology may benefit from at least two aspects of the current research. First, past research on children's cooperation has often used paradigms that align self-interest with cooperation (for review, see Knight & Chao, 1989). However, the present findings suggest that by pitting self-interest *against* cooperative motives, developmental researchers can more directly examine when children value the welfare of others over personal welfare. Second, developmental researchers may benefit from a careful consideration of how age interacts with sex to predict cooperation in social dilemmas. Along these lines, one study found that boys' same-sex interactions become *more* cooperative between 7 and 11 years of age, whereas 7–11-year-old girls' same-sex interactions become *less* cooperative (Sampson & Kardush, 1965). Fehr et al. (2008) found that boys (3–8 years of age) are more tolerant than girls of receiving a lower share of outcomes than a fellow ingroup member, compared to when they were interacting with an outgroup member. Such findings suggest that a male bias toward cooperating with male ingroup members develops relatively early. However, the results of the present analysis suggest that these studies may benefit from manipulating the gender composition of dyads/groups and examining cultural influences that may exacerbate or inhibit sex differences such as different socialization practices and different societal threats (warfare).

Cross-cultural psychology may benefit from a consideration of how social roles correspond to structural aspects of the society, including family structure and the workplace. Such roles may moderate both male and female dispositions toward cooperation. Andersen, Bulte, Gneezy, and List (2008) recently found that men in a matrilineal society are more cooperative during mixed-sex interactions than men in a patriarchal society. Future research could expand on this work by controlling for additional cross-cultural differences (e.g., cultural values) while measuring potential mediating mechanisms (e.g., social roles and male vs. female stereotypes) of the effect of cultural differences on sex differences in cooperation. More generally, there is a need to methodologically isolate cultural variables to determine which aspects of culture are affecting the sex–cooperation association and to study the psychological processes that mediate the culture–cooperation relationship.

## Strengths, Limitations, and Future Directions

The conclusions of our meta-analysis are limited to the types of social dilemmas included in our sample. Specifically, the studies included in our analysis were social dilemmas in which the interests and outcomes of the players were symmetrical and there was full information on others' outcomes. Thus, the results of our meta-analysis may not necessarily generalize to situations where cooperation occurs in the context of asymmetrical dependency (e.g., one partner has relatively more power) or information uncertainty (e.g., not knowing a partner's outcomes). Kelley et al. (2003) noted that changes in the structure of a situation (e.g., greater asymmetrical dependence) will affect the expression of particular traits and motives such as social dominance, which in turn may influence the manifestation of sex differences in cooperation.

A common misperception about social dilemmas research is that it lacks external validity. Yet, behavior in social dilemma experiments predicts cooperation outside the laboratory very well. For instance, the number of cooperative choices in dilemma games predicts how much people donate to charitable causes (Van Lange, Bekkers, Schuyt, & Van Vugt, 2007), and students quite accurately predict how their roommate would behave in such paradigms (Bem & Lord, 1979).

Another potential limitation of our work is that the effect sizes in our studies are relatively small. However, small effect sizes are common in meta-analytic reviews of sex differences and social psychological research in general (Eagly & Wood, 1991; Hyde, 2005) and can still be considered important due to an accumulative impact over time (Abelson, 1985; Martell, Lane, & Emrich, 1996). Thus, we believe that the small effect sizes do not undermine the importance of our findings. Finally, although our sample included studies conducted in 18 countries, our search was limited to English written articles, and most studies were conducted in the United States. This is a concern because most studies in our sample come from Western, Educated, Industrialized, Rich, and Democratic (WEIRD) countries, and studies conducted in WEIRD countries can generate different results than those conducted elsewhere (J. Henrich, Heine, & Norenzayan, 2010). Our understanding of the evolutionary and cultural basis of sex differences in cooperation will benefit from including participants from non-Western cultures.

## Concluding Remarks

Since Maccoby and Jacklin's (1974) review concluded that sex differences in social behavior were small and negligible, a research tradition developed to review sex differences in specific domains such as aggression, helping, and leadership, applying meta-analytic techniques. Our quantitative review extends this literature by examining sex differences in social dilemmas. We started by asking the question: Are women or men more cooperative? Our answer: It depends. Women are not more cooperative than men, in general. However, several factors moderate the sex–cooperation relationship, including the sex of partner and the duration of the interaction. Several findings support an evolutionary perspective on sex differences in cooperation, but there is also some support for a sociocultural perspective. Future research will benefit from an integration of evolutionary and sociocultural approaches to develop a more sophisticated theory of sex differences in social behavior. Doing so will refine our questions and direct future research efforts, resulting in a more comprehensive understanding of the effect of sex on cooperation.

## References

- References marked with an asterisk indicate studies included in the meta-analysis.
- Abelson, R. P. (1985). A variance explanation paradox: When a little is a lot. *Psychological Bulletin*, *97*, 129–133. doi:10.1037/0033-2909.97.1.129
- Aguiar, F., Branäs-Garza, P., Cobo-Reyes, R., Jimenez, N., & Miller, L. M. (2009). Are women expected to be more generous? *Experimental Economics*, *12*, 93–98. doi:10.1007/s10683-008-9199-z
- \*Ahmed, A. (2008). Can education affect pro-social behavior? *Cops*,

- economists and humanists in social dilemmas. *International Journal of Social Economics*, 35, 298–307. doi:10.1108/03068290810854565
- \*Alcock, J. E., & Mansell, D. (1977). Predisposition and behavior in a collective dilemma. *Journal of Conflict Resolution*, 21, 443–457. doi:10.1177/002200277702100304
- Alexander, R. D. (1987). *The biology of moral systems*. Carmel, IN: Hawthorne.
- \*Andersen, S., Bulte, E., Gneezy, U., & List, J. A. (2008). Do women supply more public goods than men? Preliminary experimental evidence from matrilineal and patriarchal societies. *American Economic Review*, 98, 376–381. doi:10.1257/aer.98.2.376
- Andersson, M. (1994). *Sexual selection*. Princeton, NJ: Princeton University Press.
- \*Ando, K. (1999). Social identification and a solution to social dilemmas. *Asian Journal of Social Psychology*, 2, 227–235. doi:10.1111/1467-839X.00036
- \*Andreoni, J., & Petrie, R. (2008). Beauty, gender, and stereotypes: Evidence from laboratory experiments. *Journal of Economic Psychology*, 29, 73–93. doi:10.1016/j.joep.2007.07.008
- Andreoni, J., & Vesterlund, L. (2001). Which is the fair sex? Gender differences in altruism. *The Quarterly Journal of Economics*, 116, 293–312. doi:10.1162/003355301556419
- \*Anthony, D., & Horne, C. (2003). Gender and cooperation: Explaining loan repayment in micro-credit groups. *Social Psychology Quarterly*, 66, 293–302. doi:10.2307/1519827
- \*Aranoff, D., & Tedeschi, J. T. (1968). Original states and behavior in the prisoner's dilemma game. *Psychonomic Science*, 12, 79–80.
- Archer, J. (1996). Sex differences in social behavior: Are the social role and evolutionary explanations compatible? *American Psychologist*, 51, 909–917. doi:10.1037/0003-066X.51.9.909
- Archer, J. (2004). Sex differences in aggression in real-world settings: A meta-analytic review. *Review of General Psychology*, 8, 291–322. doi:10.1037/1089-2680.8.4.291
- Archer, J. (2009). Does sexual selection explain human sex differences in aggression? *Behavioral and Brain Sciences*, 32, 249–266. doi:10.1017/S0140525X09990951
- Au, W. T., & Kwong, Y. Y. (2004). Measurements and effects of social value orientation in social dilemmas: A review. In R. Suleiman, D. V. Budescu, I. Fischer, & D. M. Messick (Eds.), *Contemporary research on social dilemmas* (pp. 71–98). New York, NY: Cambridge University Press.
- \*Baker, F., & Rachlin, H. (2001). Probability of reciprocation in repeated prisoner's dilemma games. *Journal of Behavioral Decision Making*, 14, 51–67. doi:10.1002/1099-0771(200101)14:1<51::AID-BDM365>3.0.CO;2-K
- Balaresque, P., Manni, F., Dugoujon, J. M., Crousau-Roy, B., & Heyer, E. (2006). Estimating sex-specific processes in human populations: Are XY-homologous markers an effective tool? *Heredity*, 96, 214–221. doi:10.1038/sj.hdy.6800779
- \*Balliet, D. (2009). [Sex differences in a public goods dilemma]. Unpublished raw data, Singapore Management University, Singapore.
- Balliet, D. (2010). Communication and cooperation in social dilemmas: A meta-analytic review. *Journal of Conflict Resolution*, 54, 39–57. doi:10.1177/0022002709352443
- Balliet, D., Mulder, L., & Van Lange, P. A. M. (2011). Reward, punishment, and cooperation: A meta-analysis. *Psychological Bulletin*, 137, 594–615. doi:10.1037/a0023489
- Balliet, D., Parks, C., & Joireman, J. (2009). Social value orientation and cooperation in social dilemmas: A meta-analysis. *Group Processes & Intergroup Relations*, 12, 533–547. doi:10.1177/1368430209105040
- Balliet, D., & Van Lange, P. A. M. (2011). *Trust, state expectations, and cooperation: A meta-analysis*. Unpublished manuscript, VU University, Amsterdam, the Netherlands.
- Barclay, P. (2010). Altruism as a courtship display: Some effects of third-party generosity on audience perceptions. *British Journal of Psychology*, 101, 123–135. doi:10.1348/000712609X435733
- \*Batson, C. D., Batson, J. G., Todd, R. M., Brummett, B. H., Shaw, L. L., & Aldeguer, C. M. R. (1995). Empathy and the collective good: Caring for one of the others in a social dilemma. *Journal of Personality and Social Psychology*, 68, 619–631. doi:10.1037/0022-3514.68.4.619
- Baumeister, R. F., & Sommer, K. L. (1997). What do women want? Gender differences and two spheres of belongingness: Comment on Cross and Madson (1997). *Psychological Bulletin*, 122, 38–44. doi:10.1037/0033-2909.122.1.38
- Becker, S. W., & Eagly, A. H. (2004). The heroism of women and men. *American Psychologist*, 59, 163–178. doi:10.1037/0003-066X.59.3.163
- \*Becker, W. M., & Miles, C. (1978). Interpersonal competition and cooperation as a function of sex of subject and sex of counterpart. *The Journal of Social Psychology*, 104, 303–304. doi:10.1080/00224545.1978.9924076
- \*Bedell, J., & Sistrunk, F. (1973). Power, opportunity costs, and sex in a mixed-motive game. *Journal of Personality and Social Psychology*, 25, 219–226. doi:10.1037/h0033947
- \*Belianin, A., & Novarese, M. (2005). *Trust, communication, and equilibrium behaviour in public goods game: A cross-country experimental study*. Unpublished manuscript, International College of Economic and Finance, Moscow, Russia.
- Belle, D. (1989). Gender differences in children's social networks and supports. In D. Belle (Ed.), *Children's social networks and social supports* (pp. 173–188). New York, NY: Wiley.
- \*Belot, M., Bhaskar, V., & van de Ven, J. (2006). *A public dilemma: Cooperation with large stakes and a large audience*. Unpublished manuscript, University of Essex, Colchester, United Kingdom.
- \*Belot, M., Bhaskar, V., & van de Ven, J. (2010). Promises and cooperation: Evidence from a TV game show. *Journal of Economic Behavior & Organization*, 73, 396–405. doi:10.1016/j.jebo.2010.01.001
- Belsky, J., Steinberg, L., & Draper, P. (1991). Childhood experience, interpersonal development, and reproductive strategy: An evolutionary theory of socialization. *Child Development*, 62, 647–670. doi:10.2307/1131166
- Bem, D. J., & Lord, C. G. (1979). Template matching: A proposal for probing the ecological validity of experimental settings in social psychology. *Journal of Personality and Social Psychology*, 37, 833–846. doi:10.1037/0022-3514.37.6.833
- Benenson, J. F. (2009). Dominating versus eliminating the competition: Sex differences in human intrasexual aggression. *Behavioral and Brain Sciences*, 32, 268–269. doi:10.1017/S0140525X0999046X
- Benenson, J. F., Apostoleris, N. H., & Parnass, J. (1997). Age and sex differences in dyadic and group interactions. *Developmental Psychology*, 33, 538–543. doi:10.1037/0012-1649.33.3.538
- Benenson, J. F., & Christakos, A. (2003). The greater fragility of females' versus males' closest same-sex friendships. *Child Development*, 74, 1123–1129. doi:10.1111/1467-8624.00596
- Benenson, J. F., Markovits, H., Fitzgerald, C., Geoffroy, D., Flemming, J., Kahlenberg, S. M., & Wrangham, R. W. (2009). Male's greater tolerance of same-sex peers. *Psychological Science*, 20, 184–190. doi:10.1111/j.1467-9280.2009.02269.x
- Benenson, J. F., Markovits, H., Thompson, M. E., & Wrangham, R. W. (2011). Under threat of social exclusion, females exclude more than males. *Psychological Science*, 22, 538–544. doi:10.1177/0956797611402511
- Ben-Ner, A., Putterman, L., Kong, F., & Magan, D. (2004). Reciprocity in a two part dictator game. *Journal of Economic Behavior & Organization*, 53, 333–352. doi:10.1016/j.jebo.2002.12.001
- Bettencourt, B. A., & Miller, N. (1996). Gender differences in aggression as a function of provocation: A meta-analysis. *Psychological Bulletin*, 119, 422–447. doi:10.1037/0033-2909.119.3.422
- \*Bixenstine, V. E., Chambers, N., & Wilson, K. V. (1964). Effect of

