Evolutionary and Social Psychological Perspectives on Human Cooperation

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Abstract

Integrating early social psychological theory and data with evolutionary theory proved difficult due to an apparent paradox: Humans are deeply cooperative in everyday situations, but how can this be so if Darwinian imperatives necessitate competition? In this chapter, we review research and theory that combines evolutionary ideas with observations from social psychological science that help to resolve this paradox. We begin by introducing the social dilemma framework to ground the conflict between the interests of the individual and others in the social environment. We then review evolutionary theories that predict when cooperation should emerge and some supportive research. Finally, we examine some of the psychological factors that favor cooperative behavior.

Keywords: cooperation, social psychology, evolutionary theory, social dilemmas, altruism, social value orientation

**Introduction**

The interface of evolutionary and social psychological perspectives on human cooperation has provided the basis of a generative conundrum in science for decades. On the one hand, it is clear from both lay and scientific observation and experimentation that people (and many other species) are often very cooperative. For example, recent research suggests that the “canonical model” of the purely self-interested human fails uniformly across cultures (Henrich et al., 2005; see also Caporael, Dawes, Orbell, & Van de Kragt, 1989). On the other hand, this behavior is hard to square with the fact that cooperative choices almost always produce lesser outcomes for individuals, at least within a single encounter, and it is hard to imagine the adaptive advantages to such behaviors. The past 50 or so years have seen some resolution of the problem through conceptual and empirical progress, particularly thanks to notions of inclusive fitness and reciprocal altruism, which allow for concern beyond the self that can be advantageous over time. Further, the integration of evolutionary and psychological perspectives has provided useful explanations from different directions. The evolutionary explanations are often ultimate and examine how cooperative behavior could reflect advantageous strategy. The psychological perspective often seeks more proximate explanations for cooperative behavior, examining, for example, individual differences in cooperative tendencies and situational factors that influence cooperative behavior. Because these explanations are more proximate, they provide more specific answers to the question of why people cooperate. Combining the two perspectives, then, can provide a more complete answer to why and under what circumstances people cooperate.

And this is an important question as humanity approaches some of the most complex collective dilemmas it has ever faced in the forms of ever greater global interdependence, resource depletion, continued population growth, and climate change. Recently, an entire volume has been dedicated to the subject of human cooperation, and within it entire chapters were dedicated to evolutionary and psychological perspectives in turn (Van Lange, Balliet, Parks, & Vugt, 2014). The more circumscribed goal of this chapter will be to note some major themes across these perspectives and point to potential areas of integration in the pursuit of understanding human cooperation.

**Human Life as an N-person Iterated Dilemma**

**The Social Dilemma Framework**

The evolutionary perspective typically views individuals as competing with one another for limited resources – both material (territory, food) and social (status, reputation). Those behavioral strategies that best serve to navigate these competitive situations toward successful reproductive outcomes should be selected for, such that the genes attending those strategies increase in frequency in the population over the generations. If it was the case that peoples' fates were never interrelated, then there would be no reason to expect that people would deviate from pure competitive strategies because there could be no advantage to this. However, our outcomes are often correlated. In the short term, it is often advantageous to cooperate to solve a specific problem that could potentially be impossible going it alone. In the long term, human groups share resource bases that are subject to exhaustion. Social dilemmas reflect the tension that occurs when self-interest meets correlated outcomes, as these dilemmas are situations in which individuals' outcomes are interdependent with, and thus dependent upon, other individuals' actions and choices, as well as their own actions and choices. In social dilemmas, it is often tempting to act primarily according to one's self-interest – particularly due to the allure of short-term gains – but if everyone acted this way then everyone would be worse off over time (Van Dijk, Parks, & Van Lange, 2013).

Thus, a social dilemma perspective – grounded in evolutionary notions of adaptive strategies – can provide a relatively comprehensive framework for considering individual behavior in its social context, broadly speaking. Such a perspective focuses on how decision-making in interpersonal contexts leads to different outcomes for the participants in interactions. The paradigmatic dilemma that has historically grounded much research is the prisoner's dilemma (Poundstone, 1993). Two men, co-conspirators in a crime, are being questioned separately by the district attorney. If both keep quiet, they know that the minimal evidence against them will lead to minimal sentences for each of them. But what if one of the men cuts a deal, confessing to the district attorney in exchange for immunity? In this case the confessor will go free, and the other man, who tries to cooperate by refusing to confess, will bear the punitive brunt. Given this, can either man afford to take the risk of cooperating, especially in the face of the temptation to "defect" and perhaps get away clean? Maybe so, given that if both men confess (i.e., defect), then things will turn out worse for both of them than if neither had confessed. This is the dilemma.

There is no *a priori* way to know which choice (cooperation or defection) one should make, because it depends so heavily on what the other person does. Evolutionary game theory attempts to mathematically model the various possible strategies and decision rules in order to understand which strategies and approaches lead to the best outcomes. In principle, the most effective strategies are also the ones that should have evolved, and thus should manifest in human psychology.

