Behavioral Consistency within the Prisoner's Dilemma Game: The Role of Personality and Situation

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Abstract

Mixed-motive games represent situations that confront people with a conflict between cooperative and non-cooperative alternatives. Despite this common basis, recent research has shown that the consistency of people's choices across different mixed-motive games is rather low. The present research examined behavioral consistency within the same mixed-motive game, by presenting participants with a series of one-shot Prisoner's Dilemma Games (PDGs). Across this set of games, payoffs were manipulated in order to intensify or weaken the conflict between self and the other party while maintaining the game's underlying structure. Our findings indicate that significant differences in choice behavior are observed as a function of both situational (i.e., manipulations of the PDG's payoff structure) and personality differences (i.e., individual differences in personality and motivational traits). Moreover, our included situational variables and personality features did not interact with each other, and were about equally impactful in shaping cooperation. Crucially, however, despite the significant behavioral differences across game variants, considerable consistency in choices was found as well, which suggests that the game's motivational basis reliably impacts choice behavior in spite of situational and personality variations. We discuss implications for theorizing on mixed-motive situations and elaborate on the question how cooperation can be promoted.

Keywords: Prisoner's Dilemma Game, within-game consistency, game variations, personality, person-situation debate

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Social dilemmas are situations that present the individual with a motivational conflict between acting on self-interest and concern for others (Kollock, 1998; Komorita & Parks, 1995). This conflict between self and others is ubiquitous in social life, as many of the most pressing societal and interpersonal problems require the resolution of such opposing interests (e.g., conservation of community resources, use of public transportation, donations to charity, volunteering, and voting in elections; see Dawes, 1980; Kollock, 1998; Van Lange, Joireman, Parks, & Van Dijk, 2013). Accordingly, the importance of understanding the situational and personality conditions that are at the basis of cooperation in dilemma situations cannot be overestimated (Haesevoets, Reinders Folmer, & Van Hiel, 2015; Simpson, 2003). In order to investigate social dilemmas empirically, scholars have modeled these conflicting interests into so-called mixed-motive games, in which people must choose between non-cooperative (which reflect self-interest and thus mirror selfish choices) and cooperative alternatives (which reflect concern for others and can hence be considered as prosocial choices, see Dawes, 1980; Dawes & Messick, 2000).

An extensive range of mixed-motive games has been employed in the literature in order to gain a better understanding of social dilemma situations (e.g., Komorita & Parks, 1995; Van Lange et al., 2013). Previous research in this domain, however, suggests that consistency in behavior between *different* mixed-motive games is rather limited (see Blanco, Engelmann, & Normann, 2010; Haesevoets et al., 2015). Do these lower than expected levels of behavioral consistency also apply to different variants of the *same* game type? Since the issue of within-game consistency did not attract much empirical attention yet, this question remains largely

unaddressed. Therefore, in the present study we measured whether people react consistently across different situational variants of the Prisoner's Dilemma Game (PDG), which actually constitutes the most studied mixed-motive game in both the psychological and the economic literature (Hardin, 2006). Rather than presenting participants incidental versions of the PDG, we obtained different variants by systematically manipulating the situational factors of endowment size, asymmetry, and non-correspondence. In addition, we also examined how game behavior is associated with important personality (i.e., individual differences in social value orientation, dispositional trust, and ideological attitudes) and motivational traits (i.e., among others, self-reported fairness, altruism, social welfare concerns, greed, fear, and competitiveness), which are all related to choice behavior in social dilemma situations.

But how do situation and personality variables relate to our research question about within-game consistency? Because previous research did not consider participants' choices over different variants of the same game, it is unclear to what extent people react consistently within a certain game type. In this regard, situational differences are important to consider because such differences are expected to result in inconsistencies in behavior (i.e., different situations might lead to different reactions). Personality variables, on the other hand, are also important to take into account because robust personality features are expected to lead to behavioral consistency (i.e., the same person is expected to react similarly over different situations).

Particularly interesting in this regard is that there are indications that situational and personality variables might interact with each other in shaping behavioral consistency. Indeed, a large body of prior research has employed a person × situation approach to study human behavior (Snyder & Cantor, 1998), and these studies were conducted in both experimental (e.g., Leikas, Lönnqvist, & Verkasalo, 2012) and field settings (e.g., Sherman, Rauthmann, Brown,

Serfass, & Jones, 2015). Many of these prior studies have investigated how various person and situational factors interact with each other in shaping behavior in mixed-motive settings (for some examples, see McClintock & Liebrand, 1988; Van Lange & Visser, 1999; Balliet & Van Lange, 2013). For instance, Hilbig and Zettler (2009) manipulated the power relation between players and investigated the predictive value of Social Value Orientation and Honesty-Humility for giving behavior in the Dictator Game and the Ultimatum Bargaining Game (for a similar approach, see Thielmann, Hilbig, & Niedtfeld, 2014). Zhao, Ferguson, and Smillie (2016) studied the effect of the Five-Factor Model and the HEXACO personality dimensions on behaviors across a series of economic games in which allocations in the Dictator Game were compared with those in the Generosity Game. Especially interesting, however, is that some prior studies even specifically focused on the PDG. In this regard, Au, Lu, Leung, Yam, and Fung (2012) found that situational variations in the risk associated with cooperation (relative to non-cooperation) interact with individual differences in risk aversion in shaping cooperative behavior in the PDG. More specifically, their results showed that risk-seeking participants cooperated more in risky games, whereas risk-averse participants cooperated more in less risky games. More recently, Thielmann and Böhm (2016) provided a critical empirical test of the link between individuals' prosocial tendencies, operationalized in terms of Social Value Orientation and Honesty-Humility, and cooperative behavior in different variants of the Intergroup PDG. Both these traits were positively associated with cooperative behavior toward others in general, irrespective of others' group membership.

Although several studies have investigated the interplay between personality features and situational variables in the prediction of cooperative behavior, most of these studies only included a limited number of situational and personality variables. Moreover, most of these prior

studies did not study how these variables are associated with people's choices over different variants of the same mixed-motive game. Indeed, most prior studies did not explicitly focus on how situational variations influence intra-individual (or within-person) consistency of behavior, but instead investigated the rank-order (or between-person) consistency of behavior (see Fleeson, 2001, 2007; Fleeson & Noftle, 2008). Intra-individual consistency can be seen as the extent to which the rank-order of different behaviors within a given person, or a person's behavioral profile, remains the same across different situations. However, Leikas and colleagues (2012) aptly noted that, despite its importance for personality dynamics, intra-individual consistency has rarely been measured. Because an important aim of our study was to investigate whether a person who cooperates in one game variant also cooperates in other variants of this same game, in the present study we employed a within-subjects approach. This approach allowed us to test to what extent participants react consistently across many different situational variants of the PDG, and to link their behaviors to various personality and motivational constructs. By doing so, the present study aims to provide a more integrative perspective that contributes to the bigger picture of what the key ingredients of cooperation are.

To summarize, the present research examined (1) to what extent intra-individual consistency in people's choice behavior can be observed across different variations of the PDG, the influence of (2) situational variables and (3) personality features on choice behavior in the PDG, and (4) how situational and personality measures interrelate with each other in shaping choice behavior in the PDG.

Consistency in Choice Behavior in Mixed-Motive Games

Because a similar conflict between selfish and social motivations is hypothesized to underlie all mixed-motive games (Messick & Brewer, 1983; Weber, Kopelman, & Messick,

2004), one would expect to observe a rather strong degree of behavioral consistency across *different* games. However, studies comparing people's choices across a range of different mixed-motive games obtained more modest than expected levels of between-game consistency. For instance, Haesevoets and colleagues (2015), who studied consistency in behavior across seven different mixed-motive games (i.e., PDG, Assurance Game, Public Goods Dilemma Game, Commons Dilemma Game, Dictator Game, Ultimatum Bargaining Game, and Trust Game), found that response patterns across these different games displayed an average correlation of r = .22. According to Gignac and Szodorai's (2016) new guidelines, this correlation coefficient can be labeled as typical.[1] Moreover, Haesevoets et al.'s (2015) results also revealed that several of these games were even non-significantly associated (for similar findings, see Blanco et al., 2010; also see Yamagishi et al., 2012, 2013).