- asymmetry in payoff on behavior in a two-person non-zero-sum game. *Journal of Conflict Resolution*, 8, 151–159. doi:10.1177/002200276400800206
- \*Bixenstine, V. E., & Garebelein, J. W. (1971). Strategies of “real” opponents in eliciting cooperative choice in a prisoner’s dilemma game. *Journal of Conflict Resolution*, 15, 157–166. doi:10.1177/002200277101500204
- \*Bixenstine, V. E., & O’Reilly, E. F. (1966). Money versus electric shock as payoff in a prisoner’s dilemma game. *The Psychological Record*, 16, 251–264.
- \*Bixenstine, V. E., Potash, H. M., & Wilson, K. V. (1963). Effects of level of cooperative choice by the other player on choices in a prisoner’s dilemma game: Part I. *Journal of Abnormal and Social Psychology*, 66, 308–313. doi:10.1037/h0040167
- \*Bixenstine, V. E., & Wilson, K. V. (1963). Effects of level of cooperative choice by the other player on choices in a prisoner’s dilemma game: Part II. *The Journal of Abnormal and Social Psychology*, 67, 139–147. doi:10.1037/h0044242
- \*Black, T. E., & Higbee, K. L. (1973). Effects of power, threat, and sex on exploitation. *The Journal of Personality and Social Psychology*, 27, 382–388. doi:10.1037/h0034937
- Boesch, C., & Boesch-Achermann, H. (2000). *The chimpanzees of the Tai Forest: Behavioral ecology and evolution*. New York, NY: Oxford University Press.
- Bolton, G. E., & Katok, E. (1995). An experimental test for gender differences in beneficent behavior. *Economic Letters*, 48, 287–292. doi:10.1016/0165-1765(94)00621-8
- \*Bonacich, P. (1972). Norms and cohesion as adaptive responses to potential conflict: An experimental study. *Sociometry*, 35, 357–375. doi:10.2307/2786500
- \*Boone, C., Brabander, B. D., & van Witteloostuijn, A. (1999). The impact of personality on behavior in five prisoner’s dilemma games. *Journal of Economic Psychology*, 20, 343–377. doi:10.1016/S0167-4870(99)00012-4
- \*Boone, C., Declerck, C., & Kiyonari, T. (2010). Inducing cooperative behavior among proselves versus prosocials: The moderating role of incentives versus trust. *Journal of Conflict Resolution*, 54, 799–824. doi:10.1177/0022002710372329
- Bowles, S. (2006, December 8). Group competition, reproductive leveling, and the evolution of human altruism. *Science*, 314, 1569–1572. doi:10.1126/science.1134829
- Bowles, S. (2009, June 5). Did warfare amongst ancestral hunter-gatherers affect the evolution of human social behaviors? *Science*, 324, 1293–1298. doi:10.1126/science.1168112
- Bradley, B. J., Doran-Sheehy, D. M., Lukas, D., Boesch, C., & Vigilant, L. (2004). Dispersed male networks in Western gorillas. *Current Biology*, 14, 510–513. doi:10.1016/j.cub.2004.02.062
- \*Brickman, P., Becker, L. J., & Castle, S. (1979). Making trust easier and harder through two forms of sequential interaction. *Journal of Personality and Social Psychology*, 37, 515–521. doi:10.1037/0022-3514.37.4.515
- \*Brown, A. (2006). *Decision-making in social dilemmas: Positive and negative framing, payoff structure, and affect* (Unpublished doctoral dissertation). Miami University, Oxford, OH.
- \*Brown, A., & Stasser, G. (2004). [Gender and take-some dilemmas]. Unpublished raw data, Miami University, Oxford, OH.
- \*Brown, K. M., & Taylor, L. O. (2000). Do as you say, say as you do: Evidence on gender differences in actual and stated contributions to public goods. *Journal of Economic Behavior & Organization*, 43, 127–139. doi:10.1016/S0167-2681(00)00113-X
- \*Brown-Kruse, J., & Hummels, D. (1993). Gender effects in laboratory public goods contribution: Do individuals put their money where their mouth is? *Journal of Economic Behavior & Organization*, 22, 255–267. doi:10.1016/0167-2681(93)90001-6
- Buchan, N. R., Croson, R. T. A., & Solnick, S. (2008). Trust and gender: An examination of behavior and beliefs in the investment game. *Journal of Economic Behavior & Organization*, 68, 466–476. doi:10.1016/j.jebo.2007.10.006
- \*Buchan, N. R., Grimalde, G., Wilson, R., Brewer, M., Fates, E., & Foddy, M. (2009). Globalization and human cooperation. *Proceedings of the National Academy of Sciences of the United States of America*, 106, 4138–4142. doi:10.1073/pnas.0809522106
- Bugental, D. B., & Beaulieu, D. A. (2009). Sex differences in response to coalitional threat. *Evolution and Human Behavior*, 30, 238–243. doi:10.1016/j.evolhumbehav.2009.02.002
- Buss, D. M. (1989). Sex differences in human mate preferences: Evolutionary hypotheses tested in 37 cultures. *Behavioral and Brain Sciences*, 12, 1–49. doi:10.1017/S0140525X00023992
- Buss, D. M. (1995). Psychological sex differences: Origins through selection. *American Psychologist*, 50, 164–168. doi:10.1037/0003-066X.50.3.164
- Buss, D. M. (2005). *The handbook of evolutionary psychology*. Hoboken, NJ: Wiley.
- Buss, D. M., & Schmidt, D. P. (1993). Sexual strategies theory: An evolutionary perspective on human mating. *Psychological Review*, 100, 204–232. doi:10.1037/0033-295X.100.2.204
- \*Cadsby, C. B., Hamaguchi, Y., Kawagoe, T., Maynes, E., & Song, F. (2007). Cross-national gender differences in behavior in a threshold public goods game: Japan versus Canada. *Journal of Economic Psychology*, 28, 242–260. doi:10.1016/j.joep.2006.06.009
- \*Cadsby, C. B., & Maynes, E. (1998). Gender and free riding in a threshold public goods game: Experimental evidence. *Journal of Economic Behavior & Organization*, 34, 603–620. doi:10.1016/S0167-2681(97)00010-3
- \*Caldwell, M. D. (1976). Communication and sex effects in a five-person prisoner’s dilemma. *Journal of Personality and Social Psychology*, 33, 273–280. doi:10.1037/0022-3514.33.3.273
- Campbell, A., Muncer, M., & Gorman, B. (1993). Sex and social representations of aggression: A communal-agentic analysis. *Aggressive Behavior*, 19, 125–135. doi:10.1002/1098-2337(1993)19:2<125::AID-AB2480190205>3.0.CO;2-1
- \*Campbell, W. K., Bush, C. P., & Brunell, A. B. (2005). Understanding the social costs of narcissism: The case of the tragedy of the commons. *Personality and Social Psychology Bulletin*, 31, 1358–1368. doi:10.1177/0146167205274855
- \*Carment, D. W. (1974). Effects of sex role in a maximizing difference game: A replication in Canada. *Journal of Conflict Resolution*, 18, 461–472. doi:10.1177/002200277401800305
- Chapais, B. (2008). *Primeval kinship: How pair-bonding gave birth to human society*. Cambridge, MA: Harvard University Press.
- \*Charness, G., & Rustishini, A. (2010). Gender differences in cooperation with group membership. *Games and Economic Behavior*, 72, 77–85. doi:10.1016/j.geb.2010.07.006
- Chatman, J. A., & O’Reilly, C. A. (2004). Asymmetric reactions to work group sex diversity among men and women. *Academy of Management Journal*, 47, 193–208. doi:10.2307/20159572
- Chaudhuri, A., & Gangadharan, L. (2003). *Gender differences in trust and reciprocity*. Unpublished manuscript, University of Auckland, New Zealand.
- \*Clark, K., & Sefton, M. (2001). The sequential prisoner’s dilemma: Evidence on reciprocity. *The Economic Journal*, 111, 51–68. doi:10.1111/1468-0297.00588
- \*Clark, M. L. (1983). Effect of confederate’s sex and status on competitive behavior of male and female college students. *The Journal of Psychology*, 113, 191–198. doi:10.1080/00223980.1983.9923575
- \*Cohen, T. R., Wildschut, T., & Insko, C. A. (2010). How communication increases interpersonal cooperation in mixed-motive dilemmas. *Journal of Experimental Psychology*, 46, 39–50. doi:10.1016/j.jesp.2009.09.009