Of course, the optimal strategy will vary depending on a wide variety of factors. For example, in addition to two-person prisoner's dilemmas there are also multiple-person prisoner's dilemmas, in which individual payoffs depend on the decisions of several people instead of just one other person. An additional factor is that in any type of dilemma there are a large number of possible pay-off matrices, which determine how much each participant receives in a particular dilemma. For example, does mutual defection lead to the worst outcome, or to the second-worst outcome? How large is the numerical value representing the "temptation to defect," or the value representing the "sucker's payoff" that results when a person is exploited? Yet another factor is the wide variety of social-contextual conditions that can surround the game. For example, is there a sanctioning system in place? Have prosocial norms been made salient? Can protagonists communicate with each other? Still another factor is that games can vary widely in their length. For example, is it a one-shot dilemma, or an iterated dilemma that goes on for many trials, such that participants have the opportunity to respond to and adapt to each other? Finally, there are also multiple types of dilemmas besides prisoner's dilemmas.

One important type of social dilemma is the resource dilemma, in which individuals have the opportunity to draw from a common community pool. Resource dilemmas are multi-person dilemmas, in which the temptation is to take more than one's fair share of the commons. This can happen because of greed (the desire to get something for nothing), fear (that others will exploit the resource, so one should "get while the getting's good"), or both. Unfortunately, the more individuals pursue this over-acquisitive strategy, the more quickly the resource collapses, leading to what Hardin (1968) referred to as "the tragedy of the commons." Indeed, it may be that the twenty-first century will see the playing out of a *global* tragedy of the commons driven by increasing population pressure on available resources and the broadly embraced belief that material success is essential for "the good life" (Myers, 2000).

Related to the resource dilemma is the public goods dilemma, in which the problem is to get people to contribute to a public good, rather than keeping people from abusing it. For example, when we suffer an accident, we all hope that there is blood available in the community blood bank. But do we donate blood? Often not – instead, we yield to the temptation not to contribute (i.e., we defect). Similarly, public radio requires the support of public pledges. However, as pledge-drive managers can attest, motivating people to call up the station to give away their money "for nothing" can be a difficult! Thus, public goods dilemmas may be particularly difficult to solve, because they require people to take intentional actions that are somewhat costly.

As these examples illustrate, cooperation is a potentially risky personal strategy within many social dilemmas, even those that are iterated and shared among many individuals. Because of the assumption of individual selfishness made by traditional evolutionary theory, it was long thought that genes coding for cooperative behavior would have a disadvantage in the evolutionary arms race (Axelrod, 1984). However, contemporary developments in evolutionary theory have begun to make a clearer place for cooperative behavior and suggest that cooperative tendencies may reflect something of a human default. Below we outline some general theories that predict cooperation will emerge in populations and examine some potential instantiations of these in humans.

**Inclusive fitness**. One important advance for understanding apparent non-self-interest in evolutionary theory was provided by Hamilton's theory of inclusive fitness (Hamilton, 1964). Focusing on the gene as the unit of selection (Dawkins, 1976), Hamilton recognized that cooperative behavior might evolve because it benefits individuals who are related to the self, even if the behavior incurs some cost to oneself. For example, although a young male may die defending his family against attack, this self-sacrificial behavior could still be selected for because overall it benefits copies of the genes of those who emit them that exist in others, for example, in the young man's brothers and sisters. More specifically, Hamilton proposed that the likelihood of self-sacrificial behavior should follow the degree of relatedness between any two individuals. Thus, the brother should be more willing to exhibit self-sacrificial behavior for a full sibling than a half sibling. Importantly, nepotistic behavior is only to be expected when the species tends to live among kin; otherwise there would generally not be opportunities to help individuals with whom one is closely related (Hamilton, 1987).

**Reciprocal altruism.** Inclusive fitness follows straightforwardly from selfish genes, but could cooperative behavior evolve even for unrelated actors? Reciprocal altruism theory (Trivers, 1971) suggests that it could. A gene or complex of genes that prompted individuals to help others in need could be adaptive *if* that other would do the same for you, were the situations reversed. In other words, cooperating with others might be advantageous to a person if the cooperation was reciprocated at a future time when one could in turn derive a considerable benefit from the help. Whether that future reciprocation occurs, however, could be very uncertain if those individuals you previously helped are "free riders," capitalizing on your generosity without paying the cost. Despite this threat to reciprocity, it is clear that humans have somehow managed to keep the risk of free riding low enough to maintain public goods. We have social welfare agencies, international relief organizations, charitable foundations, and many less formal supports for the disadvantaged, who are typically unrelated to their benefactors.