While recent research has failed to support the equivalence of different mixed-motive games, a crucial question that has not yet been addressed concerns the comparability of *similar* mixed-motive games. More specifically, within the social dilemma literature, considerable differences may also be observed in the operationalization of the same type of game (e.g., Beckenkamp, Hennig-Schmidt, & Maier-Rigaud, 2007; Rapoport & Chammah, 1965; Schopler et al., 2001). A critical question, therefore, is the extent to which behavior is consistent across different variations of the same game. This question, however, remains largely unaddressed, as only a few studies explored participants' reactions within one game type (e.g., see Andreoni & Miller, 2002; Brosig, Riechmann, & Weimann, 2007; Fischbacher & Gächter, 2010; Fisman, Kariv, & Markovits, 2007; also see Au et al., 2012; Thielmann & Böhm, 2016). Unfortunately, most of these prior studies did not explicitly focus on the consistency of behavioral choices, but

instead investigated how game variations affect selfish versus other-regarding preferences (for a notable exception, see Baumert, Schlösser, & Schmitt, 2014).

It is thus still unclear whether the lower than expected intra-individual consistency across games also applies to different variants of the same game. The study of within-game consistency is nevertheless important because it allows us to interpret the theoretical implications of the relative lack of between-game consistency. Specifically, if within-game consistency would also be rather modest, than it can be straightforwardly concluded that mixed-motive games do not elicit consistent responses. Such a result would render the study of individual differences as a basis of choice behavior futile. However, if within-game consistency would be considerably higher, the comparability and equivalence of different mixed-motive games in eliciting the intended motivational conflict between self and others should be called into question, and more research is then needed to investigate the (unique) underlying psychological basis of each game.

The Prisoner's Dilemma: Game Structure and Situational Variations

In the present study, we investigated within-game consistency in the context of the PDG. This game involves two players who each face a dichotomous choice between cooperation and non-cooperation (or defection, Axelrod, 1984; Kollock, 1998). The relative order of the four possible outcomes defines the PDG: The best possible outcome for an individual is to defect while the other player cooperates (DC), the second best outcome is mutual cooperation (CC), the second worst outcome is mutual defection (DD), and the worst outcome is to cooperate while the other defects (CD). As such, while non-cooperation (or defection) yields better payoffs than cooperation for individual players, mutual cooperation is superior to mutual defection for their joint outcomes. Although non-cooperation is the dominant strategy, ample research has shown

that people do not always act on their self-interest, but also display considerable levels of cooperation (e.g., Camerer, 2003; Roth & Murnighan, 1978; Sally, 1995).

Even though the PDG is defined by the above mentioned outcome structure, important game variations can be observed in both research and practice, thereby creating different situational variants of this game. In the present study, we have included three situational dimensions: Asymmetry in outcomes, endowment size, and level of non-correspondence. We included these particular dimensions because each of them is expected to differently affect the underlying conflict between self and others (and as such, the amount of cooperation), and because these dimensions also reflect prevalent differences in real-world mixed-motive situations (see Beckenkamp et al., 2007; Rapoport & Chammah, 1965; Schopler et al., 2001, for examples).

Our first important dimension thus concerns symmetry or asymmetry between the players' outcomes, or put differently, the extent to which the players' outcomes are contrasted (Beckenkamp et al., 2007). Although most research has examined the archetypical variant of the PDG where payoffs are identical for both players, many real-world dilemmas are characterized by asymmetry, such that decisions entail different outcomes for each player. To represent this, the symmetric payoff matrix of the PDG can be structured in such a way that the payoffs of the game's outcomes are smaller (or larger) for one player than for the other. An important feature of such asymmetric games is thus that they actually take away the possibility to reach equality in outcomes. As such, asymmetric games are expected to appeal more strongly to motives related to inequality (and the avoidance thereof), and are therefore expected to be associated with lower cooperation. While the number of studies into the effect of asymmetry is limited, their findings indeed suggest that asymmetric games produce less cooperation than symmetric ones (see Beckenkamp et al., 2007; Croson, 1999; Lave, 1965; Sheposh & Gallo, 1973).

Our second important dimension is endowment size. PDGs, both in experimental studies and in social life, may differ in terms of the magnitude of the outcomes that are at stake (Rapoport & Chammah, 1965; Weber et al., 2004). PDGs that involve greater endowments make its outcomes more impactful for the players, and thereby may accentuate their choice behavior (i.e., people with a preference for cooperation are expected to become even more cooperative, whereas people who prefer non-cooperation are expected to become even less cooperative). Moreover, considering endowment size in the context of the present study is also important due to its relation with asymmetry, in that asymmetric games involve different endowment sizes for either player.

Our final dimension reflects the level of non-correspondence in outcomes. The concept of outcome correspondence captures the relative distance between the players' outcomes (Kelley & Thibaut, 1978; Thibaut & Kelley, 1959), which refers to the extent to which both players' interests within the structure of the game converge or diverge. In this regard, Schopler and colleagues (2001) have noted that the level of outcome non-correspondence may differ between different versions of the PDG. Game variants characterized by low non-correspondence represent situations characterized by relatively low conflict in outcomes, where exploitation offers relatively small individual benefits over mutual cooperation, and mutual defection incurs relatively high costs. Conversely, game variations characterized by high non-correspondence represent situations characterized by relatively high conflict in outcomes, where exploitation offers relatively greater benefits over mutual cooperation, and mutual defection incurs relatively low costs.[2] As such, higher levels of non-correspondence imply that the conflict between the outcomes of both players increases, and that non-cooperation becomes relatively more appealing compared to cooperation. Indeed, the more the players' outcomes are opposed to each other (i.e.,

high non-correspondence), the more likely it is for non-cooperation to occur. In line with this reasoning, research suggests that greater outcome non-correspondence indeed produces lower levels of cooperation (see Molm, Takahashi, & Peterson, 2000; Parks & Hulbert, 1995).

Put briefly, while sharing the same general outcome structure, representations of the PDG differ according to important dimensions that affect the underlying conflict between self and others, and thereby may have significant repercussions for people's choice behavior in these different game variants. However, it is not clear yet what repercussions such variations have for behavioral consistency. Accordingly, the present research presents participants with a series of one-shot games, in which these focal situational factors are manipulated. Moreover, to the best of our knowledge, we are the first to include in a single study design these three situational factors, which have been studied hitherto in isolation.

Personality as a Determinant of Cooperation

It is well established in the literature that decisions in mixed-motive situations are not only shaped by situational factors, but also by individual differences. Although prior research has shown that various personality features are consistently linked with game behavior (e.g., Au & Kwong, 2004; Hilbig & Zettler, 2009; Kurzban & Houser, 2001), recent research has also demonstrated inconsistent associations between personality features and choice behavior in *different* mixed-motive games (see Haesevoets et al., 2015). A possible reason for this is that the expression of personality may be contingent on the structure of different games, such that particular games may, or may not afford the expression of particular motives (cf. Van Lange, De Cremer, Van Dijk, & Van Vugt, 2007). With regard to different situational variants of the *same* type of game, however, consistency would indicate that different game variants evoke the same motivational conflict that their common structure implies. To understand the consistency of

people's choices across different versions of the same game (i.e., within-game consistency), it is thus also of crucial importance to relate choice behavior to personality constructs.

Which personality features are most strongly associated with behavior in mixed-motive settings? We have included three personality features in our study that are each directly related to concern for self and others, namely: Social Value Orientation, dispositional trust, and ideological attitudes. Note that we have selected these particular personality features because they are assumed to alter people's outcome preferences in mixed-motive settings, and thereby may result in different decisions for high versus low scorers on these traits (Kelley & Thibaut, 1978; Van Lange et al., 2007).

As a first dispositional factor we thus included Social Value Orientation (SVO), which has been linked extensively to choice behavior in mixed-motive situations. This concept is very closely related to self-other concerns, as it refers to stable individual differences in the relative importance that people attach to outcomes for themselves compared to the outcomes for others (Messick & McClintock, 1968; Van Lange, 1999). It is assessed by examining participants' preferences for particular distributions of valuable points between themselves and another person in decomposed games. Four major value orientations are typically distinguished: altruistic, cooperative, individualistic, and competitive orientation (for more information on these orientations, see Van Lange, 1999). These four orientations reflect differences in concern for self and others, and thereby in the motivations that underlie mixed-motive interactions. Accordingly, ample prior research has shown that SVO significantly influences cooperation in a wide range of mixed-motive situations (for reviews, see Au & Kwong, 2004; Balliet, Parks, & Joireman, 2009; Bogaert, Boone, & Declerck, 2008), with altruists and cooperators typically showing more cooperation than individualists and competitors.