- \*Conrath, D. W. (1972). Sex role and "cooperation" in the game of Chicken. *Journal of Conflict Resolution*, *16*, 433–443. doi:10.1177/002200277201600311
- Conway, M., Pizzamiglio, M. T., & Mount, L. (1996). Status, communal-ity, and agency: Implications for stereotypes of gender and other groups. *Journal of Personality and Social Psychology*, *71*, 25–38. doi:10.1037/0022-3514.71.1.25
- Cooper, H. M. (1998). *Synthesizing research: A guide for literature re-views* (3rd ed.). Thousand Oaks, CA: Sage.
- \*Corfman, K. P., & Lehmann, D. R. (1994). The prisoner's dilemma and the role of information in setting advertising budgets. *Journal of Adver-tising*, *23*, 35–48.
- Cosmides, L., Tooby, J., & Barkow, J. H. (1992). Introduction: Evolution-ary psychology and conceptual integration. In J. H. Barkow, L. Cos-mides, & J. Tooby (Eds.), *The adapted mind: Evolutionary psychology and the generation of culture* (pp. 3–18). New York, NY: Oxford University Press.
- Costrich, N., Feinstein, J., Kidder, L., Marecek, J., & Pascale, L. (1975). When stereotypes hurt: Three studies of penalties for sex-role reversals. *Journal of Experimental Social Psychology*, *11*, 520–530. doi:10.1016/0022-1031(75)90003-7
- Crosan, R., & Buchan, N. (1999). Gender and culture: International ex-perimental evidence from trust games. *The American Economic Review*, *89*, 386–391. doi:10.1257/aer.89.2.386
- Crosan, R., & Gneezy, U. (2009). Gender differences in preferences. *Journal of Economic Literature*, *47*, 448–474. doi:10.1257/jel.47.2.448
- \*Crosan, R., Marks, M., & Snyder, J. (2008). Group work for women: Gender and group identity in social dilemmas. *Negotiation Journal*, *24*, 411–427. doi:10.1111/j.1571-9979.2008.00195.x
- Cross, S. E., & Madson, L. (1997). Models of the self: Self-construals and gender. *Psychological Bulletin*, *122*, 5–37. doi:10.1037/0033-2909.122.1.5
- \*Crowne, D. P. (1966). Family orientation, level of aspiration, and inter-sonal bargaining. *Journal of Personality and Social Psychology*, *3*, 641–645. doi:10.1037/h0023282
- D'Andrade, R. G. (1989). Cultural cognition. In M. I. Posner (Ed.), *Foundations of cognitive science* (pp. 795–830). Cambridge, MA: MIT Press.
- Darwin, C. (1871). *The descent of man, and selection in relation to sex*. New York, NY: Appleton.
- Dawes, R. M. (1980). Social dilemmas. *Annual Review of Psychology*, *31*, 169–193. doi:10.1146/annurev.ps.31.020180.001125
- \*Dawes, R. M., McTavish, J., & Shaklee, H. (1977). Behavior, commu-nication, and assumptions about other people's behavior in a commons dilemma situation. *Journal of Personality and Social Psychology*, *35*, 1–11. doi:10.1037/0022-3514.35.1.1
- Deaux, K., & LaFrance, M. (1998). Gender. In D. T. Gilbert, S. T. Fiske, & G. Lindzey (Eds.), *The handbook of social psychology* (4th ed., pp. 788–827). New York, NY: Oxford University Press.
- Deaux, K., & Lewis, L. L. (1984). Structure of gender stereotypes: Inter-relationships among components and gender label. *Journal of Person-ality and Social Psychology*, *46*, 991–1004. doi:10.1037/0022-3514.46.5.991
- Deaux, K., & Major, B. (1987). Putting gender into context: An interactive model of gender-related behavior. *Psychological Review*, *94*, 369–389. doi:10.1037/0033-295X.94.3.369
- \*Declerck, C. H., Boone, C., & Kiyonari, T. (2010). Oxytocin and coop-eration under conditions of uncertainty: The modulating role of incen-tives in social information. *Hormones and Behavior*, *57*, 368–374. doi:10.1016/j.yhbeh.2010.01.006
- \*De Cremer, D., & Van Dijk, E. (2009). Paying for sanction in social dilemmas: The effects of endowment asymmetry and accountability. *Organizational Behavior and Human Decision Processes*, *109*, 45–55. doi:10.1016/j.obhdp.2009.01.004
- De Dreu, C. K. W. (2010). Social conflict: The emergence and conse-quences of struggle and negotiation. In S. T. Fiske, D. T. Gilbert, & G. Lindzey (Eds.), *Handbook of social psychology* (5th ed., pp. 983–1023). Hoboken, NJ: Wiley.
- de Waal, F. B. M. (2000, July 28). Primates—A natural heritage of conflict resolution. *Science*, *289*, 586–590. doi:10.1126/science.289.5479.586
- Diekmann, A. B., & Eagly, A. H. (2008). Of men, women, and motivation: A role congruity account. In J. Y. Shaw & W. L. Gardner (Eds.), *Handbook of motivation science* (pp. 434–447). London, England: Guil-ford Press.
- \*Dolbear, F. T., Lave, L. B., Bowman, G., Lieberman, A., Prescott, E., Rueter, F., & Sherman, R. (1969). Collusion in the prisoner's dilemma: Number of strategies. *Journal of Conflict Resolution*, *13*, 252–261. doi:10.1177/002200276901300206
- \*Drouvelis, M., Metcalfe, R., & Powdthavee, N. (2010). *Priming cooper-ation in social dilemma games*. Unpublished manuscript, University of York, England.
- Dufwenberg, M., & Muren, A. (2006). Generosity, anonymity, and gender. *Journal of Economic Behavior & Organization*, *61*, 42–49. doi:10.1016/j.jebo.2004.11.007
- Dunbar, R. I. M. (1996). *Grooming, gossip, and the evolution of language*. New York, NY: Harvard University Press.
- Dupanloup, I., Pereira, L., Bertorelle, G., Calafell, F., Prata, M. J., Amo-rim, A., & Barbujani, G. (2003). A recent shift from polygyny to monogamy in humans is suggested by the analysis of worldwide Y-chromosome diversity. *Journal of Molecular Evolution*, *57*, 85–97. doi:10.1007/s00239-003-2458-x
- Duval, S., & Tweedie, R. (2000). Trim and fill: A simple funnel-plot-based method of testing and adjusting for publication bias in meta-analysis. *Biometrics*, *56*, 455–463. doi:10.1111/j.0006-341X.2000.00455.x
- Eagly, A. H. (2009). The his and hers of prosocial behavior: An exami-nation of the social psychology of gender. *American Psychologist*, *64*, 644–658. doi:10.1037/0003-066X.64.8.644
- Eagly, A. H., & Crowley, M. (1986). Gender and helping behavior: A meta-analytic review of the social psychological literature. *Psychologi-cal Bulletin*, *100*, 283–308. doi:10.1037/0033-2909.100.3.283
- Eagly, A. H., & Johnson, B. T. (1990). Gender and leadership style: A meta-analysis. *Psychological Bulletin*, *108*, 233–256. doi:10.1037/0033-2909.108.2.233
- Eagly, A. H., & Steffen, V. J. (1984). Gender stereotypes stem from the distribution of women and men into social roles. *Journal of Personality and Social Psychology*, *46*, 735–754. doi:10.1037/0022-3514.46.4.735
- Eagly, A. H., & Steffen, V. J. (1986). Gender and aggressive behavior: A meta-analytic review of the social psychological literature. *Psychologi-cal Bulletin*, *100*, 309–330. doi:10.1037/0033-2909.100.3.309
- Eagly, A. H., & Wood, W. (1991). Explaining sex differences in social behavior: A meta-analytic review. *Personality and Social Psychology Bulletin*, *17*, 306–315. doi:10.1177/0146167291173011
- Eagly, A. H., & Wood, W. (1999). The origins of sex differences in human behavior: Evolved dispositions versus social roles. *American Psycholo-gist*, *54*, 408–423. doi:10.1037/0003-066X.54.6.408
- Eagly, A. H., & Wood, W. (2011). Social role theory. In P. A. M. Van Lange, A. Kruglanski, & E. T. Higgins (Eds.), *Handbook of theories in social psychology* (Vol. 2, pp. 458–476). London, England: Sage.
- Eals, M., & Silverman, I. (1994). The hunter-gatherer theory of spatial sex differences: Proximate factors mediating the female advantage in recall of object arrays. *Ethology and Sociobiology*, *15*, 95–105. doi:10.1016/0162-3095(94)90020-5
- Eckel, C. C., & Grossman, P. J. (1996). The relative price of fairness: Gender differences in a punishment game. *Journal of Economic Behav-ior & Organization*, *30*, 143–158. doi:10.1016/S0167-2681(96)00854-2
- Eckel, C. C., & Grossman, P. J. (2001). Chivalry and solidarity in ultima-tum games. *Economic Inquiry*, *39*, 171–188. doi:10.1111/j.1465-7295.2001.tb00059.x