How is this reciprocity established and maintained? Reciprocal altruism and the vulnerability it introduces adds the requirement of a compensatory sensitivity to the possibility of being exploited by others who might take undue advantage of one's help and charity, otherwise generosity is a sucker's proposition. That is, reciprocity requires the ability to detect cheaters (Cosmides & Tooby, 1992). The idea that reciprocal altruism and cheater-detection are linked evolved social strategies is well illustrated in Axelrod's computer simulation tournaments. Axelrod's (1984) competition compared the functional efficacy of a wide variety of strategies for playing iterated two-person prisoner's dilemmas demonstrated that the winning strategies tended to have two qualities: they were “nice,” meaning that they cooperated on the first move, and they were "punitive," meaning that they did not tolerate the other's defection. If the opponent defects, a tit-for-tat strategy “remembers” and always defects immediately, in retaliation, as it were. In terms of the concepts developed above, "niceness" is analogous to the willingness to seek reciprocal altruism (i.e., mutually beneficial relations). "Punitiveness" is analogous to cheater-detection and punishment, a characteristic without which cooperation cannot be maintained.

To better reflect the environments in which organisms can make cooperative decisions, more recent models of reciprocity have incorporated other important variables that help maintain cooperation as a stable strategy: variability, choice, and time. Specifically, when there are both cooperative and competitive prospective exchange partners, some individuals will primarily exchange with cooperative others (i.e., they are choosey), and choosey cooperators will tend to assort over time and thus “lock in” to mutually beneficial relationships (McNamara, Barta, Fromhage, & Houston, 2008) and out-compete less cooperative, less choosey interactors. Most of the above can be considered reflections of direct reciprocity in which possibilities of future reciprocation are plausible. However, sometimes people cooperate with no clear chance for reciprocation from the recipient of their initial generosity, simply responding to cooperative reputational information of another. This is a reflection of indirect reciprocity, whereby cooperative acts are initiated to maintain a reputation such that others who may receive your reputational information are inclined to help you out later (Roberts, 2008).

**Costly signaling.** How could one invite cooperative advances from others over time? One way may be to somehow communicate the ability to cooperate in a way that is obvious to all (McAndrew, 2002). For example, one could make a donation in one's own name to a local charity, and then it would be clear to all who saw the donor list that you participated to better the public good and they would likely infer that you are generally cooperative. That donation is obviously an expenditure of your own resources, so it is a costly signal that one has the resources to spare and the capacities to acquire them in the first place, as well as the willingness to share. Thus, costly signals tend to be honest signals because there is a fitness cost associated with having the signaled quality (Gintis, Smith, & Bowles, 2001). As another example, if an individual makes the choice to actively and unilaterally punish a cheater, there is a cost involved through the altercation, but that individual also gains reputation for taking the initiative and having the necessary capacities to punish for the sake of the group.

**Advantageous cooperation in groups.** In what other ways might the risks be mitigated, such that cooperation becomes a more viable strategy? Some have posited the possibility of group or multilevel selection (McAndrew, 2002). That is, some cooperation that is costly to oneself may benefit the group and provide group-level advantages. This concept has been controversial in evolutionary biology because of the implication that imperatives beyond the selfish gene could provide a locus for selection pressure. Further, other criticism points out that group selection and inclusive fitness are equivalent (Sober & Wilson, 1999), so it is just a re-description for an already articulated theory. Still, the group process lens may be useful for considering human cooperation, whether it is ultimately best captured by the theories outlined above, so we provide an illustrative example. In order for group processes to confer advantages due to cooperation, it must be the case that cooperative groups outperform competitive ones and that cooperators can find each other, as in the computer models by McNamara et al. (2008).

Sheldon and McGregor (2000) demonstrated that cooperative groups can be more advantageous than competitive ones in a laboratory study of the tragedy of the commons. Participants were first placed into groups of four, based on their scores on a measure of prosocial values (i.e., the "Aspirations index," a measure of intrinsic versus extrinsic valuing; Kasser & Ryan, 1996). Some groups consisted of four participants with predominantly prosocial values (i.e., community, intimacy, growth); some groups consisted of four participants with predominantly self-serving values (i.e., money, fame, beauty); and some groups consisted of two of each type. Participants made repeated bids concerning a group resource (i.e., a forest). The forest replenished at a 10% rate, and each group continued bidding until their forest was gone. Sheldon and McGregor examined whether it was the case that "nice groups finish first," by showing that predominantly prosocial groups received the largest score in the resource dilemma.

Hierarchical modeling revealed support for this idea, but also suggested a more complex picture. Specifically, an individual's value scores had contradictory influence upon individual harvest-totals, at within-group and between-group levels of analysis. Group-members who were more prosocial than their group-mates harvested less, because of their self-restraint, and thus did worse, within-groups. However, members of groups that were more prosocial than the other groups harvested more, because of their group's aggregate ability to preserve the resource. Overall, intrinsic individuals did no better or worse than extrinsic individuals, because the two types of effect essentially cancelled out.

Thus, it appears that the outcomes for dispositional cooperators are crucially dependent on a particular factor: the extent to which cooperators are concentrated within groups, such that would-be exploiters have been excluded from their midst. Without this, they are at a disadvantage. Could prosocial types achieve such an assortative arrangement on their own? If it were not the case that cooperators were also “choosey,” then it would be difficult for cooperators to maintain their advantage (McNamara et al., 2008).