A second frequently studied personality variable is dispositional trust (Yamagishi, 1988). This concept reflects the extent to which people hold generally positive expectations of others and are willing to be vulnerable to them. This concept is also rather closely related to the conflict between self and others, as it reflects the motivational dimension of fear (or concern for being exploited in the case of cooperative behavior). Another important reason to include this concept, however, is that trust in others can be seen as an ultimate precondition for cooperation to occur (De Cremer & Tyler, 2007). That is, in order for cooperation to take place, in addition to having a prosocial orientation, it is also necessary that people expect that the persons with whom they are interacting will cooperate. Research demonstrates that high trusting individuals expect more cooperation from others, and consequently show more cooperative behavior than low trusting individuals (e.g., Kuhlman, Camac, & Cunha, 1986; Yamagishi, 1988).

A final category of variables that has recently been associated with behavior in mixed-motive interactions comprises ideological attitudes. A first variable that reflects the difference between left- and right-wing ideological attitudes is Right-Wing Authoritarianism (RWA; Altemeyer, 1981; Asbrock, Sibley, & Duckitt, 2010; Duckitt & Sibley, 2007). RWA reflects social-cultural right-wing beliefs and comprises the covariation of conventionalism, authoritarian submission, and authoritarian aggression. A second important ideological attitude is Social Dominance Orientation (SDO; Pratto, Sidanius, Stallworth, & Malle, 1994). This concept is considered to be a general attitudinal orientation toward intergroup relations, reflecting whether one generally prefers such relations to be equal versus hierarchical, and represents a tendency to favor and maintain policies that preserve social inequality. As such, contrary to more specific outcome preferences or expectations of others' trustworthiness, ideological attitudes reflect orientations toward broader social themes regarding concern for self and others. Recent research

indicates that high scorers on RWA and SDO tend to show lower levels of cooperation in a range of different mixed-motive situations (see Haesevoets et al., 2015; also see McFarland, Ageyev, & Djintcharadze, 1996; Peterson, Doty, & Winter, 1993).

From the above, it can be concluded that our included personality measures are all inherently related to the conflict between concern for self and others. Yet, it is fair to note that these personality measures have a rather broad focus, as each of them appeals to several (more specific) motivational dimensions. Therefore, in addition to the study of these personality measures, research has also tried to advance our understanding of people's choice behavior by directly examining the specific motivational orientations associated with either cooperative or non-cooperative behavior in particular games (for more information, see Fehr & Schmidt, 2006; Kelley & Thibaut, 1978; Van Hiel, Vanneste, & De Cremer, 2008; Van Lange, 1999; Van Lange et al., 2007).

In this vein, an important distinction has been made in the literature between prosocial motives, which are expected to push a person toward cooperation, and proself motives, which are expected to push a person toward non-cooperation. Critical in this regard, however, is that the exact self-other conflict that characterizes each mixed-motive game is expected to be shaped by a mixture of specific prosocial and proself motives (Thielmann, Böhm, & Hilbig, 2015). According to the conceptual model of Thielmann et al. (2015), cooperative choices in the PDG are expected to be associated with the prosocial motives of fairness, altruism, and social welfare concerns, while non-cooperative choices in the PDG are expected to be related to the proself motives of greed, fear, and competitiveness. In addition, other relevant motives in the context of the PDG might be concern for others, entitlement, inequality aversion, and risk aversion (see Campbell, Bonacci, Shelton, Exline, & Bushman, 2004; Engelmann & Strobel, 2004; Mandrik &

Bao, 2005). A brief description of these motivational orientations and their relationships with cooperation in mixed-motive situations is included in Appendix A.

Importantly, because prior research suggests that such motives represent enduring personality characteristics (Kuhlman & Marshello, 1975; Liebrand, 1984; Messick & McClintock, 1968), in the present study the motives under investigation were measured as trait variables, rather than as state variables. In general, individuals who display higher scores on motives that are associated with choice behavior in the PDG are expected to display decisions that are consistent with those motives, also across different situational variants of the game.

In sum, if different game variants evoke the same underlying motivational conflict, consistent associations between choice behavior and individual difference variables that relate to this conflict should be observed. If, however, different representations of the same game are interpreted differently by individuals, then fluctuating associations to their personality should emerge, as well as weak associations to their choice behavior across situational game variations.

The Present Study

The aims of the present contribution were fourfold. In light of our first aim, we investigated whether participants behave consistently across different variants of the PDG: When a person cooperates in one variant of the PDG, will he or she also cooperate in other variants of this game? Our subsequent aims consisted of investigating whether situational and personality variables can help us to gain a better understanding of the issue of within-game consistency. More specifically, our second aim consisted of investigating how the situational factors of endowment size, asymmetry, and level of non-correspondence affect cooperation. In light of our third aim, we investigated the relationship between individual differences in selfish and social orientation (in the form of various personality features and motivational traits) and game

behavior. Finally, because we manipulated multiple situational features and administered a substantive set of individual differences variables, we were also able to establish the relative weight of situation and personality as bases for choice behavior. In this light, for our fourth aim we applied a person × situation approach, by examining how our included situational variables and personality features interrelate in shaping cooperation. More specifically, we examined whether the relationship between personality factors and choice behavior varies according to the situational features of the PDG.

Method

Our procedure, materials, data, and data analysis scripts are made publicly available through Open Science Framework, and can be accessed via the following link: https://osf.io/wpf7t/. Because our research questions were of an exploratory nature, we have not preregistered our hypotheses prior to conducting the study.

Participants and Procedure

A total of 209 undergraduate university students (37 men, 172 women; M_{age} = 18.66, *SD* = 1.93) participated in the experiment in exchange for course credits. Students were invited to the laboratory in groups of 35 to 45 persons. Upon their arrival, each participant was placed in front of a computer. Participants first answered our personality and motivational measures. Next, the participants engaged in our experimental task. At the start of this task, the participants were thoroughly informed about the PDG's structure. In order to test whether participants understood the game's outcome structure, they answered three questions that probed their general comprehension of the game. Participants who were unable to answer at least two of these checks correctly were excluded from the analyses (*N* = 19; 9.1%). The participants subsequently played the different situational variants of the PDG. To minimize strategic effects from repeated play,

participants were told that they would play each game with a different interaction partner. In other words, we only employed single-shot (instead of repeated) games in our study. Moreover, they received no feedback about their partners' choices during the task. Participants were not directly connected to an interaction partner, but they were (manually) paired with another participant at the end of the experimental session, and paid according to the outcome of both players' decision in one of the games. As such, an important feature of the present study is thus that we used real (instead of hypothetical) monetary incentives (and this in the absence of deception).

Individual Difference Measures

With exception of SVO, the individual difference measures were all rated on seven-point Likert scales ranging from (1) *Strongly disagree* to (7) *Strongly agree*. Negatively stated items were reverse-coded before the scale scores were constructed. The correlations among the individual difference measures are included in Table 1.

Personality Traits.

Social Value Orientation. We assessed participants' social value orientation by means of the SVO Slider Measure (Murphy, Ackermann, & Handgraaf, 2011).[3] Each item of this measure presents a resource allocation choice over a well-defined continuum of joint payoffs. For each of the scale's items, participants have to decide how to allocate hypothetical monetary resources between themselves and another person. An important advantage of the SVO Slider over categorical measures is that it assesses orientations on a continuous scale in terms of an angle (M = 30.71, SD = 10.30). A positive angle indicates a positive concern for the payoff of the other (increasing concern for others), while a negative angular value indicates a negative concern for the payoff of the other (increasing concern for the self).[4]

Dispositional trust. Dispositional trust was measured using a seven-item scale that is based on Yamagishi's (1988) Interpersonal Trust Scale. A sample item is: "One should not trust others until one knows them well" (M = 4.51, SD = 1.01, α = .84).

Ideological attitudes. We assessed ideological attitudes by means of a ten-item RWA scale (Altemeyer, 1981; Duriez & Van Hiel, 2002) and a 14-item SDO scale (Pratto et al., 1994; Van Hiel & Duriez, 2001). Sample items are: "Being kind to loafers or criminals will only encourage them to take advantage of our weakness, so it is best to use a firm, tough hand when dealing with them" (RWA; M = 3.23, SD = 0.90, α = .80) and "To get ahead in life, it is sometimes necessary to step on other groups" (SDO; M = 2.71, SD = 0.86, α = .84).