- Eckes, T., & Trautner, H. M. (2000). Developmental social psychology of gender: An integrative framework. In T. Eckes & H. M. Trautner (Eds.), *The developmental social psychology of gender* (pp. 3–32). Mahwah, NJ: Erlbaum.
- \*Eek, D., & Biel, A. (2003). The interplay between greed, efficiency, and fairness in public-goods dilemmas. *Social Justice Research, 16*, 195–215. doi:10.1023/A:1025984611796
- Ember, C. R. (1975). Residential variation among hunter-gatherers. *Cross-Cultural Research, 10*, 199–227. doi:10.1177/106939717501000302
- \*Enzle, M. E., Harvey, M. D., & Wright, E. F. (1992). Implicit role obligations versus social responsibility in constituency representation. *Journal of Personality and Social Psychology, 62*, 238–245. doi:10.1037/0022-3514.62.2.238
- \*Evans, G. W., & Crumbaugh, C. M. (1966). Payment schedule, sequence of choice, and cooperation in the prisoner's dilemma game. *Psychonomic Science, 5*, 87–88.
- \*Farrelly, D., Lazarus, J., & Roberts, G. (2007). Altruists attract. *Evolutionary Psychology, 5*, 313–329.
- Fehr, E., Bernhard, H., & Rockenbach, B. (2008, August 28). Egalitarianism in young children. *Nature, 454*, 1079–1083. doi:10.1038/nature07155
- Feingold, A. (1994). Gender differences in personality: A meta-analysis. *Psychological Bulletin, 116*, 429–456. doi:10.1037/0033-2909.116.3.429
- \*Ferguson, E. D., & Schmitt, S. (1988). Gender-linked stereotypes and motivation affect performance in the prisoner's dilemma game. *Perceptual and Motor Skills, 66*, 703–714.
- \*Ferrin, D. L., Bligh, M. C., & Kohlse, J. C. (2008). It takes two to tango: An interdependence analysis of the spiraling of perceived trustworthiness and cooperation in interpersonal and intergroup relationships. *Organizational Behavior and Human Decision Processes, 107*, 161–178. doi:10.1016/j.obhdp.2008.02.012
- \*Fisher, R., & Smith, W. P. (1969). Conflict of interest and attraction in the development of cooperation. *Psychonomic Science, 14*, 154–155.
- \*Fleishman, J. A. (1988). The effects of decision framing and others' behavior on cooperation in a social dilemma. *Journal of Conflict Resolution, 32*, 162–180. doi:10.1177/0022002788032001008
- Flinn, M. V., & Low, B. S. (1986). Resource distribution, social competition, and mating patterns in human societies. In D. Rubinstien & R. Wrangham (Eds.), *Ecological aspects of social evolution* (pp. 217–243). Princeton, NJ: Princeton University Press.
- Flinn, M. V., & Ward, C. V. (2005). Ontogeny and evolution of the social child. In B. J. Ellis & D. F. Bjorkland (Eds.), *Origins of the social mind: Evolutionary psychology and child development* (pp. 19–44). New York, NY: Guilford Press.
- Foley, R. (1995). The adaptive legacy of human evolution: A search for the environment of evolutionary adaptedness. *Evolutionary Anthropology, 4*, 194–203. doi:10.1002/evan.1360040603
- Foley, R. A., & Lee, P. C. (1989, February 17). Finite social space, evolutionary pathways, and reconstructing hominid behavior. *Science, 243*, 901–906. doi:10.1126/science.2493158
- \*Fox, J., & Guyer, M. (1978). "Public" choice and cooperation in n-person prisoner's dilemma. *Journal of Conflict Resolution, 22*, 469–481. doi:10.1177/002200277802200307
- \*Frank, R. H., Gilovich, T., & Regan, D. T. (1993). Does studying economics inhibit cooperation? *Journal of Economic Perspectives, 7*, 159–171.
- \*Fudenberg, D., Rand, D. G., & Dreber, A. (2010). *Slow to anger and fast to forgive: Cooperation in an uncertain world*. Unpublished manuscript, Harvard University, Cambridge, MA.
- \*Gabriel, S., & Gardner, W. L. (1999). Are there "his" and "hers" types of interdependence? The implications of gender differences in collective versus relational interdependence for affect, behavior, and cognition. *Journal of Personality and Social Psychology, 77*, 642–655. doi:10.1037/0022-3514.77.3.642
- \*Gallo, P. S., Funk, S. G., & Levine, J. R. (1969). Reward size, method of presentation, and number of alternatives in a prisoner's dilemma game. *Journal of Personality and Social Psychology, 13*, 239–244. doi:10.1037/h0028283
- \*Gallo, P., & Sheposh, J. (1971). Effects of incentive magnitude on cooperation in the prisoner's dilemma game: A reply to Gumpert, Deutsch, and Epstein. *Journal of Personality and Social Psychology, 19*, 42–46. doi:10.1037/h0031092
- Gangestad, S. W., Simpson, J. A., Cousins, A. J., Garver-Apgar, C. E., & Christensen, P. N. (2004). Women's preferences for male behavioral displays change across the menstrual cycle. *Psychological Science, 15*, 203–207. doi:10.1111/j.0956-7976.2004.01503010.x
- \*Garza, R. T., & Borchert, J. E. (1990). Maintaining social identity in a mixed-gender setting: Minority/majority status and cooperative/competitive feedback. *Sex Roles, 22*, 679–691. doi:10.1007/BF00292054
- Gat, A. (2006). *War in human civilization*. Oxford, England: Oxford University Press.
- Geary, D. C. (2009). Sex differences in reciprocal altruism: Reply to Mower. *Journal for the Theory of Social Behaviour, 39*, 121–124. doi:10.1111/j.1468-5914.2008.00392.x
- Geary, D. C. (2010). *Male, female: The evolution of human sex differences*. Washington, DC: American Psychological Association. doi:10.1037/12072-000
- Geary, D. C., Byrd-Craven, J., Haord, M. K., Vigil, J., & Numtee, C. (2003). Evolution and development of boys' social behavior. *Developmental Review, 23*, 444–470. doi:10.1016/j.dr.2003.08.001
- \*Gillis, J. S., & Woods, G. T. (1971). The 16pf as an indicator of performance in the prisoner's dilemma. *Journal of Conflict Resolution, 15*, 393–402. doi:10.1177/002200277101500310
- \*Goehring, D. J., & Kahan, J. P. (1976). The uniform n-person prisoner's dilemma game: Construction and test of an index of cooperation. *Journal of Conflict Resolution, 20*, 111–128. doi:10.1177/002200277602000104
- Goodall, J. (1986). *The chimpanzees of Gombe: Patterns of behavior*. Cambridge, MA: Harvard University Press.
- \*Granberg, D., & Stevens, J. S. (1975). Effect of communication on cooperation in expanded prisoner's dilemma and chicken games. *Simulation & Gaming, 6*, 166–187. doi:10.1177/104687817500600203
- \*Grant, M. J., & Sermat, V. (1969). Status and sex of other as determinants of behavior in a mixed-motive game. *Journal of Personality and Social Psychology, 12*, 151–157. doi:10.1037/h0027573
- \*Greig, F., & Bohnet, I. (2009). Exploring gendered behavior in the field with experiments: Why public goods are provided by women in a Nairobi slum. *Journal of Economic Behavior & Organization, 70*, 1–9. doi:10.1016/j.jebo.2008.12.006
- Griskevicius, V., Tybur, J. M., Sundie, J. M., Cialdini, R. B., Miller, G. E., & Kenrick, D. T. (2007). Blatant benevolence and conspicuous consumption: When romance motives elicit strategic costly signals. *Journal of Personality and Social Psychology, 93*, 85–102. doi:10.1037/0022-3514.93.1.85
- Guilaine, J., & Zammit, J. (2004). *The origins of war: Violence in prehistory*. Malden, MA: Blackwell.
- \*Hamburger, H., Guyer, M., & Fox, J. (1975). Group size and cooperation. *Journal of Conflict Resolution, 19*, 503–531. doi:10.1177/002200277501900307
- Hamilton, W. D. (1964). The genetical evolution of social behavior. *Journal of Theoretical Biology, 7*, 1–16. doi:10.1016/0022-5193(64)90038-4
- Hammer, M. F., Mendez, F. L., Cox, M. P., Woerner, A. E., & Wall, J. D. (2008). Sex-biased evolutionary forces shape genomic patterns of human diversity. *PLoS Genetics, 4*, 1–8. doi:10.1371/journal.pgen.1000202

- \*Hardy, C. L., & van Vugt, M. (2006). Nice guys finish first: The competitive altruism hypothesis. *Personality and Social Psychology Bulletin*, 32, 1402–1413. doi:10.1177/0146167206291006
- \*Hartman, E. A. (1974). Degree of cooperation in a prisoner's dilemma as a function of sex roles, responsiveness and the exploitativeness of the simulated other. *Personality and Social Psychology Bulletin*, 1, 287–289. doi:10.1177/014616727400100197
- \*Hartman, E. A. (1980). Motivational bases of sex differences in choice behavior. *Journal of Conflict Resolution*, 24, 455–475. doi:10.1177/002200278002400304
- Hawkes, K., & Bliege Bird, R. (2002). Showing off, handicap signaling, and the evolution of men's work. *Evolutionary Anthropology*, 11, 58–67. doi:10.1002/evan.20005
- Hedges, L. V., & Olkin, I. (1985). *Statistical methods for meta-analysis*. Orlando, FL: Academic Press.
- Hemelrijk, C. K., & Gygas, L. (2004). Dominance style, differences between the sexes and species. *Interaction Studies*, 5, 131–146. doi:10.1075/is.5.1.07hem
- \*Hemesath, M., & Pomponio, X. (1998). Cooperation and culture: Students from China and the United States in a prisoner's dilemma. *Cross-Cultural Research*, 32, 171–184. doi:10.1177/106939719803200203
- Henrich, J., Heine, S. J., & Norenzayan, A. (2010). The weirdest people in the world? *Behavioral and Brain Sciences*, 33, 61–83. doi:10.1017/S0140525X0999152X
- Henrich, N., & Henrich, J. (2007). *Why humans cooperate: A cultural and evolutionary explanation*. Oxford, England: Oxford University Press.
- Hill, K. R., Walker, R., Bozovic, M., Eder, J., Headland, T., Hewlett, B., ... Wood, B. (2011, March 11). Unique patterns of kin coresidence characterize hunter-gatherer societies. *Science*, 331, 1286–1289. doi:10.1126/science.1199071
- Hofstede, G. (2001). *Cultures consequences: Comparing values, behaviors, institutions, and organizations across nations* (2nd ed.). Thousand Oaks, CA: Sage.
- Hogg, M. A., & Turner, J. C. (1987). Intergroup behavior, self-stereotyping, and the salience of social categories. *British Journal of Social Psychology*, 26, 325–340. doi:10.1111/j.2044-8309.1987.tb00795.x
- \*Holm, H. J. (2000). Gender-biased focal points. *Games and Economic Behavior*, 32, 292–314. doi:10.1006/game.1998.0685
- \*Hopthrow, T., Abrams, D., Frings, D., & Hulbert, L. G. (2007). Group-drink: The effects of alcohol on intergroup competitiveness. *Psychology of Addictive Behaviors*, 21, 272–276. doi:10.1037/0893-164X.21.2.272
- \*Horai, J., & Tedeschi, J. T. (1969). Effects of credibility and magnitude of punishment on compliance to threats. *Journal of Personality and Social Psychology*, 12, 164–169. doi:10.1037/h0027486
- \*Horai, J., & Tedeschi, J. T. (1975). Compliance and the use of threats and promises after a power reversal. *Behavioral Science*, 20, 117–124. doi:10.1002/bs.3830200204
- \*Hottes, J. H., & Kahn, A. (1974). Sex differences in a mixed-motive conflict situation. *Journal of Personality*, 42, 260–275. doi:10.1111/j.1467-6494.1974.tb00673.x
- \*Hu, Y., & Liu, D. (2003). Altruism versus egoism in human behavior of mixed-motives. *American Journal of Economics and Sociology*, 62, 677–705. doi:10.1111/1536-7150.00240
- \*Huntoon, A. (2006). Norms, personality traits, values, and gender: The use of injunctive and descriptive norms in public goods dilemmas. *Dissertation Abstracts International: Section B. Sciences and Engineering*, 67(2), 1206.
- Hyde, J. S. (2005). The gender similarity hypothesis. *American Psychologist*, 60, 581–592. doi:10.1037/0003-066X.60.6.581
- \*Insko, C. A., Kirchner, J. L., Pinter, B., Efav, J., & Wildschut, T. (2005). Interindividual–intergroup discontinuity as a function of trust and categorization: The paradox of expected cooperation. *Journal of Personality and Social Psychology*, 88, 365–385. doi:10.1037/0022-3514.88.2.365
- \*Insko, C. A., Pinkley, R. L., Hoyle, R. H., & Dalton, B. (1987). Individual versus group discontinuity: The role of intergroup contact. *Journal of Experimental Social Psychology*, 23, 250–267. doi:10.1016/0022-1031(87)90035-7
- \*Insko, C. A., Schopler, J., Drigotas, S. M., & Graetz, K. A. (1993). The role of communication in interindividual–intergroup discontinuity. *Journal of Conflict Resolution*, 37, 108–138. doi:10.1177/0022002793037001005
- \*Iredale, W., Van Vugt, M., & Dunbar, R. (2008). Showing off in humans: Male generosity as a mating signal. *Evolutionary Psychology*, 6, 386–392. doi:10.1556/JEP.2007.1013
- \*Jackson, J. W. (2001). Effects of endowment amount and attributions on responses to a subgroup social dilemma. *Group Dynamics: Theory, Research, and Practice*, 5, 67–80. doi:10.1037/1089-2699.5.2.67
- \*Jackson, J. W. (2008). Reactions to social dilemmas as a function of group identity, rational calculations, and social context. *Small Group Research*, 39, 673–705. doi:10.1177/1046496408322761
- \*James, T., Soroka, L., & Benjafield, J. G. (2001). Are economists rational, or just different? *Social Behavior and Personality*, 29, 359–364. doi:10.2224/sbp.2001.29.4.359
- \*Jaster, D., & Arrow, H. (2010). *Trust in friends or loyalty to the group: Sex differences in cooperation rates during public goods dilemmas*. Working paper, University of Oregon, Eugene.
- Josephson, S. C. (2002). Does polygyny reduce fertility? *American Journal of Human Biology*, 14, 222–232. doi:10.1002/ajhb.10045
- \*Kahn, A., Hottes, J., & Davis, W. L. (1971). Cooperation and optimal responding in the prisoner's dilemma game: Effects of sex and physical attractiveness. *Journal of Personality and Social Psychology*, 17, 267–279. doi:10.1037/h0030597
- \*Kamas, L., Preston, A., & Baum, S. (2008). Altruism in individual and joint-giving decisions: What's gender got to do with it? *Feminist Economics*, 14, 23–50. doi:10.1080/13545700801986571
- \*Kanouse, D. E., & Wiest, W. M. (1967). Some factors affecting choice in the prisoner's dilemma. *Journal of Conflict Resolution*, 11, 206–213. doi:10.1177/002200276701100208
- Karremans, J. C., & Van Lange, P. A. M. (2004). Back to caring after being hurt: The role of forgiveness. *European Journal of Social Psychology*, 34, 207–227. doi:10.1002/ejsp.192
- Keeley, L. H. (1996). *War before civilization: The myth of the peaceful savage*. Oxford, England: Oxford University Press.
- Kelley, H. H., Holmes, J. G., Kerr, N. L., Reis, H. T., Rusbult, C. E., & Van Lange, P. A. M. (2003). *An atlas of interpersonal situations*. New York, NY: Cambridge University Press.
- Kelley, H. H., & Stahelski, A. J. (1970). Social interaction basis of cooperators' and competitors' beliefs about others. *Journal of Personality and Social Psychology*, 16, 66–91. doi:10.1037/h0029849
- Kelly, S., & Dunbar, R. I. M. (2001). Who dares wins: Heroism versus altruism in women's mate choice. *Human Nature*, 12, 89–105. doi:10.1007/s12110-001-1018-6
- \*Kennelly, A., & Fantino, E. (2007). The sharing game: Fairness in resource allocation as a function of incentive, gender, and recipient types. *Judgment and Decision Making*, 2, 204–216.
- Kenrick, D. T., & Keefe, R. C. (1992). Age preferences in mates reflect sex differences in human reproductive strategies. *Behavioral and Brain Sciences*, 15, 75–91. doi:10.1017/S0140525X00067595
- Kenrick, D. T., Li, N. L., & Butner, J. (2003). Dynamical evolutionary psychology: Individual decision rules and emergent social norms. *Psychological Review*, 110, 3–28. doi:10.1037/0033-295X.110.1.3
- Kenrick, D. T., & Luce, C. L. (2000). An evolutionary life-history model of gender differences and similarities. In T. Eckes & H. M. Trautner (Eds.), *The developmental social psychology of gender* (pp. 35–63). Mahwah, NJ: Erlbaum.
- Kenrick, D. T., Trost, M. R., & Sundie, J. M. (2004). Sex roles as adaptations: An evolutionary perspective on gender differences and