Sheldon, Sheldon, and Osbaldiston (2000) addressed the group-assortation question by inviting college students to play an N-person prisoner's dilemma game for movie ticket prizes (which went to the top 15% of game-scorers). Participants completed questionnaires in which they listed three friends, to whom the researchers also sent questionnaires. All participants' values were assessed, including both primary and secondary (participant-selected) participants. Participants and their friends constituted self-selected groups, whose outcomes were pooled over five rounds of bidding in a social dilemma, in order to determine each individual's total outcome.

First, Sheldon et al. (2000) demonstrated that significant value-based assortation had occurred among the groups; specifically, participants with intrinsic values tended to select other intrinsic participants for their groups, and vice versa for participants with more extrinsic values. Such heterogeneity at the group level is an important pre-condition for group-selection to occur (Sober & Wilson, 1999) – if groups do not differ, then there can be no advantage in belonging to one group, rather than another. In particular, this heterogeneity between groups (and homogeneity within groups) indicates that those with prosocial values can indeed successfully assort with each other.

Second, Sheldon et al. (2000) showed that intrinsic values had a significant positive effect on participant game-scores at the between-group level of analysis, and a significant negative effect on game-score at the within-group level of analysis, replicating the finding of Sheldon and McGregor (2000). Because of these largely canceling effects, intrinsic individuals fared no worse than extrinsic individuals, on average. Although this may not sound impressive, it was actually quite striking given the intrinsic types' much greater vulnerability to exploitation. By aggregating themselves into groups, they managed to completely mitigate this disadvantage.

Despite the possible reducibility of group selection to inclusive fitness cited above, appeals to theoretical pluralism are generally for highlighting the heuristic values of the different ways of thinking, rather than maintaining them as separable. One advantage of the group-selection perspective is that in addition to clearly modeling the group-level benefit, it can also model the vulnerabilities of individuals within cooperative groups. For example, what happens to animals that readily perform the sentry duty, compared to animals that shirk this duty (i.e., "free riders" who do not contribute to the public good)? How bad does the within-group free rider problem have to get, before the between-group advantage disappears? In addition, the multilevel perspective allows for examination of possible interactions between within- and between-group variables. For example, the within-group effectiveness of a particular individual strategy (e.g., Machiavellianism) may depend upon the particular group-type or context in which the person is nested (i.e., gullible versus savvy groups). Thus, regardless of the debate about theoretical reducibility, the group-selection way of thinking may be particularly useful for psychologists considering group composition and individual strategies within short-term settings.

Another interesting ─ albeit controversial ─ idea in the area of evolution of cooperation in humans concerns purposive selection. Specifically, human purposes may have had an effect on natural selection processes in that the maintenance of cooperation in small groups would have required punishing cheaters and rewarding cooperators (Boehm, 2008). To the extent that these group processes of punishment and status conferral could influence reproductive success across generations (i.e., become a consistent environmental pressure), then one would expect them to provide a source of selection pressure that follows from the purpose of cooperation maintenance. Indeed, they do seem capable of this, as Boehm notes that political bullies are frequently the subjects of executions, and often the traits that stimulate social approval are willingness to share and cooperate (Boehm, 2008). It is important to note that this perspective, like the irreducible perspective on group selection, allows for unorthodox sources of evolutionary causality, which may be grounds for healthy skepticism. But those sources may also hold promise for better explaining the extent of cooperative tendencies and sanctioning processes evident in humans today, in particular.

**Summary.** The preceding sections have outlined the evolutionary game theoretical perspective on cooperation and some theories that address questions of whether we should expect cooperation to arise in certain contexts as well as why we should have those expectations. At the most basic level, evolutionary processes should select for those tendencies that function to maintain many genetic replicates in the population (and their opportunities for replication), for example, through inclusive fitness processes, and to accrue individuals' opportunities to replicate further, for example, through participating reciprocally in mutually beneficial relationships over time and communicating one's value along cooperative dimensions. In the next section, we will examine more proximate explanations of human cooperation by examining the psychology of human cooperation.

**Psychological Considerations**

Humans are not privy to the calculus of their genetic information or the environments that shaped it, nor do they have foresight of all adaptive challenges their environments will produce over their lifespans. Rather, they come equipped with a set of mechanisms that have proven to be adaptive on average given past environments that can be triggered given the appropriate eliciting stimuli. Cooperative behaviors and the thoughts and feelings people experience when they make them are thus far removed from the ultimate questions that guide them. If you ask your friend why she donated to a charity, she is unlikely to say that she calculated her coefficient of relatedness to the recipients. Instead, she is more likely to say that it “felt like the right thing to do” or that she is “just someone who likes to donate to causes like that.” These psychological explanations are just as valid as evolutionary ones and not ultimately incompatible, but psychological explanations change the focus from distal fitness imperatives to the individuals with dispositions to think, feel, and behave in particular ways given particular situations and adaptive challenges in their environments.