Motivational Traits.

Fairness. The fairness motive was measured by the five-item Fairness Attribution Scale of Van Hiel et al. (2008). The items of this attribution scale were adapted in order to measure individual differences in the importance that people ascribe to fairness considerations. A sample item is: "When I have to make a decision that also influences others, I want to make a decision that leads to a fair outcome for everyone" (M = 5.85, SD = 0.79, α = .81).

Altruism. Individual differences in altruism were probed using two scales. The first scale was the abridged ten-item version of the Self-Report Altruism Scale (Rushton, Chrisjohn, & Fekken, 1981), of which a sample item is: "I would give money to a charity" (M = 5.60, SD = 0.82, α = .78). Secondly, a three-item measure was adapted from the MaxOther scale of Tazelaar, Van Lange, and Ouwerkerk (2004); "When I have to make a decision that also influences others …": "…I want to act in a generous way that mainly serves the interests of the others," "…I take especially the outcomes of the others into account," and "…above all I want the others to benefit" (M = 3.99, SD = 1.02, α = .81).

Social welfare concerns. Participants' concern with the general welfare of society was probed using a self-developed four-item scale; "I find it important to…": "…undertake actions that make our world a better place," "…help people in need without expecting anything in return," "…undertake actions that improve our society," and "…help others to improve their lives" (M = 5.54, SD = 1.00, α = .88).

Greed. We measured the greed motive using the six-item Greed Scale of Krekels and Pandelaere (2015). A sample item is: "One can never have enough" (M = 3.34, SD = 1.03, α = 81).

Fear. Fear was measured with the nine-item Fear Attribution Scale of Van Hiel et al. (2008), which was adapted to capture individual differences in fear. A sample item is: "When I have to make a decision that also influences others, I am afraid that others will exploit me" (M = 3.80, SD = 1.29, α = .92).

Competitiveness. We used the ten-item Competitive Scale (Xie, Yu, Chen, & Chen, 2006) to probe individual differences in competitiveness. A sample item is: "Even in a group working towards a common goal, I still want to outperform others" (M = 3.55, SD = 1.06, α = .85).

Concern for others. Concern for others was measured using two scales. The first scale is the nine-item Concern for Others Scale (Solomon & Kendall, 1979), of which a sample item is: "When I see someone having a problem, I want to help" (M = 5.49, SD = 0.71, α = .78). The second scale is based on the five-item Concern for Others subscale of the Levels of Self-Concept Scale (Selenta & Lord, 2005). A sample item is: "If another person was having a personal problem, I would help him or her even if it meant sacrificing my time or money" (M = 5.83, SD = 0.67, α = .74).

Psychological entitlement. Individual differences in the belief that one should get preferential treatment were measured using the nine-item Psychological Entitlement Scale (Campbell et al., 2004). A sample item is: "I honestly feel that I am just more deserving than others" (M = 2.21, SD = 0.79, α = .80).

Inequality aversion. We measured inequality aversion using the victim and beneficiary subscales of the Justice Sensitivity Inventory (Schmitt, Gollwitzer, Maes, & Arbach, 2005). The victim subscale consists of ten items that measure participants' aversion for disadvantageous inequality (i.e., being worse off than others, e.g., "It bothers me when others receive something that ought to be mine;" M = 4.65, SD = 0.94, α = .86), while the beneficiary subscale consists of ten items which measure participants' aversion for advantageous inequality (i.e., being better off than others, e.g., "It disturbs me when I receive what others ought to have;" M = 4.93, SD = 0.85, α = .85).

Risk aversion. Finally, individual differences in risk aversion were measured with the six-item General Risk Aversion Scale (Mandrik & Bao, 2005). A sample item is: "I prefer situations that have foreseeable outcomes" (M = 4.39, SD = 1.08, α = .81).

Reduction of Motivations. Table 1 reveals that our motivational traits include a large number of highly interrelated concepts. Therefore, we conducted a factor analysis (using the maximum likelihood method) to reduce these motivations to a limited number of indicators of the underlying motivational conflict. Three factors with an (initial) eigenvalue of 3.55, 2.30, and 1.29 (explained variances of 27.3%, 17.7%, and 9.9%, respectively) were extracted (see Table 2 for the factor weights after OBLIMIN rotation). Social welfare concerns, altruism, concern for others, fairness, and advantageous inequality aversion loaded on the first factor, which embodies *prosocial* motivations. Greed, competitiveness, disadvantageous inequality aversion, and

psychological entitlement constituted the second factor, which reflects *proself* motivations. Finally, risk aversion and fear loaded on the third factor, which we labelled *fearful* motivations. These three factors were all significantly associated ($|.20| < r < |.32|$, all ps $< .001$; see Table 1).

Situational Variants of the Prisoner's Dilemma Game

After completing these individual difference measures, participants played 16 different single-shot PDGs. Although these games shared the basic outcome structure that defines the PDG, endowment size (low versus high payoffs), asymmetry in outcomes (symmetric versus asymmetric outcomes), and level of non-correspondence (low versus medium versus high versus very high non-correspondence) were orthogonally manipulated in a 2 × 2 × 4 within-subjects design. The outcome structure of each game is included in Appendix B.[5] The presentation order of the 16 games was randomized.[6] To get an estimate of reliability, PDG 9 of Appendix B was repeated a second time. These two identical games correlated rather strongly ($r = .45$, $p < .001$).[7] Upon completion of the PDGs, participants also were presented with a series of games in which the cooperative and non-cooperative options were accompanied by an additional exit option. We excluded these trinary-choice games from the analyses reported in the current manuscript (these data are reported in a separate article about the influence of exit options on cooperation and social welfare, see Haesevoets, Bostyn, Reinders Folmer, Roets, & Van Hiel, 2018).

Manipulation of Endowment Size. To manipulate endowment size, each game was presented in a version with low payoffs and in a version with high payoffs, with outcomes in the latter version being double the size of those in the former version. As such, in situations of high endowments there is more at stake than in situations of low endowments; that is, under high (versus low) endowments, more can be earned for both oneself and for the other player (see Appendix B).

Manipulation of Asymmetry in Outcomes. Games were presented with either symmetric or asymmetric outcomes for either player. In symmetric games, the (low or high) payoffs that the participant and the other player received from each of the game's four possible outcomes were identical. In asymmetric games, the game's outcomes yielded low payoffs for one player, and high payoffs for the other. Following prior research of Beckenkamp et al. (2007), asymmetric games combined the outcomes of the low endowment version of the game and those of the high endowment version into a single matrix with asymmetric payoffs. Participants received the high payoff (and their partner the low payoff) for games in the high endowment condition; for games in the low endowment condition, these outcomes were reversed (see Appendix B).

Manipulation of Level of Non-Correspondence. The concept of outcome non-correspondence refers to the extent to which the two players' interests within the structure of the game converge or diverge. The degree of non-correspondence can be expressed in terms of Rapoport's (1967) often studied *K*-index of cooperation. This index captures the benefit of mutual cooperation over mutual defection (i.e., distance between CC and DD outcomes) relative to the benefit of exploitation over the sucker's payoff (i.e., distance between DC and CD outcomes). In our study, we created four different non-correspondence levels by decreasing (or increased) the payoff of the mutual cooperation outcome, while simultaneously increasing (or decreasing) to an equivalent extent the payoff of the mutual defection outcome (cf. Schopler et al., 2010), keeping constant the outcomes of unilateral defection and unilateral cooperation. By doing so, the advantage that players receive from unilateral defection is increased, while the cost of mutual defection is reduced. Thereby, different versions of the game vary the level of non-correspondence between players' outcomes, while maintaining the PDG's basic outcome structure (i.e., the fixed order of the four outcome options remains unchanged in all the game

variants). Through this procedure, four non-correspondence conditions (low, medium, high, and very high) were created. These four conditions are characterized by a *K*-index of respectively 0.80, 0.60, 0.40, and 0.20 (Appendix B provides more information on how we calculated these index scores).

Results

In order to examine the statistical power of our study, we conducted a sensitivity power analysis after gathering the data. This type of power analysis entails calculating the minimum effect size that could be detected at a given power level for a specific study design and sample size. The results of this sensitivity power analysis (which are provided in Appendix C) show that our study had sufficient power to detect the effects that are reported below.