- similarities. In A. Eagly, A. Beall, & R. Sternberg (Eds.), *Psychology of gender* (pp. 65–91). New York, NY: Guilford Press.
- \*Kershenbaum, B. R., & Komorita, S. S. (1970). Temptation to defect in the prisoner's dilemma game. *Journal of Personality and Social Psychology, 16*, 110–113. doi:10.1037/h0029839
- \*Kiesler, S., Sproull, L., & Waters, K. (1996). A prisoner's dilemma experiment on cooperation with people and human-like computers. *Journal of Personality and Social Psychology, 70*, 47–65. doi:10.1037/0022-3514.70.1.47
- \*Knight, G. P. (1980). Behavioral similarity, confederate strategy, and sex composition of dyad as determinants of interpersonal judgments and behavior in the prisoner's dilemma game. *Journal of Research in Personality, 14*, 91–103. doi:10.1016/0092-6566(80)90043-4
- Knight, G. P., & Chao, C. (1989). Gender differences in the cooperative, competitive, and individualistic social values of children. *Motivation and Emotion, 13*, 125–141. doi:10.1007/BF00992958
- Kollock, P. (1998). Social dilemmas: The anatomy of cooperation. *Annual Review of Sociology, 24*, 183–214. doi:10.1146/annurev.soc.24.1.183
- \*Komorita, S. S. (1965). Cooperative choice in a prisoner's dilemma game. *Journal of Personality and Social Psychology, 2*, 741–745. doi:10.1037/h0022673
- \*Komorita, S. S., & Mechling, J. (1967). Betrayal and reconciliation in a two-person game. *Journal of Personality and Social Psychology, 6*, 349–353. doi:10.1037/h0024736
- Komorita, S. S., & Parks, C. D. (1994). *Social dilemmas*. Boulder, CO: Westview Press.
- Kopelman, S., Weber, J. M., & Messick, D. M. (2002). Factors influencing cooperation in the commons dilemmas: A review of experimental psychological research. In E. Ostrom, T. Dietz, N. Dolsak, P. C. Stern, S. Stonich, & E. U. Weber (Eds.), *The drama in the commons* (pp. 113–156). New York, NY: The National Academy Press.
- \*Kortenkamp, K. V., & Moore, C. F. (2006). Time, uncertainty, and individual differences in decisions to cooperate in resource dilemmas. *Personality and Social Psychology Bulletin, 32*, 603–615. doi:10.1177/0146167205284006
- \*Kramer, R. M., & Brewer, M. B. (1984). Effects of group identity on resource use in a simulated commons dilemma. *Journal of Personality and Social Psychology, 46*, 1044–1057. doi:10.1037/0022-3514.46.5.1044
- Kruger, D. J., & Nesse, R. M. (2004). Sexual selection and the male:female mortality ratio. *Evolutionary Psychology, 2*, 66–85.
- \*Kube, S., & Traxler, C. (2009). *The interaction of legal and social norm enforcement*. Unpublished manuscript, Max Planck Institute for Research on Collective Goods, Bonn, Germany.
- \*Kuhlman, D. M., & Marshello, A. F. (1975). Individual differences in game motivation as moderators of preprogrammed strategy effects in the prisoner's dilemma. *Journal of Personality and Social Psychology, 32*, 922–931. doi:10.1037/0022-3514.32.5.922
- \*Kümmerli, R., Colliard, C., Fiechter, N., Petitpierre, B., Russier, F., & Keller, L. (2007). Human cooperation in social dilemmas: Comparing the snowdrift game with the prisoner's dilemma. *Proceedings of the Royal Society B: Biological Sciences, 274*, 2965–2970. doi:10.1098/rspb.2007.0793
- \*Kurzban, R. (2001). The social psychophysics of cooperation: Nonverbal communication in a public goods game. *Journal of Nonverbal Behavior, 25*, 241–259. doi:10.1023/A:1012563421824
- \*Kurzban, R., & Houser, D. (2001). Individual differences in cooperation in a circular public goods game. *European Journal of Personality, 15*, S37–S52. doi:10.1002/per.420
- \*Kuwabara, K. (2005). Nothing to fear but fear itself: Fear of fear, fear of greed and gender effects in two-person asymmetric social dilemmas. *Social Forces, 84*, 1257–1272. doi:10.1353/sof.2006.0020
- \*Lacy, W. B. (1978). Assumptions of human nature, and initial expectations and behavior as mediators of sex effects in prisoner's dilemma research. *Journal of Conflict Resolution, 22*, 269–281. doi:10.1177/002200277802200204
- LeBlanc, S., & Register, K. E. (2003). *Constant battles: The myth of the peaceful, noble savage*. New York, NY: St. Martin's Press.
- Ledyard, J. O. (1995). Public goods: A survey of experimental research. In J. H. Kagel & A. E. Roth (Eds.), *The handbook of experimental economics* (pp. 111–194). Princeton, NJ: Princeton University Press.
- Li, N. P., Bailey, J. M., Kenrick, D. T., & Linsenmeier, J. A. W. (2002). The necessities and luxuries of mate preferences: Testing the tradeoffs. *Journal of Personality and Social Psychology, 82*, 947–955. doi:10.1037/0022-3514.82.6.947
- Li, N. P., Halterman, R. A., Cason, M. J., Knight, G. P., & Maner, J. K. (2008). The stress-affiliation paradigm revisited: Do people prefer the kindness of strangers or their attractiveness? *Personality and Individual Differences, 44*, 382–391. doi:10.1016/j.paid.2007.08.017
- \*Liebrand, W. B. G. (1984). The effect of social motives, communication, and group size on behavior in an N-person multi-stage mixed-motive game. *European Journal of Social Psychology, 14*, 239–264. doi:10.1002/ejsp.2420140302
- \*Liebrand, W. B. G., & Van Run, G. J. (1985). The effects of social motives on behavior in social dilemmas in two cultures. *Journal of Experimental Social Psychology, 21*, 86–102. doi:10.1016/0022-1031(85)90008-3
- \*Lindskold, S., Han, G., & Betz, B. (1986). Repeated persuasion in interpersonal conflict. *Journal of Personality and Social Psychology, 51*, 1183–1188. doi:10.1037/0022-3514.51.6.1183
- \*Lindskold, S., McElwain, D. C., & Wayner, M. (1977). Cooperation and the use of coercion by groups and individuals. *Journal of Conflict Resolution, 21*, 531–550. doi:10.1177/002200277702100309
- Lipsey, M. W., & Wilson, D. B. (2001). *Practical meta-analysis*. London, England: Sage.
- \*List, J. A. (2006). Friend or foe? A natural experiment of the prisoner's dilemma. *The Review of Economics and Statistics, 88*, 463–471. doi:10.1162/rest.88.3.463
- Lovejoy, O. (2009, October 2). Reexamining human origins in light of *Ardipithecus ramidus*. *Science, 326*, 74e1–74e8.
- Low, B. S. (1989). Cross-cultural patterns in the training of children: An evolutionary perspective. *Journal of Comparative Psychology, 103*, 311–319. doi:10.1037/0735-7036.103.4.311
- \*Lutzker, D. R. (1961). Sex role, cooperation and competition in a two-person non-zero-sum game. *Journal of Conflict Resolution, 5*, 366–368. doi:10.1177/002200276100500403
- Maccoby, E. E. (1990). Gender and relationships: A developmental account. *American Psychologist, 45*, 513–520. doi:10.1037/0003-066X.45.4.513
- Maccoby, E. E., & Jacklin, C. N. (1974). *The psychology of sex differences*. Stanford, CA: Stanford University Press.
- Maccoby, E. E., & Jacklin, C. N. (1987). Gender segregation in childhood. In H. W. Reese (Ed.), *Advances in child development and behavior* (Vol. 20, pp. 239–287). New York, NY: Cambridge University Press. doi:10.1016/S0065-2407(08)60404-8
- Macfarlan, S. J., & Quinlan, R. J. (2008). Kinship, family, and gender effects in the ultimatum game. *Human Nature, 19*, 294–309. doi:10.1007/s12110-008-9045-1
- \*Mack, D., Auburn, P. N., & Knight, G. P. (1971). Sex role identification and behavior in a reiterated prisoner's dilemma game. *Psychonomic Science, 24*, 280–282.
- \*Mack, D., Williams, J. G., & Kremer, J. M. (1979). Perception of a simulated other player and behavior in the reiterated prisoner's dilemma game. *The Psychological Record, 29*, 43–48.
- \*Majolo, B., Ames, K., Brumpton, R., Garratt, R., Hall, K., & Wilson, N. (2006). Human friendship favours cooperation in the iterated prisoner's dilemma. *Behaviour, 143*, 1383–1395. doi:10.1163/156853906778987506