In the sections that follow, we will outline a few major themes of psychological research on cooperation. Specifically, we will focus on various situational characteristics that impact cooperative behavior, as well as individual differences in cooperative tendencies. Throughout, we will note where we can make sense of the psychological explanations in terms of evolutionary theories.

Like the evolutionary perspective, research in psychology has also wrestled with the abstract question of whether humans are primarily interested in maximizing short-term personal gain. The short answer across numerous studies, like the cross-cultural studies by Henrich et al. (2005), is generally no. People often seek better long-term outcomes that, in the context of group living, require cooperative efforts with others. As alluded to above, there are a few key factors that inform whether individuals cooperate or the extent to which they cooperate: personal dispositions, situational features, and time. Below we sketch some key considerations along each of these factors.

**Individual Differences**

Social value orientation is perhaps the most heavily studied individual difference in the social dilemma context in psychology (reviewed in Balliet, Parks, & Joireman, 2009). Social value orientation measurement is based on decomposed prisoner’s dilemma games (Messick & McClintock, 1968) in which participants allocate points to self and an imagined other they do not know and will not meet. Unlike the dilemmas outlined above, the payoffs for self and other are wholly dependent on the choices of the participant and the payoff matrix. From this decision making, researchers can categorize participants into prosocials, individualists, and competitors (though others are possible, these are the most common types). Prosocials tend toward decisions that emphasize joint gain. Individualists tend to maximize own gain without regard to the outcomes of others. Competitors tend to maximize the distance between self and other, negatively weighting others’ gains in their decisions.

Thus, it appears that each orientation is informed by a few basic motives. Prosocials appear to pursue not only joint gain, but also equality (Van Lange, 1999), and competitors and individualists pursue neither (Van Lange & Van Doesum, 2012). If anything, the motives of competitors are aimed at inequality. Supporting this motivational view, research has shown that prosocials are angered by exchange violations regardless of the impact those violations have on their own personal outcomes, whereas individualists and competitors do not exhibit this equality violation response if their outcomes are not impacted (Stouten, de Cremer, & van Dijk, 2005). Further, in everyday life it appears prosocials donate more to charities in general, and aim their donations especially toward those that help the disadvantaged (Van Lange, Bekkers, Schuyt, & Vugt, 2007) and identify with more egalitarian political groups (Van Lange, Bekkers, Chirumbolo, & Leone, 2012).

Another construct that appears to index the egalitarian motive is found in the values people report to hold dear. If people say that they find helping their communities or being benevolent toward others to be more centrally important than personal financial gain and social power, then this likely reflects the same underlying dimension along which prosocials, individualists, and competitors fall when measured by decomposed games. A potential criticism to this mode of measurement, as suggested by the evolutionary theories above, is that people may pose as more prosocial than they really are to reap the benefits of a good reputation. However, it appears this technique identifies real-world cooperators as well. For example, people who endorse affiliation and community feeling engage in more ecologically responsible behavior in their everyday lives (Brown & Kasser, 2005) and identify with egalitarian political groups (Sheldon & Nichols, 2009), whereas people who centrally value extrinsic pursuits of money and fame are more anti-egalitarian and ethnically prejudiced (Duriez, Vansteenkiste, Soenens, & De Witte, 2007) and experience more interpersonal conflict (Kasser & Ryan, 2001). Further, recent research suggests that cooperative primes are more likely to generate cooperative behavior for people identified as more prosocial on this measure than those identified as less prosocial (Prentice & Sheldon, submitted). Thus, it may be possible to activate cooperative motives through situational primes, but this will be most effective for those who strongly represent the reward of cooperation in their value systems.

Recent reviews suggest that the majority of people are prosocial and competitors are in the minority (Au & Kwong, 2004). Even toddlers exhibit interdependent morality, working together, recognizing recognize joint outcomes, and divide resources equally (Thomasello & Vaish, 2013). What, then, are the roots of an overly competitive or exploitative interpersonal orientation? One explanation may be that it reflects a heritable trait that fills a niche in the midst of high cooperation. But exploitation invites punishment, and risk-conferring heritable genotypes often require releasing stimuli for phenotypic expression. One candidate for the release of competitive phenotypes is psychological insecurity – when environments and relationships are fundamentally unstable and inconsistent. Consistent with this idea, Kasser, Ryan, and Zax, (1995) showed that children raised in insecure neighborhoods or by cold, controlling parents are more likely to develop competitive values. Similarly, Van Lange, De Bruin, Otten, and Joireman (1997) showed that competitive orientations are associated with insecure attachment, and Sheldon and Kasser (2008) provided experimental evidence that insecurity causes a more acquisitive orientation.