Behavioral Consistency within the Prisoner's Dilemma Game

Table 3 reports the descriptive statistics (non-cooperation rates, cooperation rates, means, and standard deviations) for the behaviors in the 16 PDGs. We first computed correlations between the behaviors in the 16 games. These correlations are presented in Table 4. From this table, it can be derived that the correlations among the games were all positive and significant ($.19 < r < .55$; all ps $< .01$). A closer look at Table 4 reveals that, in general, if two games differ strongly in terms of the three game parameters, they display a smaller correlation than if two games vary only slightly in terms of the three game parameters. This notion should be taken into consideration when interpreting the reported correlation coefficients.

In order to investigate the amount of behavioral consistency, we next computed the average correlation among behaviors in the 16 different games, by using the Open Psychometric Meta-Analysis software (Wiernik, 2017). This analysis showed a highly significant ($p < .001$) average correlation of $r = .36$ (CI_{95} [.35, .37]), which can be labelled as relatively large according

to Gignac and Szodorai's (2016) guidelines. Because one of the most widely reported measures of internal consistency is Cronbach's alpha, we subsequently also computed the Cronbach's alpha for participants responses in the 16 game variants ($\alpha = .90$), which can also be labeled as rather high. From these two latter findings, it can hence be derived that participants' choices across the different variants of the PDG indeed show consistency: If a person cooperated (or did not) in one PDG, it is likely that he or she also cooperated (or did not) in another variant of this game.

Personality and Situation as Determinants of Cooperation

The results presented above indicate that there is considerable consistency in choice behavior over the different versions of the PDG. Nevertheless, the analysis also seems to indicate that consistency differs in light of the situational manipulations. In the next step, we therefore looked in a more detailed and structured way at how choice behavior is influenced by our situational game manipulations, as well as by the player's personality.

The complexity of the current data necessitates a detailed discussion of our analysis strategy to examine how personality and situational factors influence choice behavior within the PDG. Given the explorative nature of the current study, we used a model-building approach using generalized linear mixed models (GLMMs) with the lme4 package in R to search for the "best-fitting" statistical model (R Core Team, 2013; Bates, Maechler, Bolker, & Walker, 2015). Each participant responded to multiple games; as such, each data-point is not fully independent, necessitating a mixed modelling approach. GLMMs allow the estimation of both "fixed effects" (an average effect across all participants) and "random effects" (participant specific effects). Modelling a random effect allows one to correct for the repeated measurement of each participant. Random effects can be further divided into intercept-only models and models that

include both random intercepts and random slopes. Intercept-only models model an average response for each participant individually. Random-slopes models additionally model the effect of any pre-specified predictor for each individual participant, allowing the effect of a predictor to vary for each participant.

Model-building with mixed models is still an active area of research, and statistical science is yet to settle on a "gold standard" (for some recent methods, see Hui, Müller, & Welsh, 2016). A discussion of this topic falls beyond the scope of this paper, but one of the difficulties is that fixed and random effects need to be jointly estimated. However, estimates for fixed effects will depend on which random slope effects are included into the model and vice-versa (essentially leading to a chicken and egg type problem). To overcome this problem, we used a two-step approach. We first determined which fixed effects to include in our model and subsequently determined a best-fitting random-effects structure. To determine which fixed effects to include we used a manual, stepwise-forward model-building procedure. As the situational variables (endowment size, asymmetry, non-correspondence, and the interaction between endowment size and asymmetry) were explicit manipulations of the game structure, we decided to use these factors as a base model and then added all other predictors one at a time, as a main effect to this model. We used Akaike information criterion (AIC) values to determine which predictors to retain. This procedure was repeated in an iterative fashion up until the point where including any additional predictors decreased model fit. Once a main-effects model was determined, we tested all possible interaction effects of those variables included in the model, again using the AIC as a decision criterion, to determine if any interaction effect increases model fit.

Once the fixed-effect structure was established, we determined an appropriate random effects structure through the procedure outlined in Bates, Kliegl, Vasishth, and Baayen (2015). This procedure entails fitting all possible random slopes and subsequently running a principal component analysis to determine which of these are mathematically superfluous, iteratively eliminating them from the model until a maximal, yet parsimonious random effects structure is obtained. Our final model is displayed in Table 5. The *p*-values reported in this table were obtained with the lmerTest package (Kuznetsova, Brockhoff, & Christensen, 2017) through the Satterthwaite's method for approximating degrees of freedom.

Several interesting observations emerged from our final model and the model-building procedure. First of all, participants' choices in the PDGs were significantly predicted by the three situational manipulations (high endowments, symmetric outcomes, and low levels of non-correspondence led to more cooperation than low endowments, asymmetric outcomes, and high levels of non-correspondence) and the interaction of endowment size and asymmetry (in asymmetric games cooperation was highest under high endowments, whereas in symmetric games cooperation was highest under low endowments). It is worth noting that these situational effects were consistently found in all the models that we ran. But which of these situational variables has the largest predictive value? To answer this question, we additionally computed the proportion of the variance in the outcome variable that can be explained by each of the situational variations, using the method developed by Nakagawa and Schielzeth (2013) to calculate a measure of explained variance (R^2) for GLMMs. We used random intercept-only models for these calculations to ensure each model had the same random effects structure. These calculations revealed that endowment size accounts for about 0.3% of the variance in choice

behavior, asymmetry for 6.8%, and non-correspondence for 2.1% (while the interaction between endowment size and asymmetry explained 0.3%).

We also conducted some additional analyses in which we looked at the influence of each of the personality predictors separately. These analyses revealed that all our individual difference measures (with exception of the fearful motivational factor) significantly predicted participants' choices in the PDGs (high scores on SVO, dispositional trust, and the prosocial motivational factor, and low scores on RWA, SDO, and the proself motivational factor led to more cooperation). Our final model, however, contained only two of these personality traits: SVO and RWA. Adding any other personality or motivational variable led to a decrease in model fit. However, this observation needs to be qualified. Many alternative models fitted the data almost as well as our final model, and as such, it would be incorrect to argue in favor of this one model against all other potential models. Specifically, including either SDO or RWA leads to a better model fit than a model without either of these variables, but including both is unnecessary as it is mostly their shared variance that correlated with the outcome measure. The same is true for SVO, dispositional trust, and the prosocial and proself factors, although in this case SVO was clearly the best predictor of these four. Here, we also computed the proportion of the variance in the outcome variable that can be explained by each of the individual difference variables (Nakagawa & Schielzeth, 2013). These calculations revealed that, of the individual difference measures, SVO accounted for most of the variance in choice behavior (approximately 5.2%). The other individual difference measures each individually explained approximately 3% of the total variance in choice behavior (i.e., RWA: 3.2%, SDO: 3.1%, dispositional trust: 2.8%, prosocial motivational factor: 3.0%, proself motivational factor: 3.1%). The fearful factor (which was not significantly associated with choice behavior) only explained 0.1% of the variance.

It is worth explicitly mentioning that none of the possible interaction effects increased the fit of the model. Additionally, as can be gleaned from a comparison of Table 5 (which shows the results of our final model) with Table 6 (which shows the results for a model containing only the situational variables as predictors), controlling for personality did not change the size of the situational effects. In this vein, we have also correlated the individual difference measures separately with the cooperation rates calculated across the different situational game variants (see Table 7). This table shows that most of the personality variables correlated with game behavior in either all or in none of the situational variants, which further underscores the lack of significant interaction effects between our personality and situational variables. Together, these findings suggest that both personality and situation have independent effects on cooperation.

Relative Weight of Personality and Situation

Although the results of our prior analyses indicated that personality and situational variables both independently influence choice behavior, it is still unclear which factor is most influential in shaping cooperation. Therefore, for our best fitting model (that included all three situational variables and the personality traits SVO and RWA), we additionally computed the proportion of the variance in the outcome variable that can be explained by the situational variations and the personality variables (Nakagawa & Schielzeth, 2013). These extra analyses showed that our best-fitting model explained a total of $R^2_{GLMM(m)}$ = 16.7% of the variance in choice behavior. Of this total explained variance, the three situational variables (together) accounted for 9.0% of the variance, whereas the two included personality traits (together) accounted for the remaining 7.8%. This finding thus indicates that, in our study context, the effects of the included situational variables and the relationships of the personality features accounted for very similar levels of variance in participants' choice behavior.