- Major, B., & Adams, J. B. (1983). Role of gender, interpersonal orientation, and self-presentation in distributive-justice behavior. *Journal of Personality and Social Psychology, 45*, 598–608. doi:10.1037/0022-3514.45.3.598
- Manson, J. H., & Wrangham, R. W. (1991). Intergroup aggression in chimpanzees and humans. *Current Anthropology, 32*, 369–390. doi:10.1086/203974
- Markovits, H., & Benenson, J. F. (2010). Males outperform females in translating social relations in to spatial positions. *Cognition, 117*, 332–340. doi:10.1016/j.cognition.2010.09.006
- Marlowe, F. (2004). Marital residence among foragers. *Current Anthropology, 45*, 277–284. doi:10.1086/382256
- Martell, R. F., Lane, D. M., & Emrich, C. (1996). Male–female differences: A computer simulation. *American Psychologist, 51*, 157–158. doi:10.1037/0003-066X.51.2.157
- \*Marwell, G., Schmitt, D. R., & Shotola, R. (1971). Cooperation and interpersonal risk. *Journal of Personality and Social Psychology, 18*, 9–32. doi:10.1037/h0030707
- \*Mason, C. F., Phillips, O. R., & Redington, D. B. (1991). The role of gender in a non-cooperative game. *Journal of Economic Behavior & Organization, 15*, 215–235. doi:10.1016/0167-2681(91)90030-2
- Mauss, M. (1990). *The gift: The form and reason for exchange in archaic societies*. W. D. Halls (Trans.). New York, NY: Norton. (Original work published 1950)
- \*McCallum, D. M., Harring, K., Gilmore, R., Drenan, S., Chase, J. P., Insko, C. A., & Thibaut, J. (1985). Competition and cooperation between groups and between individuals. *Journal of Experimental Social Psychology, 21*, 301–320. doi:10.1016/0022-1031(85)90032-0
- \*McClintock, C. G., Gallo, P., & Harrison, A. A. (1965). Some effects of variations in other strategy upon game behavior. *Journal of Personality and Social Psychology, 1*, 319–325. doi:10.1037/h0021807
- \*McClintock, C. G., & Liebrand, W. G. (1988). Role of interdependence structure, individual value orientation, and another's strategy in social decision making: A transformational analysis. *Journal of Personality and Social Psychology, 55*, 396–409. doi:10.1037/0022-3514.55.3.396
- McClintock, C. G., & McNeel, S. P. (1966). Cross-cultural comparisons of interpersonal motives. *Sociometry, 29*, 406–427. doi:10.2307/2786296
- McGuire, W. J., & McGuire, C. V. (1982). Significant others in self space: Sex differences and developmental trends in social self. In J. Suls (Ed.), *Psychological perspectives on the self* (pp. 71–96). Hillsdale, NJ: Erlbaum.
- \*McKeown, C. D., Gahagan, J. P., & Tedeschi, J. T. (1967). The effect of prior power strategy on behavior after a shift of power. *Journal of Experimental Research in Personality, 2*, 226–233. Retrieved from <http://search.proquest.com/docview/615508067?accountid=10978>
- \*McNeel, S. P., McClintock, C. G., & Nuttin, J. M., Jr. (1972). Effects of sex role in a two-person mixed-motive game. *Journal of Personality and Social Psychology, 24*, 372–380. doi:10.1037/h0033726
- Mead, M. (1961). *Cooperation and competition among primitive peoples*. Boston, MA: Beacon Press.
- \*Meeker, B. F. (1984). Cooperative orientation, trust, and reciprocity. *Human Relations, 37*, 225–243. doi:10.1177/001872678403700304
- \*Meier, S. (2005). *Conditions under which women behave less/more pro-socially than men: Evidence from two field experiments*. Unpublished manuscript, Harvard University, Cambridge, MA.
- \*Meux, E. P. (1973). Concern for the common good in an n-person game. *Journal of Personality and Social Psychology, 28*, 414–418. doi:10.1037/h0035116
- \*Miermin, L. S. (1976). The effects of sex and communication on performance in a three-person mixed-motive game. Adelphi University. *ProQuest Dissertations and Theses*. Retrieved from <http://search.proquest.com/docview/302749791?accountid=10978>
- \*Miller, G. H., & Pyke, S. W. (1973). Sex, matrix variations, and perceived personality effects in mixed-motive games. *Journal of Conflict Resolution, 17*, 335–349. doi:10.1177/002200277301700209
- \*Miller, R. R. (1967). No play: A means of conflict resolution. *Journal of Personality and Social Psychology, 6*, 150–156. doi:10.1037/h0024598
- \*Millet, K., & Dewitte, S. (2007). Altruistic behavior as a costly signal of general intelligence. *Journal of Research in Personality, 41*, 316–326. doi:10.1016/j.jrp.2006.04.002
- \*Mitani, Y., & Flores, N. (2007). Does gender matter for demand revelation in threshold public goods experiments? *Economic Bulletin, 3*, 1–7.
- Moskowitz, D. S., Suh, E. J., & Desaulniers, J. (1994). Situational influences on gender differences in agency and communion. *Journal of Personality and Social Psychology, 66*, 753–761. doi:10.1037/0022-3514.66.4.753
- \*Mulder, L. B. (2008). The difference between punishments and rewards in the promotion of moral concerns in social decision making. *Journal of Experimental Social Psychology, 44*, 1436–1443. doi:10.1016/j.jesp.2008.06.004
- \*Mulder, L. B. (2010). *How the presence of sanctions affects feelings of guilt and shame*. Unpublished manuscript, University of Groningen, the Netherlands.
- \*Mulder, L. B., & Nelissen, R. M. A. (2010). *When rules really make a difference: The effect of cooperation rules on moral norms in social dilemmas*. Manuscript submitted for publication, University of Groningen, the Netherlands.
- \*Mulder, L. B., Van Dijk, E., & De Cremer, D. (2009). When sanctions work if there are alternative options to defect: The role of trust in leaders. *Social Influence, 4*, 122–137. doi:10.1080/15534510802469156
- \*Mulder, L. B., Van Dijk, E., De Cremer, D., & Wilke, H. A. M. (2006a). Undermining trust and cooperation: The paradox of sanctioning systems in social dilemmas. *Journal of Experimental Social Psychology, 42*, 147–162. doi:10.1016/j.jesp.2005.03.002
- \*Mulder, L. B., Van Dijk, E., De Cremer, D., & Wilke, H. A. M. (2006b). When sanctions fail to increase cooperation in social dilemmas: Considering the presence of an alternative defection option. *Personality and Social Psychology Bulletin, 32*, 1312–1324. doi:10.1177/0146167206289978
- Mulder, M. B. (1992). Women's strategies in polygynous marriage: Kipsigis, datoga, and other east African cases. *Human Nature, 3*, 45–70. doi:10.1007/BF02692266
- Murdock, G. P., & Wilson, S. F. (1980). Settlement patterns and community organization: Cross-cultural codes 3. In H. Barry & A. Schlegel (Eds.), *Cross-cultural samples and codes* (pp. 75–116). Pittsburgh, PA: University of Pittsburgh Press.
- \*Murnighan, J. K., & Roth, A. E. (1983). Expecting continued play in prisoner's dilemma games: A test of several models. *Journal of Conflict Resolution, 27*, 279–300. doi:10.1177/0022002783027002004
- Nishida, T., Corp, N., Hamai, M., Matsumoto-Oda, A., Mitani, J. C., & Nakamura, M. (2003). Demography, female life-history, and reproductive profiles among the chimpanzees of Mahale. *American Journal of Primatology, 59*, 99–121. doi:10.1002/ajp.10068
- \*Nowell, C., & Tinkler, S. (1994). The influence of gender on the provision of a public good. *Journal of Economic Behavior & Organization, 25*, 25–36. doi:10.1016/0167-2681(94)90084-1
- \*Oberholzer-Gee, F., Waldfogel, J., & White, M. W. (2010). Friend or foe? Cooperation and learning in high-stakes games. *The Review of Economics and Statistics, 92*, 179–187. doi:10.1162/rest.2009.10174
- \*Oda, R. (1997). Biased face recognition in the prisoner's dilemma game. *Evolution and Human Behavior, 18*, 309–315. doi:10.1016/S1090-5138(97)00014-7
- \*Orbell, J. M., Dawes, R., & Schwartz-Shea, P. (1994). Trust, social categories and individuals: The case of gender. *Motivation and Emotion, 18*, 109–128. doi:10.1007/BF02249396
- \*Ortmann, A., & Tichy, L. K. (1999). Gender differences in the laboratory:

- Evidence from prisoner's dilemma games. *Journal of Economic Behavior & Organization*, 39, 327–339. doi:10.1016/S0167-2681(99)00038-4
- \*Orwant, C. J., & Orwant, J. E. (1970). A comparison of interpreted and abstract versions of mixed-motive games. *Journal of Conflict Resolution*, 14, 91–97. doi:10.1177/002200277001400110
- \*Oskamp, S., & Kleinke, C. (1970). Amount of reward in a variable in the prisoner's dilemma game. *Journal of Personality and Social Psychology*, 16, 133–140. doi:10.1037/h0029840
- \*Oskamp, S., & Perlaman, D. (1965). Factors affecting cooperation in a prisoner's dilemma game. *Journal of Conflict Resolution*, 9, 359–374. doi:10.1177/002200276500900308
- Oswald, D. L., Clark, E. M., & Kelly, C. M. (2004). Friendship maintenance: An analysis of individual and dyad behaviors. *Journal of Social and Clinical Psychology*, 23, 413–441. doi:10.1521/jscp.23.3.413.35460
- Pasternak, B., Ember, C. R., & Ember, M. (1997). *Sex, gender, and kinship: A cross-cultural perspective*. Upper Saddle River, NJ: Prentice Hall.
- \*Patterson, A. H., & Boles, W. E. (1974). The effects of personal space variables upon approach and attitudes toward the other in a prisoner's dilemma game. *Personality and Social Psychology Bulletin*, 1, 364–366. doi:10.1177/0146167274001001123
- \*Perugini, M., Tan, J., & Zizzo, D. J. (2005). *Which is the more predictable gender? Public good contribution and personality*. Unpublished manuscript, University of Essex, Clochester, United Kingdom.
- Phillips, T., Barnard, C., Ferguson, E., & Reader, T. (2008). Do humans prefer altruistic mates? Testing a link between sexual selection and altruism towards non-relatives. *British Journal of Psychology*, 99, 555–572. doi:10.1348/000712608X298467
- \*Pilisuk, M., Skolnick, P., & Overstreet, E. (1968). Predicting cooperation from the two sexes in a conflict simulation. *Journal of Personality and Social Psychology*, 10, 35–43. doi:10.1037/h0026310
- \*Poppe, M. (2005). The specificity of social dilemma situations. *Journal of Economic Psychology*, 26, 431–441. doi:10.1016/j.joep.2004.12.006
- \*Poppe, M., & Utens, L. (1986). Effects of greed and fear of being gyped in a social dilemma situation with changing pool size. *Journal of Economic Psychology*, 7, 61–73. doi:10.1016/0167-4870(86)90012-7
- Potts, M., & Hayden, T. (2008). *Sex and war: How biology explains warfare and terrorism and offers a path to a safer world*. Dallas, TX: Benbella Books.
- Probst, T. M., Carnevale, P. J., & Triandis, H. C. (1999). Cultural values in inter-group and single-group social dilemmas. *Organizational Behavior and Human Decision Processes*, 77, 171–191. doi:10.1006/obhd.1999.2822
- \*Pruitt, D. G. (1967). Reward structure and cooperation: The decomposed prisoner's dilemma game. *Journal of Personality and Social Psychology*, 7, 21–27. doi:10.1037/h0024914
- Pruitt, D. G. (1983). Strategic choice in negotiation. *American Behavioral Scientist*, 27, 167–194. doi:10.1177/000276483027002005
- Pruitt, D. G., & Kimmel, M. J. (1977). Twenty years of experimental gaming: Critique, synthesis, and suggestions for the future. *Annual Review of Psychology*, 28, 363–392. doi:10.1146/annurev.ps.28.020177.002051
- \*Putterman, L., Tyran, J., & Kamei, K. (2010). *Public goods and voting on formal sanction schemes: An experiment*. Unpublished manuscript, Brown University, Providence, RI.
- \*Rapoport, A. (1988). Experiments with n-person social traps: II. Tragedy of the commons. *Journal of Conflict Resolution*, 32, 473–488. doi:10.1177/0022002788032003004
- \*Rapoport, A., & Chammah, A. M. (1965). Sex differences in factors contributing to the level of cooperation in the prisoner's dilemma game. *Journal of Personality and Social Psychology*, 2, 831–838. doi:10.1037/h0022678
- \*Reich, C., & Purbhoo, M. (1975). The effect of cross-cultural contact. *Canadian Journal of Behavioral Science/Revue canadienne des sciences du comportement*, 7, 313–327. doi:10.1037/h0081917
- \*Rooney, P. M., Mesch, D. J., Chin, W., & Steinberg, K. S. (2005). The effects of race, gender, and survey methodologies on giving in the US. *Economics Letters*, 86, 173–180. doi:10.1016/j.econlet.2004.06.015
- \*Ruffle, B. J., & Sosis, R. (2007). Does it pay to pray? Costly ritual and cooperation. *The B. E. Journal of Economic Analysis & Policy*, 7, 1–35.
- Rusbult, C. E., Verette, J., Whitney, G. A., Slovic, L. F., & Lipkus, I. (1991). Accommodation processes in close relationships: Theory and preliminary evidence. *Journal of Personality and Social Psychology*, 60, 53–78. doi:10.1037/0022-3514.60.1.53
- Sadalla, E. K., Kenrick, D. T., & Vershure, B. (1987). Dominance and heterosexual attraction. *Journal of Personality and Social Psychology*, 52, 730–738. doi:10.1037/0022-3514.52.4.730
- Sahlins, M. (1972). *Stone age economics*. New York, NY: Aldine De Gruyter.
- Sally, D. (1995). Conversation and cooperation in social dilemmas: A meta-analysis of experiments from 1958 to 1992. *Rationality and Society*, 7, 58–92. doi:10.1177/1043463195007001004
- Sampson, E. E., & Kardush, M. (1965). Age, sex, class, and race differences in response to a two-person non-zero-sum game. *Journal of Conflict Resolution*, 9, 212–220. doi:10.1177/002200276500900207
- \*Sanna, L. J., Parks, C. D., & Chang, E. C. (2003). Mixed-motive conflict in social dilemmas: Mood as input to competitive and cooperative goals. *Group Dynamics: Theory, Research, and Practice*, 7, 26–40. doi:10.1037/1089-2699.7.1.26
- Schwartz, S. H., & Rubel, T. (2005). Sex differences in value priorities: Cross-cultural and multimethod studies. *Journal of Personality and Social Psychology*, 89, 1010–1028. doi:10.1037/0022-3514.89.6.1010
- Schwieren, C., & Sutter, M. (2008). Trust in cooperation or ability? An experimental study on gender differences. *Economic Letters*, 99, 494–497. doi:10.1016/j.econlet.2007.09.033
- \*Seguino, S., Stevens, T., & Lutz, M. (1996). Gender and cooperative behavior: Economic man rides alone. *Feminist Economics*, 2, 1–21. doi:10.1080/738552683
- Seielstad, M. T., Minch, E., & Cavalli-Sforza, L. L. (1998). Genetic evidence for a higher female migration rate in humans. *Nature Genetics*, 20, 278–280. doi:10.1038/3088
- \*Sell, J. (1997). Gender, strategies, and contributions to public goods. *Social Psychology Quarterly*, 60, 252–265. doi:10.2307/2787085
- \*Sell, J., Griffith, W. I., & Wilson, R. K. (1993). Are women more cooperative than men in social dilemmas? *Social Psychology Quarterly*, 56, 211–222. doi:10.2307/2786779
- Sell, J., & Kuipers, K. J. (2009). A structural social psychological view of gender differences in cooperation. *Sex Roles*, 61, 317–324. doi:10.1007/s11199-009-9597-5
- \*Sell, J., & Wilson, R. K. (1991). Levels of information and contributions to public goods. *Social Forces*, 70, 107–124. doi:10.2307/2580064
- Sellen, D. W. (1999). Polygyny and child growth in a traditional pastoral society. *Human Nature*, 10, 329–371. doi:10.1007/s12110-999-1007-8
- \*Sermat, V. (1967). The effect of an initial cooperative or competitive treatment upon a subject's response to conditional cooperation. *Behavioral Science*, 12, 301–313. doi:10.1002/bs.3830120405
- \*Setzman, E. J. (1974). Cooperation and competition between men and women in a dyadic game-playing situation. *Dissertation Abstracts International*, August 1974, 1109–1110.
- \*Sheldon, K. M. (1999). Learning lessons of tit-for-tat: Even competitors can get the message. *Journal of Personality and Social Psychology*, 77, 1245–1253. doi:10.1037/0022-3514.77.6.1245
- \*Sheldon, K. M., & McGregor, H. A. (2000). Extrinsic value orientation and “the tragedy of the commons.” *Journal of Personality*, 68, 383–411. doi:10.1111/1467-6494.00101
- \*Shinada, M., & Yamagishi, T. (2007). Punishing free riders: Direct and

- indirect promotion of cooperation. *Evolution and Human Behavior*, 28, 330–339. doi:10.1016/j.evolhumbehav.2007.04.001
- \*Shomer, R. W., Davis, A. H., & Kelley, H. H. (1966). Threats and the development of coordination: Further studies of the Deutsch and Krauss trucking game. *Journal of Personality and Social Psychology*, 4, 119–126. doi:10.1037/h0023553
- \*Sibley, S., Senn, S., & Epanchin, A. (1968). Race and sex of adolescents and cooperation in a mixed-motive game. *Psychonomic Science*, 13, 123–124.
- Sidanius, J., & Pratto, F. (1999). *Social dominance: An intergroup theory of social hierarchy and oppression*. New York, NY: Cambridge University Press.
- Silverman, I., & Eals, M. (1992). Sex differences in spatial abilities: Evolutionary theory and data. In J. H. Barkow, L. Cosmides, & J. Tooby (Eds.), *The adapted mind: Evolutionary psychology and the generation of culture* (pp. 533–549). New York, NY: Oxford University Press.
- \*Simpson, B. (2003). Sex, fear, and greed: A social dilemma analysis of gender and cooperation. *Social Forces*, 82, 35–52. doi:10.1353/sof.2003.0081
- \*Simpson, B., & Macy, M. W. (2004). Power, identity, and collective action in social exchange. *Social Forces*, 82, 1373–1409. doi:10.1353/sof.2004.0096
- Simpson, B., & Van Vugt, M. (2009). Sex differences in cooperation: Integrating the evolutionary and social psychological perspectives. *Advances in Group Processes*, 26, 81–103. doi:10.1108/S0882-6145(2009)0000026007
- \*Skotko, V., Langmeyer, D., & Lundgren, D. (1974). Sex differences as artifact in the prisoner's dilemma game. *Journal of Conflict Resolution*, 18, 707–713. doi:10.1177/002200277401800411
- Skrypnik, B. J., & Snyder, M. (1982). On the self-perpetuating nature of stereotypes about women and men. *Journal of Experimental Social Psychology*, 18, 277–291. doi:10.1016/0022-1031(82)90054-3
- \*Small, D. A., & Loewenstein, G. (2005). The devil you know: The effect of identifiability on punishment. *Journal of Behavioral Decision Making*, 18, 311–318. doi:10.1002/bdm.507
- \*Smith, E. R., Jackson, J. W., & Sparks, C. W. (2003). Effects of inequality and reasons for inequality on group identification and cooperation in social dilemmas. *Group Processes & Intergroup Relations*, 6, 201–220. doi:10.1177/1368430203006002005
- \*Smith, N. S., Vernon, C. R., & Tarte, R. D. (1975). Random strategies and sex differences in the prisoner's dilemma game. *Journal of Conflict Resolution*, 19, 643–650. doi:10.1177/002200277501900405
- Snijders, C., & Keren, G. (2001). *Do you trust? Whom do you trust? When do you trust?* Unpublished manuscript, Utrecht University, Heidelberglaan, the Netherlands.
- Solnick, S. J. (2001). Gender differences in the ultimatum game. *Economic Inquiry*, 39, 189–200. doi:10.1111/j.1465-7295.2001.tb00060.x
- \*Solow, J. L., & Kirkwood, N. (2002). Group identity and gender in public goods experiments. *Journal of Economic Behavior & Organization*, 48, 403–412. doi:10.1016/S0167-2681(01)00243-8
- \*Speer, D. C. (1972). Marital dysfunctionality and two-person non-zero-sum game behavior: Cumulative monadic measures. *Journal of Personality and Social Psychology*, 21, 18–24. doi:10.1037/h0032004
- \*Steele, M. W., & Tedeschi, J. T. (1967). Matrix indices and strategy choices in mixed-motive games. *Journal of Conflict Resolution*, 11, 198–205. doi:10.1177/002200276701100207
- \*Stockard, J., van de Kragt, A. J. C., & Dodge, P. J. (1988). Gender roles and behavior in social dilemmas: Are there sex differences in cooperation and in its justification? *Social Psychology Quarterly*, 51, 154–163. doi:10.2307/2786837
- Strassmann, B. I. (1997). Polygyny as a risk factor for child mortality among the Dogon. *Current Anthropology*, 38, 688–695. doi:10.1086/204657
- Stuhlmacher, A. F., & Walters, A. E. (1999). Gender differences in negotiation outcome: A meta-analysis. *Personnel Psychology*, 52, 653–677. doi:10.1111/j.1744-6570.1999.tb00175.x
- \*Surbey, M. K., & McNally, J. J. (1997). Self-deception as a mediator of cooperation and defection in varying social contexts described in the iterated prisoner's dilemma. *Evolution and Human Behavior*, 18, 417–435. doi:10.1016/S1090-5138(97)00090-1
- Swap, W., & Rubin, J. Z. (1983). Measurement of interpersonal orientation. *Journal of Personality and Social Psychology*, 44, 208–219. doi:10.1037/0022-3514.44.1.208
- \*Swingle, P. G. (1970). Exploitative behavior in non-zero-sum games. *Journal of Personality and Social Psychology*, 16, 121–132. doi:10.1037/h0029844
- \*Swope, K. J., Cadigan, J., Schmitt, P. M., & Shupp, R. (2008). Personality preferences in laboratory economics experiments. *The Journal of Socio-Economics*, 37, 998–1009. doi:10.1016/j.socsec.2006.12.065
- \*Takahashi, C., Yamagishi, T., Tanida, S., Kiyonari, T., & Kanazawa, S. (2006). Attractiveness and cooperation in social exchange. *Evolutionary Psychology*, 4, 315–329.
- \*Tedeschi, J. T., Bonoma, T., & Novinson, N. (1970). Behavior of a threatener: Retaliation vs. fixed opportunity costs. *Journal of Conflict Resolution*, 14, 69–76. doi:10.1177/002200277001400108
- \*Tedeschi, J., Lesnick, S., & Gahagan, J. (1968). Feedback and “washout” effects in the prisoner's dilemma game. *Journal of Personality and Social Psychology*, 10, 31–34. doi:10.1037/h0026312
- \*Tedeschi, J. T., Powell, J., Lindsfold, S., & Gahagan, J. P. (1969). The patterning of “honored” promises and sex differences in social conflicts. *The Journal of Social Psychology*, 78, 297–298. doi:10.1080/00224545.1969.9922375
- Thayer, B. A. (2004). *Darwin and international relations: On the evolutionary origins of war and ethnic conflict*. Lexington, KY: University Press of Kentucky.
- Thierry, B., Iwaniuk, A. N., & Pellis, S. M. (2000). The influence of phylogeny on the social behaviour of macaques (Primates: Cercopithecidae, genus *Macaca*). *Ethology*, 106, 713–728. doi:10.1046/j.1439-0310.2000.00583.x
- Tooby, J., & Cosmides, L. (1988, April). *The evolution of war and its cognitive foundations* (Institute for Evolutionary Studies Technical Report 88-1). Paper presented at the Evolution and Human Behavior Meetings, Ann Arbor, MI.
- Twenge, J. M. (1997). Changes in masculine and feminine traits over time: A meta-analysis. *Sex Roles*, 36, 305–325. doi:10.1007/BF02766650
- Twenge, J. M. (2001). Changes in women's assertiveness in response to status and roles: A cross-temporal meta-analysis. *Journal of Personality and Social Psychology*, 81, 133–145. doi:10.1037/0022-3514.81.1.133
- \*Van Egeren, L. F. (1979). Cardiovascular changes during social competition in mixed-motive game. *Journal of Personality and Social Psychology*, 37, 858–864. doi:10.1037/0022-3514.37.6.858
- \*Van Lange, P. A. M. (1999). The pursuit of joint outcomes and equality in outcomes: An integrative model of social value orientation. *Journal of Personality and Social Psychology*, 77, 337–349. doi:10.1037/0022-3514.77.2.337
- Van Lange, P. A. M., Bekkers, R., Schuyt, T. N. M., & Van Vugt, M. (2007). From games to giving: Social value orientation predicts donations to noble causes. *Basic and Applied Social Psychology*, 29, 375–384. doi:10.1080/01973530701665223
- Van Lange, P. A. M., & Joireman, J. (2008). How we can promote behavior that serves all of us in the future. *Social Issues and Policy Review*, 2, 127–157. doi:10.1111/j.1751-2409.2008.00013.x
- Van Lange, P. A. M., Rusbult, C. E., Drigotas, S. M., Arriaga, X. B., Witcher, B. S., & Cox, C. (1997). Willingness to sacrifice in close relationships. *Journal of Personality and Social Psychology*, 72, 1373–1395. doi:10.1037/0022-3514.72.6.1373
- Van Vugt, M. (2009). Sex differences in intergroup competition, aggression, and warfare: The male warrior hypothesis. *Annals of the New York*