Again, competitive or extrinsic orientations may be appropriate strategies given competitive circumstance. The potential problem with dispositional competitiveness comes later on, when circumstances change for the better – in this case the competitor may not be able to reform, feeling that life has handed him/her a "bum deal," that it is a dog-eat-dog world, and that s/he is deserving of compensation and special rewards. Still, there is also some reason for optimism regarding peoples' ability to shift towards more cooperative strategies as a result of life-experience. For example, Sheldon (1999) conducted repeated prisoner's dilemma tournaments, one month apart, in which all participants faced a tit-for-tat strategy during the first session, and participants were randomly paired against other participants in the second session. Sheldon showed that even those with competitive dispositions switched to more cooperation during the second session, as a result of having faced the "punitive" tit-for-tat in the first session; that is, they had accommodated their strategy to the fact that exploiting the opponent was not feasible.

**Situational Factors**

We have alluded to the importance of the potential for punishment above, and this is just one example of a situational factor that can impact whether individuals and groups cooperate, and an extremely important one. Other key situational factors include rewards for cooperation, opportunities for sanctions, and the potential payoff matrix that interactors face. Each of these has effects on cooperative behavior, and we detail some examples below.

Payoff matrices determine how much of a “dilemma” the dilemma really is, or how tempting defection for short-term gain may be. For example, in the context of a group academic project, one may be guaranteed the passing grade that the cooperative members will ensure without putting in much effort oneself. In this situation, conflict is high because a member could stand to gain a great deal for nothing and the other group members could suffer considerably because they are missing the contribution of one member. Thus, the payoff matrix alone exhibits a strong pull on behavior. But people still cooperate in high conflict situations, so how does this come about? One prominent variable is trust, which is the acceptance of vulnerability in the pursuit of dependent outcomes and the maintenance of positive expectations for others’ behaviors. Indeed, trust has been shown to attenuate the breakdown of cooperation as dilemma conflict increases (reviewed in Balliet & Van Lange, 2013).

But trust is not always present and may be hard to instill in the face of high conflict or interaction histories that were competitive. One way to overcome the problem of low trust is to introduce the opportunity for sanctions or punishments (Yamagishi, 1986). In the same way that sanctions can be an effective means of bringing parties to the table to cooperate in international affairs, they can also be used in other dilemmas. However, sanctions do pose some risk to sustaining cooperative outcomes. In some circumstances, sanctions lead people to perceive the dilemma as a business exchange, rather than an ethical exchange in which egalitarian motives may be salient (Tenbrunsel & Messick, 1999).

Less formal types of sanctioning could take the form of ostracism and social exclusion or loss of reputation, which suggests that loss of reputation in itself could provide a basis for cooperation maintenance. Thus, the signaling value of cooperative behavior, rather than the immediate cooperative situation, may provide a source of motivation for acting cooperatively. Indeed, it appears that self-sacrificial behavior can win a person reputational gains (McAndrew & Perilloux, 2012), and that signaling constitutes something of a market within cooperative dilemmas. Underscoring this, Parks and Stone (2010) demonstrated that people who were *too* cooperative were subject to sanctioning, as it seemed that they were violating norms for how much reputation one could take away from the dilemma. Therefore, a free-rider may be the subject of disdain, but perhaps so too the smug saint.

**Temporal Considerations**

That the situational factors surrounding dilemmas often become important because of long-term reputational concerns points to another important factor impacting social dilemmas: time. As the results of McNamara et al.'s (2008) simulation of choosey cooperators and Sheldon et al.’s (2000) in vivo assortation effects demonstrate, people need time to figure out who has a good reputation or actually is a cooperator through direct experience. Not only does time facilitate assortation, but it weighs on people’s decision-making within social dilemmas. For example, people who tend to weigh the long-term consequences of their behavior (see Strathman, Gleicher, Boninger, & Scott, 1994) were more likely to limit consumption in a resource dilemma (Kortenkamp & Moore, 2006). Extrapolating from this, shifting participant’s time perspective may also impact dilemma behavior, and indeed it appears to do so. In one set of studies, participants with individualist and competitive values who were primed with a long-term perspective exhibited less behavioral greed in take-some dilemmas (Cozzolino, Sheldon, Schachtman, & Meyers, 2009). Finally, the temporal dimension also allows for interaction learning to occur such that participants can learn that a cooperative strategy would be more fruitful than a competitive one and make appropriate adjustments (Sheldon, 1999) as well as for groups to establish cooperative norms by witnessing the behavior of consistent contributors (Weber & Murnighan, 2008).

**Conclusion**

For the early decades of social psychology, it was difficult to see how the ready cooperation humans could exhibit (e.g., given a shared obstacle; Sherif, 1966) could be integrated with the austere survival imperatives implied by Darwinian evolutionary theory. More recent developments now indicate that human nature is deeply cooperative, given the chance, and that this is not incompatible with evolutionary processes. Pinker (2011), in *The Better Angels of our Nature,* noted not only this cooperative capacity, but something yet more optimistic: Human cooperation has demonstrably improved for centuries, as underlined by declines in violence across the globe. Human culture and modern commerce depend on an incredibly complex network of dependencies and co-dependencies, as do relationships between individual actors. The questions now are, “how do we manage to pull this off?” and “how can we use this information to pull it off even better?” Hopefully we can harness our cooperative potentials even further, so that humanity can get through the perilous bottleneck that appears to be looming in the 21st century.