Discussion

In contemporary society many conflicts arise from competing interests in terms of self-versus-other concerns (Simpson, 2003; Van Lange et al., 2013). A wide range of mixed-motive games has been employed in psychological research to study these concerns, but prior research revealed rather low behavioral consistency across different mixed-motive games. The aim of the present study was to investigate if these low levels of consistency also apply to different variants of the same game. We therefore examined whether participants behave consistently within different situational variants of the PDG (aim 1). Besides within-game consistency, we also investigated how various situational and personality factors influence choice behavior – both independently (aims 2 and 3) and in relation with each other (aim 4).

Main Conclusions

Four important conclusions can be derived from the current data. Our first aim was to compare choice behavior within a wide set of one-shot PDGs. Our study included a range of games that differed on three crucial situational dimensions, which raised its stakes, contrasted its outcomes, and rendered players' interests almost completely aligned or opposed. Nevertheless, our analyses revealed a relatively large average correlation and a high Cronbach's alpha for people's choices across the 16 PDGs. As such, while people may show low behavioral consistency across different mixed-motive situations (e.g., Blanco et al., 2010; Haesevoets et al., 2015), consistency within the same game type appears to be higher (although the expectation of a perfect relationship would, of course, be unrealistic).

The second aim of this study was to better understand how situational factors affect people's choices in mixed-motive situations. Despite the considerable consistency between people's decisions across the different versions of the PDG, our results revealed that the

situational manipulations nevertheless had powerful effects on choice behavior. Participants were significantly more likely to cooperate in games with high (versus low) endowments, in games with symmetric (versus asymmetric) outcomes, and in games with low (versus high) levels of non-correspondence. The former two effects were qualified by a significant interaction, such that in asymmetric games participants were more likely to cooperate under high endowments than under low endowments (for a similar result, see Sheposh & Gallo, 1973), whereas in symmetric games participants were more likely to cooperate under low endowments than under high endowments.

Important in this regard is that the present study was the first to manipulate endowment size, asymmetry, and non-correspondence together in a single study design. As such, an interesting contribution of our study is that it allowed us to investigate which of these three situational dimensions is most impactful in shaping choice behavior. The results of our analyses revealed that, together, these three situational manipulations explained close to 10% of the variance in choice behavior – of which endowment size accounts for about 0.3%, asymmetry for 6.8%, and non-correspondence for 2.1% (while the interaction between endowment size and asymmetry explained 0.3%). It can hence be concluded that, while a core of consistency in behavior is observed across different PDGs, situational factors (and especially asymmetry) exert a powerful influence on people's decisions in specific representations of the game – and thereby may evoke choice behavior that differs substantially from games that differ on these dimensions. This conclusion is especially relevant when considering the prevalence of such situational differences in real-world social dilemmas (e.g., Beckenkamp et al., 2007; Rapoport & Chammah, 1965; Schopler et al., 2001). To understand people's choices in specific dilemmas, it is thus important to represent their situational features in mixed-motive games that seek to model them.

The third aim of our study was to better understand how personality relates to choice behavior. Our findings showed that individual differences in personality and motivation both yielded considerable differences in choice behavior across the various versions of the PDG. More specifically, participants with high (versus low) scores on SVO, dispositional trust, and the prosocial motivational factor were significantly more likely to cooperate in the different game versions, as were participants with low (versus high) scores on RWA, SDO and the proself motivational factor. As such, these findings underline that robust patterns of choice behavior can be observed across different representations of the PDG as a function of these individual differences variables (see also the correlation matrix that is reported in Table 7), which may consistently shape people's preference for cooperative or non-cooperative behavior. Our findings further revealed that SVO was the best individual predictor, as it explained (by itself) about 5.2% of the total variance in choice behavior. This is not surprising as SVO is (of all our included personality measures) most closely related to game behavior, both in conceptual and in methodological terms. The other individual difference measures (i.e., RWA, SDO, dispositional trust, and prosocial and proself motivations) each individually explained about 3% of the total variance in choice behavior.

Critically, however, the correlation matrix reported in Table 1 revealed these individual differences measures to all be highly inter-correlated. Because of this empirical overlap, in our analyses we focused on identifying the model that best fits our data. Interestingly, in our final model, only SVO and RWA were included as "unique" personality predicators (and these two personality traits together explained almost 8% of the variance in choice behavior). As such, a particularly interesting contribution of the present research is that our best-fitting model underlined the importance of ideological attitudes − besides social value orientation − for

predicting choice behavior in the context of the PDG. This conclusion is especially relevant because ideological attitudes represent more general societal orientations that may be especially important to many real-life social dilemmas (such as environmental issues and policy preferences; cf. Schultz & Stone, 1994; Van Lange, Bekkers, Chirumbolo, & Leone, 2012), relative to the more specific preferences for (numerical) outcomes that characterize SVO. As such, further consideration of ideological attitudes in future research may enable us to situate the game literature within a much broader framework. We therefore encourage future research on mixed-motive interactions to also take the role of ideological attitudes into account.

A person × situation approach was applied with the goal of investigating how situational factors and personality features interrelate in shaping choice behavior within the PDG (aim 4). Our findings indicated that the included situational factors and personality traits exerted separate effects on participants' decisions. Moreover, their expression was not contingent on each other, which underlines the robustness of the observed situational and personality effects across various representations of the PDG. This result is notable in light of previous studies that have consistently shown that behavior is jointly determined by the interaction of personality and situational variables (cf. Snyder & Cantor, 1998), in the sense that the expression of personality differences depends on certain situational features (for some notable examples, see Leikas et al., 2012; Sherman et al., 2015; also see Balliet & Van Lange, 2013). It is important to note, however, that the lack of person-situation interaction effects that was observed in the present study should only be interpreted in the context of the specific variables that were included in our study, and by no means imply that such interactions cannot occur if other personality and situational variables are taken into consideration.

Lastly, the present research is also relevant for the long-standing discussion about the relative weight of the person and the situation as determinants of people's behavior. Some researchers have argued that people have consistent personalities that guide their behaviors across situations, whereas others claim that people are not consistent enough across different situations to be characterized by certain personality traits (cf. Epstein & O'Brien, 1985; Kenrick & Funder, 1988; Rowe, 1987). Our findings contribute to this debate by illuminating the relative contribution of situational and personality factors in the context of the PDG. Specifically, when looking at our best-fitting model, our situational manipulations together explained about 9% of the total variance in choice behavior, whereas personality together explained almost 8%. Accordingly, it can hence be concluded that – in the context of the present study – people's personality and the situation were about equally impactful in shaping cooperative behavior (i.e., our included personality and situational variables accounted for very similar levels of variance in participants' choice behavior). In sum, both the situation and the person matter as sources of behavior.

Motives Underlying Cooperation and Non-Cooperation

We obtained a relatively large average inter-correlation of $r = .36$ in choice behavior across the different PDGs. Although we found rather strong within-game consistency, prior research of Haesevoets and colleagues (2015), who investigated the level of consistency across entirely different mixed-motive games, reported substantially lower levels of between-game consistency. More specifically, these authors found a typical average correlation coefficient of $r = .22$ among seven different types of mixed-motive games. When we take these findings together, it can be concluded that behavioral consistency seems considerably higher within the *same* game type (even when implementing considerable variation in their situational features)

than between *different* game types. Because different variants of the same kind of game (e.g., two versions of the PDG) can be considered as more similar in structure than completely different game types (e.g., a PDG and a Dictator Game), this finding is actually in agreement with prior research on the cross-situational consistency of behavior. More specifically, this line of research has shown that although the cross-situational consistency of behavior has often been qualified as rather low, greater situational similarity and aggregation of behavioral measurements are generally associated with more cross-situational consistency (e.g., Furr & Funder, 2004; Sherman, Nave, & Funder, 2010).

Interestingly, these findings are also consistent with the idea that the self-other conflict that characterizes each mixed-motive game is shaped by a combination of specific motives that are decisive for determining choice behavior, and that these motives may differ between different types of games (cf. Thielmann et al., 2015). However, while theorizing has associated a range of specific motives with decisions in the PDG (e.g., the prosocial motives of fairness, altruism, and social welfare with cooperation; the proself motives of greed, fear, and competitiveness with non-cooperation, see Thielmann et al., 2015), direct examination of these motives in the present research indicated some important differences from these assumptions. As indicated by Table 1, cooperative choices in the PDG were associated with higher scores on self-reported altruism, social welfare concerns, concern for others,[8] and advantageous inequality aversion, while non-cooperative choices were associated with higher scores on self-reported greed and psychological entitlement. Conversely, no significant correlations with choice behavior were found for fairness, fear, competitiveness, disadvantageous inequality aversion, and risk aversion.