- Academy of Sciences*, 1167, 124–134. doi:10.1111/j.1749-6632.2009.04539.x
- Van Vugt, M., & Ahuja, A. (2010). *Selected: Why some people lead, why others follow and why it matters*. London, England: Profile Books.
- Van Vugt, M., & De Cremer, D. (1999). Leadership in social dilemmas: The effects of group identification on collective actions to provide public goods. *Journal of Personality and Social Psychology*, 76, 587–599. doi:10.1037/0022-3514.76.4.587
- \*Van Vugt, M., De Cremer, D., & Janssen, D. P. (2007). Gender differences in cooperation and competition: The male-warrior hypothesis. *Psychological Science*, 18, 19–23. doi:10.1111/j.1467-9280.2007.01842.x
- Vigil, J. M. (2007). Asymmetries in the friendship preferences and social styles of men and women. *Human Nature*, 18, 143–161. doi:10.1007/s12110-007-9003-3
- \*Vinacke, W. E., Mogy, R., Powers, W., Langan, C., & Beck, R. (1974). Accommodative strategy and communication in a three-person matrix game. *Journal of Personality and Social Psychology*, 29, 509–525. doi:10.1037/h0036196
- \*Voissem, N. H., & Sistrunk, F. (1971). Communication schedule and cooperative game behavior. *Journal of Personality and Social Psychology*, 19, 160–167. doi:10.1037/h0031277
- Voyer, D., Postma, A., Brake, B., & Imperato-McGinley, J. (2007). Gender differences in objection location memory: A meta-analysis. *Psychonomic Bulletin & Review*, 14, 23–38. doi:10.3758/BF03194024
- Voyer, D., Voyer, S., & Bryden, M. P. (1995). Magnitude of sex differences in spatial abilities: A meta-analysis and consideration of critical variables. *Psychological Bulletin*, 117, 250–270. doi:10.1037/0033-2909.117.2.250
- Walters, A. E., Stuhlmacher, A. F., & Meyer, L. L. (1998). Gender and negotiator competitiveness: A meta-analysis. *Organizational Behavior and Human Decision Processes*, 76, 1–29. doi:10.1006/obhd.1998.2797
- Watts, D. P. (1996). Comparative socio-ecology of gorillas. In W. C. McGrew, L. F. Marchant, & T. Nishida (Eds.), *Great ape societies* (pp. 16–28). Cambridge, England: Cambridge University Press.
- Weber, J. M., Kopelman, S., & Messick, D. M. (2004). A conceptual review of decision-making in social dilemmas: Applying a logic of appropriateness. *Personality and Social Psychology Review*, 8, 281–307. doi:10.1207/s15327957pspr0803\_4
- Whitesell, N. R., & Harter, S. (1996). The interpersonal context of emotion: Anger with close friends and classmates. *Child Development*, 67, 1345–1359. doi:10.2307/1131704
- Whyte, M. K. (1978). *The status of women in preindustrial societies*. Princeton, NJ: Princeton University Press.
- Wilder, J. A., Kingan, S. B., Mobasher, Z., Pilkington, M. M., & Hammer, M. F. (2004). Global patterns of human mitochondrial DNA and Y-chromosome structure are not influenced by higher migration rates of females versus males. *Nature Genetics*, 36, 1122–1125. doi:10.1038/ng1428
- \*Wiley, M. G. (1968). *Sex differences in cooperation and competition* (Unpublished doctoral dissertation). Vanderbilt University, Nashville, TN.
- \*Wiley, M. G. (1973). Sex roles in games. *Sociometry*, 36, 526–541. doi:10.2307/2786248
- \*Willer, R. (2009). Groups reward individual sacrifice: The status of solution to the collective action problem. *American Sociological Review*, 74, 23–43. doi:10.1177/000312240907400102
- Wilson, J. F., Weiss, D. A., Richards, M., Thomas, M. G., Bradman, N., & Goldstein, G. B. (2001). Genetic evidence for different male and female roles during cultural transitions in the British Isles. *Proceedings of the National Academy of Science, USA*, 98, 5078–5083. doi:10.1073/pnas.071036898
- \*Wit, A. P., & Kerr, N. L. (2002). “Me versus just us versus us all” categorization and cooperation in nested social dilemmas. *Journal of Personality and Social Psychology*, 83, 616–637. doi:10.1037/0022-3514.83.3.616
- \*Wit, A., & Wilke, H. (1992). The effect of social categorization on cooperation in three types of social dilemmas. *Journal of Economic Psychology*, 13, 135–151. doi:10.1016/0167-4870(92)90056-D
- \*Wit, A., & Wilke, H. (1998). Public good provision under environmental and social uncertainty. *European Journal of Social Psychology*, 28, 249–256. doi:10.1002/(SICI)1099-0992(199803/04)28:2<249::AID-EJSP868>3.0.CO;2-J
- Witt, M. G., & Wood, W. (2010). Self-regulation of gendered behavior in everyday life. *Sex Roles*, 62, 635–646. doi:10.1007/s11199-010-9761-y
- Wood, W., & Eagly, A. H. (2002). A cross-cultural analysis of the behavior of women and men: Implications for the origins of sex differences. *Psychological Bulletin*, 128, 699–727. doi:10.1037/0033-2909.128.5.699
- Wood, W., & Eagly, A. H. (2010). Gender. In S. T. Fiske, D. T. Gilbert, & G. Lindzey (Eds.), *Handbook of social psychology* (5th ed., pp. 629–667). Hoboken, NJ: Wiley.
- Wrangham, R. W. (1999). Evolution of coalitionary killing [Supplement: Yearbook of physical anthropology]. *American Journal of Physical Anthropology*, 110, 1–30. doi:10.1002/(SICI)1096-8644(1999)110:29+<1::AID-AJPA2>3.0.CO;2-E
- Wrangham, R. W., & Peterson, D. (1996). *Demonic males*. New York, NY: Houghton Mifflin Company.
- \*Yamagishi, T. (1986). The provision of a sanctioning system as a public good. *Journal of Personality and Social Psychology*, 51, 110–116. doi:10.1037/0022-3514.51.1.110
- \*Yamagishi, T., Foddy, M., Matsuda, M., Kiyonari, T., & Platow, M. J. (2005). Comparisons of Australians and Japanese on group-based cooperation. *Asian Journal of Social Psychology*, 8, 173–190. doi:10.1111/j.1467-839x.2005.00165.x
- \*Yamagishi, T., & Mifune, N. (2009). Social exchange and solidarity: In-group love or out-group hate? *Evolution and Human Behavior*, 30, 229–237. doi:10.1016/j.evolhumbehav.2009.02.004
- \*Yamagishi, T., Terai, S., Kiyonari, T., Mifune, N., & Kanazawa, S. (2007). The social exchange heuristic: Managing errors in social exchange. *Rationality and Society*, 19, 259–291. doi:10.1177/1043463107080449
- Yuki, M., & Yakota, K. (2009). The primal warrior: Outgroup threat priming enhances intergroup discrimination in men but not women. *Journal of Experimental Social Psychology*, 45, 271–274.

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