References

Au, W. T., & Kwong, J. Y. Y. (2004). Measurements and effects of social-value orientation in social dilemmas. In R. Suleiman (Ed.) *Contemporary Psychological Research on Social Dilemmas*, pp. 71-98. New York, NY: Cambridge University Press.

Axelrod, R. (1984). *The evolution of cooperation.* New York, NY: Basic Books.

Balliet, D., Parks, C., & Joireman, J. (2009). Social value orientation and cooperation in social dilemmas: A meta-analysis. *Group Processes and Intergroup Relations*, *12*, 533–547. doi:10.1177/1368430209105040

Balliet, D., & Van Lange, P. A. M. (2013). Trust, conflict, and cooperation: A meta-analysis. *Psychological Bulletin*, *139*, 1090–1112. doi:10.1037/a0030939

Boehm, C. (2008). Purposive social selection and the evolution of human altruism. *Cross-Cultural Research*, *42*), 319–352. doi:10.1177/1069397108320422

Brown, K. W., & Kasser, T. (2005). Are psychological and ecological well-being compatible? The role of values, mindfulness, and lifestyle. *Social Indicators Research*, *74*, 349–368. doi:10.1007/s11205-004-8207-8

Caporael, L. R., Dawes, R. M., Orbell, J. M., & Van de Kragt, A. J. (1989). Selfishness examined: Cooperation in the absence of egoistic incentives. *Behavioral and Brain Sciences*, *12*, 683–739. doi:10.1017/S0140525X00025292

Cosmides, L., & Tooby, J. (1992). Cognitive adaptations for social exchange. In J. H. Barkow, L. Cosmides, & J. Tooby (Eds.), *The adapted mind: Evolutionary psychology and the generation of culture* (pp. 163–228). New York, NY: Oxford University Press.

Cozzolino, P. J., Sheldon, K. M., Schachtman, T. R., & Meyers, L. S. (2009). Limited time perspective, values, and greed: Imagining a limited future reduces avarice in extrinsic people. *Journal of Research in Personality*, *43*, 399–408. doi:10.1016/j.jrp.2009.01.008

Dawkins, R. (1976). *The selfish gene*. New York, NY: Oxford University Press.

Duriez, B., Vansteenkiste, M., Soenens, B., & De Witte, H. (2007). The social costs of extrinsic relative to intrinsic goal pursuits: Their relation with social dominance and racial and ethnic prejudice. *Journal of Personality*, *75*, 757–782. doi:10.1111/j.1467-6494.2007.00456.x

Gintis, H., Smith, E. A., & Bowles, S. (2001). Costly signaling and cooperation. *Journal of Theoretical Biology*, *213*, 103–119. doi:10.1006/jtbi.2001.2406

Hamilton, W. D. (1964). The genetical evolution of social behaviour. I. *Journal of Theoretical Biology*, *7*, 1–16.

Hamilton, W. D. (1987). Discriminating nepotism: expectable, common, overlooked. In D. J. C. Fletcher & C. D. Michener (Eds.) *Kin recognition in animals*, pp. 417-437. New York, NY: Wiley.

Henrich, J., Boyd, R., Bowles, S., Camerer, C., Fehr, E., Gintis, H., … Tracer, D. (2005). Models of decision-making and the coevolution of social preferences. *Behavioral and Brain Sciences*, *28*, 838–855. doi:10.1017/S0140525X05460148

Kasser, T., & Ryan, R. M. (1996). Further examining the American dream: Differential correlates of intrinsic and extrinsic goals. *Personality and Social Psychology Bulletin, 22*, 80-87.

Kasser, T., & Ryan, R. M. (2001). Be careful what you wish for: Optimal functioning and the relative attainment of intrinsic and extrinsic goals. In P. Schmuck & K. M. Sheldon (Eds.), *Life goals and well-being: Towards a positive psychology of human striving* (pp. 116-131). Goettingen, Germany: Hogrefe & Huber Publishers.

Kasser, T., Ryan, R. M., Zax, M., & Sameroff, A. J. (1995). The relations of maternal and social environments to late adolescents’ materialistic and prosocial values. *Developmental Psychology*, *31*, 907–914. doi:10.1037/0012-1649.31.6.907

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

McAndrew, F. T. (2002). New evolutionary perspectives on altruism: Multilevel-selection and costly-signaling theories. *Current Directions in Psychological Science*, *11*, 79–82. doi:10.1111/1467-8721.00173

McAndrew, F. T., & Perilloux, C. (2012). Is self-sacrificial competitive altruism primarily a male activity? *Evolutionary Psychology*, *10*, 50-65.