Importantly, although the present research provides some first insights in the motives that underlie choice behavior in the PDG, the ideal study would include several motivations and

several mixed-motive games (each in a range of structural variations) in order to unravel the unique and shared motives that underlie behavior in different mixed-motive games. Such an approach would allow a direct replication of the present study, plus an extension to other games as well as other motivational predictors. In this regard, a valuable recommendation for future research, therefore, is to cross-validate the present findings in other mixed-motive games, to examine whether similar consistency in choice behavior may be observed in those settings, and to unravel the unique underlying motivational basis of each game. In this light, it is also important to note that in the present study we implemented a trait-based assessment of the included motives, rather than a state-based assessment. It is possible, however, that associations with motivational traits may not be directly equivalent to the motives that are activated by the games. Future research is encouraged to further investigate the role of both trait-based and state-based motivations underlying choice behavior, and whether these two types of motives differentially affect people's responses.

How Can Cooperation be Promoted?

An important practical issue that results from the present study concerns the question if, and how, cooperation can be enhanced. In light of this question, our finding that the personality variables and situational features that were included in our study influenced about equally strongly people's cooperative tendencies suggests that cooperation can potentially be promoted through both these factors.

First, although the personality measures that were included in the present study are considered to be relatively stable over time, they are not set in stone. That is, these characteristics are expected to also be amenable to social and cultural shaping. In this vein, Duckitt (2001) has argued that RWA and SDO are not immutable personality-type traits, but rather ideological

attitudes that express relatively independent motivational goals of social cohesion and collective security (in the case of RWA) and of group-based dominance and superiority (in the case of SDO). In line with this reasoning, longitudinal studies have shown that RWA indeed changes as a function of individual and contextual features (e.g., Sibley & Duckitt, 2010). A certain level of malleability can also be expected for SVO, trust, and the motivational traits, as these traits may also develop over time (e.g., Van Lange et al., 2007). As such, a first possibility to promote cooperation may thus be by altering these traits in such a way that people become more prosocial. This can, for instance, be achieved through socialization, interventions, education, and training programs. Such programs can help people to better understand the consequences of cooperation and non-cooperation for self and others at both the short and the long term; and as such may even persuade more self-interested persons to act more cooperatively (see Van Lange & Joireman, 2008). To the best of our knowledge, we do not know of any research that investigates the effectiveness of interventions and educational and training programs in this specific context. Future research is needed to test the potential effectiveness of such interventions.

A second possibility to increase cooperation is by shaping the situation in such a way that the cooperative option becomes more attractive, even for those who have a strong tendency to compete. The percentages reported in Table 3 indicate that close to 80% of our participants choose the cooperative option in the game with low endowments, symmetric outcomes, and the lowest degree of non-correspondence (i.e., PDG 2). Yet, in the game with low endowments, asymmetric outcomes, and the highest degree of non-correspondence (i.e., PDG 16) less than 40% choose the cooperative option. Applying incentives to reduce asymmetry and non-

correspondence in outcomes is hence another avenue through which cooperation might be promoted.

Limitations and Recommendations for Future Research

Our study is not without limitations. First of all, in the present study the personality measures and the game behaviors were all measured during the same experimental session, which may have resulted in carryover effects from the preceding individual difference measures to the subsequently measured game behaviors. We encourage future research in this domain to separate the measurement of these two factors in time, for instance by measuring personality some weeks prior to the experimental session. Another limitation of the present study is that we only employed one-shot measures of game behavior. Because behavior in such games might differ from behavior in repeated games (in which participants' behavior will also be influenced by the decisions of their counterpart), an important recommendation for subsequent studies is to also investigate game behavior in ongoing (repeated) interactions. Moreover, the use of only one-shot games may have yielded an underestimation of the reported within-game consistency level, which may increase when behavior in a specific game variant would be measured multiple times to counter measurement error. So, in order to have a more solid estimation of within-game consistency, an approach is needed in which measurement error is explicitly taken into account. This can be achieved by measuring each game variant with multiple repetitions (i.e., present participants with completely identical game variants). We encourage future research to use such identical (duplicate) games when investigating within-game consistency.

Our results seem to indicate that within-game behaviors are considerably more consistent than between-game behaviors (which is actually in line with the literature on the role of similarity in cross-situational consistency). However, because the relationships across and within

games in previous studies have been obtained in different samples, no direct comparison in terms of their magnitude is possible. Indeed, prior research of Haesevoets et al. (2015) used multiple game types in only one single variant, whereas the present study investigated a single game type in multiple variations. Yet, a study that assesses participants' reactions to multiple variants of multiple game types has not yet been conducted. Therefore, a valuable recommendation for future research in this particular area is to employ a "multi-variant-multi-game" approach, which will allow a more direct comparison of between-game and within-game consistency levels in a single study design.

In his classical work, Dawes (1980) talked about three important ingredients for enhancing cooperation in social dilemma situations: Knowledge, morality, and trust. Only trust had been administered in the present study. So, even though our research included an extensive range of situational and personality factors, there are also other factors relevant to choice behavior. One important personality factor that was not included in the present research is the Honesty-Humility dimension of the HEXACO model of personality (Hilbig & Zettler, 2009), which according to prior research is also significantly associated with cooperation in mixed-motive situations. Another interesting variable to take into consideration in future research is expectations of the other player's behavior, as meta-analytic research has recently revealed that such expectations partially mediate the relationship between personality and choice behavior (Pletzer et al., 2018). Other related personality concepts that might be interesting to include in future research are the Dark Triad (Paulhus & Williams, 2002) and the Interpersonal Circumplex (Wiggins, 2003). In light of this latter concept, it must be stressed that there is a conceptual overlap between many of the traits that are typically examined in the present study context and the Interpersonal Circumplex, which is defined by two orthogonal axes: A vertical axis which

consists of status, dominance, power, and control (concepts that are closely related to the proself dimension of mixed-motive situations), and a horizontal axis which consists of solidarity, friendliness, warmth, and love (concepts that are closely related to the prosocial dimension of mixed-motive situations). Although there is little cross-talk between the interpersonal and mixed-motive game literatures in general, there nonetheless seems to be a meaningful overlap. Researchers should be aware of this overlap when investigating the present research questions.

Conclusion

In sum, our results showed that differences in choice behavior occur as a function of both situational and personality differences (but our included situational variables and personality features did not interact with each other). In spite of the significant behavioral differences across game variants, considerable consistency in choices was found as well. Yet, it should be acknowledged that the present findings are based on the results of a single study; and that further research is needed to replicate, clarify, and extend the current findings. In this regard, we believe that it would be particularly valuable to complement the present findings with more ecologically valid field data from real-life social dilemmas. Through such initiatives, future research can build on the present insights to further advance our understanding of cooperation in social dilemmas and to uncover novel ways to facilitate it, for the benefit of all.

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Footnotes

[1] Gignac and Szodorai (2016) formulated the following guidelines for interpreting correlation coefficients: A correlation coefficient smaller than .10 mirrors a relatively small association, a correlation coefficient between .10 and .30 is considered a typical association, and a correlation coefficient larger than .30 reflects a relatively large association.

[2] In these respects, non-correspondence is similar to Rapoport's (1967) "Index of Cooperation," which captures the benefit of mutual cooperation over mutual defection (i.e., distance between CC and DD outcomes) relative to the benefit of exploitation over the sucker's payoff (i.e., distance between DC and CD outcomes).

[3] In addition to the SVO Slider Measure, we also included the Triple Dominance Measure to probe participants' value orientation. Similar results were obtained with both measures.

[4] Based on their SVO angle, participants can also be categorized into the four classic SVO types. Accordingly, we identified 158 cooperators (83.2%), 31 individualists (16.3%), and one competitor (0.5%). None of the participants' angle was high enough to be categorized as an altruist. Because this categorical classification discards the relative strength of participants' value orientation, we used the SVO angle in our analyses.

[5] The different cooperative and non-cooperative options were always presented at the exact same location in the matrix. Although this may have artificially increased the consistency of participants' responses, a closer look reveals that – across all sixteen game variants – only 3% of our participants consistently selected the non-cooperative option, whereas 15% consistently selected the cooperative alternative. These findings thus illustrate that the large majority of our participants (82%) varied their choices over the different game variants.