McNamara, J. M., Barta, Z., Fromhage, L., & Houston, A. I. (2008). The coevolution of choosiness and cooperation. *Nature*, *451*, 189–192. doi:10.1038/nature06455

Messick, D. M., & McClintock, C. G. (1968). Motivational bases of choice in experimental games. *Journal of Experimental Social Psychology*, *4*, 1–25. doi:10.1016/0022-1031(68)90046-2

Myers, D. G. (2000). The funds, friends, and faith of happy people. *American Psychologist*, *55*, 56–67. doi:10.1037/0003-066X.55.1.56

Parks, C. D., & Stone, A. B. (2010). The desire to expel unselfish members from the group. *Journal of Personality and Social Psychology*, *99*, 303–310. doi:10.1037/a0018403

Pinker, S. (2011). *The better angels of our nature: Why violence has declined*. New York, NY: Penguin.

Poundstone, W. (1993). *Prisoner’s dilemma*. New York, NY: Anchor Books.

Prentice, M., & Sheldon, K. M. (under review). *The role of values in the induction of cooperative behavior in social dilemmas.*

Roberts, G. (2008). Evolution of direct and indirect reciprocity. *Proceedings of the Royal Society B: Biological Sciences*, *275*, 173–179. doi:10.1098/rspb.2007.1134

Sheldon, K. M. (1999). Learning the 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., & Kasser, T. (2008). Psychological threat and extrinsic goal striving. *Motivation and Emotion*, *32*, 37–45. doi:10.1007/s11031-008-9081-5

Sheldon, K. M. & McGregor, H. (2000). Extrinsic value orientation and the ‘tragedy of

the commons.'  *Journal of Personality, 68,* 383-411.

Sheldon, K. M., & Nichols, C. P. (2009). Comparing democrats and republicans on intrinsic and extrinsic values. *Journal of Applied Social Psychology*, *39*, 589–623. doi:10.1111/j.1559-1816.2009.00452.x

Sheldon, K.M., Sheldon, M.S., & Osbaldiston, R. (2000). Prosocial values and group-assortation within an N-person prisoner’s dilemma. *Human Nature*, *11*, 387-404.

Sherif, M. (1966). *In common predicament: Social psychology of intergroup conflict and cooperation*. Boston, MA: Houghton Mifflin.

Sober, E. (1999). *Unto others: The evolution and psychology of unselfish behavior*. Cambridge, MA: Harvard University Press.

Stouten, J., de Cremer, D., & van Dijk, E. (2005). All is well that ends well, at least for proselfs: emotional reactions to equality violation as a function of social value orientation. *European Journal of Social Psychology*, *35*, 767–783. doi:10.1002/ejsp.276

Strathman, A., Gleicher, F., Boninger, D. S., & Scott, C. (1994). The consideration of future consequences: Weighing immediate and distant outcomes of behavior. *Journal of Personality and Social Psychology*, *66*, 742–752. doi:10.1037/0022-3514.66.4.742

Tenbrunsel, A. E., & Messick, D. M. (1999). Sanctioning systems, decision frames, and cooperation. *Administrative Science Quarterly*, *44*, 684–707. doi:10.2307/2667052

Trivers, R. (1971). The evoluition of reciprocal altruism. *Quarterly Review of Biology,*

*46*, 35-57.

Tomasello, M., & Vaish, A. (2013). Origins of human cooperation and morality. *Annual Review of Psychology*, *64*, 231-255.

Van Dijk, E., Parks, C. D., & van Lange, P. A. M. (2013). Social dilemmas: The challenge of human cooperation. *Organizational Behavior and Human Decision Processes*, *120*, 123–124. doi:10.1016/j.obhdp.2012.12.005

Van Lange, P. V. (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, Balliet, D. P., Parks, C. D., & Vugt, M. van. (2014). *Social dilemmas: Understanding human cooperation*. New York, NY: Oxford University Press.

Van Lange, P. A. M., Bekkers, R., Chirumbolo, A., & Leone, L. (2012). Are conservatives less likely to be prosocial than liberals? From games to ideology, political preferences and voting. *European Journal of Personality*, *26*, 461–473. doi:10.1002/per.845

Van Lange, P. A. M., Bekkers, R., Schuyt, T. N. M., & Vugt, M. V. (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., Otten, W., & Joireman, J. A. (1997). Development of prosocial, individualistic, and competitive orientations: Theory and preliminary evidence. *Journal of Personality and Social Psychology*, *73*, 733–746. doi:10.1037/0022-3514.73.4.733

Van Lange, P. A. M., & Van Doesum, N. J. (2012). The psychology of interaction goals comes as a package. *Psychological Inquiry*, *23*, 75–79. doi:10.1080/1047840X.2012.657566

Weber, J. M., & Murnighan, J. K. (2008). Suckers or saviors? Consistent contributors in social dilemmas. *Journal of Personality and Social Psychology*, *95*, 1340–1353. doi:10.1037/a0012454

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