[6] Each participant first played PDG 9 *and* PDG 10 (random order), followed by PDG 11 *or* PDG 12 (randomly selected). The remaining games were presented in a randomized order.

[7] A comparison of participants' choices in these two identical games (i.e., PDG 9 of Appendix B, which was administered twice) reveals that about 76% of the participants acted consistently in both games (i.e., 57% of the participants selected the cooperative option in both games, whereas 19% selected the non-cooperative option in both games). The remaining participants (24%) selected the cooperative option in one game and the non-cooperative option in the other game.

[8] For concern for others, only the first (but not the second) scale correlated significantly with the cooperation index.

Table 1.

Correlations among the individual difference measures and between the individual difference measures and the cooperation index.

Variables	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.	17	18.	19.	20.
1. Social Value Orientation	–																			
2. Dispositional Trust	.27**	–																		
3. Right-Wing Authoritarianism	-.17*	-.45**	–																	
4. Social Dominance Orientation	-.23**	-.33**	.53**	–																
5. Fairness	.26**	.03	-.09	-.29**	–															
6. Altruism: Scale 1	.19**	.34**	-.29**	-.46**	.27**	–														
7. Altruism: Scale 2	.34**	.04	-.18*	-.26**	.30**	.29**	–													
8. Social Welfare Concerns	.17*	.18*	-.38**	-.49**	.36**	.53**	.31**	–												
9. Greed	-.23**	-.31**	.26**	.25**	-.19*	-.17*	-.10	-.14	–											
10. Fear	-.05	-.24**	.18*	-.13	.07	-.09	.14	.03	.27**	–										
11. Competitiveness	-.09	-.23**	.15*	.14	-.02	-.11	-.08	-.09	.51**	.32**	–									
12. Concern for Others: Scale 1	.15*	.43**	-.48**	-.51**	.23**	.50**	.24**	.47**	-.28**	.06	-.11	–								
13. Concern for Others: Scale 2	.06	.16*	-.23**	-.40**	.40**	.48**	.24**	.51**	-.12	.15*	-.10	.42**	–							
14. Psychological Entitlement	-.19**	-.32**	.36**	.35**	-.11	-.26**	-.19**	-.17*	.39**	.07	.23**	-.37**	-.25**	–						
15. Disadvant. Inequal. Aversion	-.30**	-.29**	.18*	.08	.09	-.10	-.10	.00	.35**	.31**	.34**	-.17*	.12	.23**	–					
16. Advant. Inequal. Aversion	.18*	.08	-.19*	-.35**	.26**	.26**	.34**	.36**	-.22**	.20**	-.12	.33**	.38**	-.26**	.05	–				
17. Risk Aversion	-.05	-.13	.12	-.12	.16*	-.06	-.00	-.07	.05	.49**	.11	.06	.17*	-.08	.24**	.22**	–			
18. Factor 1: Prosocial Motives	.25**	.31**	-.42**	-.62**	.52**	.75**	.46**	.81**	-.28**	.12	-.14*	.71**	.77**	-.39**	-.02	.56**	.10	–		
19. Factor 2: Proself Motives	-.27**	-.42**	.34**	.28**	-.15*	-.25**	-.15*	-.16*	.90**	.45**	.72**	-.36**	-.14	.54**	.55	-.25**	.13	-.32**	–	
20. Factor 3: Fearful Motives	-.02	-.17*	.10	-.21**	.27**	-.07	.15*	.01	.05	.79**	.20**	.14	.32**	.14	.38**	.43**	.85**	.25**	.20**	–
21. Cooperation Index (total)	.30**	.22**	-.24**	-.26**	.03	.20**	.23**	.17*	-.16*	-.04	-.13	.17*	.08	-.25**	-.12	.18*	-.09	.22**	-.21**	-.03

Note. The Cooperation Index (total) is computed by counting the total number of cooperative choices in the 16 Prisoner's Dilemma Games. * $p < .05$, ** $p < .01$.

Table 2.

Maximum likelihood analysis of the motivational traits (Pattern Matrix).

Variables	Factor 1	Factor 2	Factor 3
Social Welfare Concerns	**.82**	.11	-.18
Altruism: Scale 1	**.74**	.01	-.23
Concern for Others: Scale 2	**.69**	.05	.11
Concern for Others: Scale 1	**.60**	-.15	.01
Fairness	**.44**	-.03	.14
Advantageous Inequality Aversion	**.41**	-.15	.30
Altruism: Scale 2	**.41**	-.03	.04
Greed	-.02	**.80**	-.07
Competitiveness	.02	**.63**	.07
Disadvantageous Inequality Aversion	.06	**.47**	.24
Psychological Entitlement	-.21	**.44**	-.14
Risk Aversion	-.07	-.01	**.74**
Fear	.07	**.32**	**.61**

Note. Loadings greater than |.30| in boldface.

Table 3.

Descriptive statistics of the different Prisoner's Dilemma Games.

Games	Non-Cooperation	Cooperation	*M*	*SD*
PDG 1: High endowment, symmetric, low non-correspondence	42 (22.1%)	148 (77.9%)	.78	.42
PDG 2: Low endowment, symmetric, low non-correspondence	39 (20.5%)	151 (79.5%)	.79	.41
PDG 3: High endowment, asymmetric, low non-correspondence	62 (32.6%)	128 (67.4%)	.67	.47
PDG 4: Low endowment, asymmetric, low non-correspondence	88 (46.3%)	102 (53.7%)	.54	.50
PDG 5: High endowment, symmetric, medium non-correspondence	47 (24.7%)	143 (75.3%)	.75	.43
PDG 6: Low endowment, symmetric, medium non-correspondence	40 (21.1%)	150 (78.9%)	.79	.41
PDG 7: High endowment, asymmetric, medium non-correspondence	77 (40.5%)	113 (59.5%)	.59	.49
PDG 8: Low endowment, asymmetric, medium non-correspondence	95 (50.0%)	95 (50.0%)	.50	.50
PDG 9: High endowment, symmetric, high non-correspondence	50 (26.3%)	140 (73.7%)	.74	.44
PDG 10: Low endowment, symmetric, high non-correspondence	48 (25.3%)	142 (74.7%)	.75	.44
PDG 11: High endowment, asymmetric, high non-correspondence	90 (47.4%)	100 (52.6%)	.53	.50
PDG 12: Low endowment, asymmetric, high non-correspondence	101 (53.2%)	89 (46.8%)	.47	.50
PDG 13: High endowment, symmetric, very high non-correspondence	67 (35.3%)	123 (64.7%)	.65	.48
PDG 14: Low endowment, symmetric, very high non-correspondence	71 (37.4%)	119 (62.6%)	.63	.49
PDG 15: High endowment, asymmetric, very high non-correspondence	97 (51.1%)	93 (48.9%)	.49	.50
PDG 16: Low endowment, asymmetric, very high non-correspondence	115 (60.5%)	75 (39.5%)	.39	.49
TOTAL (average of the 16 PDGs)	**37.14%**	**62.86%**	**.63**	**.29**

Note. The exact payoff structure of each game is included in Appendix B. Non-cooperation is denoted with value 0, cooperation with value 1.

Table 4.

Correlations among the different Prisoner's Dilemma Games.

Games	PDG 1	PDG 2	PDG 3	PDG 4	PDG 5	PDG 6	PDG 7	PDG 8	PDG 9	PDG 10	PDG 11	PDG 12	PDG 13	PDG 14	PDG 15
PDG 1	–														
PDG 2	.48**	–													
PDG 3	.36**	.45**	–												
PDG 4	.35**	.23**	.32**	–											
PDG 5	.52**	.43**	.25**	.35**	–										
PDG 6	.38**	.47**	.33**	.25**	.45**	–									
PDG 7	.36**	.40**	.55**	.29**	.37**	.31**	–								
PDG 8	.33**	.40**	.43**	.55**	.38**	.31**	.44**	–							
PDG 9	.40**	.35**	.22**	.24**	.49**	.37**	.33**	.26**	–						
PDG 10	.30**	.51**	.24**	.19**	.37**	.29**	.29**	.32**	.31**	–					
PDG 11	.21**	.28**	.37**	.26**	.26**	.31**	.42**	.30**	.22**	.30**	–				
PDG 12	.37**	.35**	.34**	.45**	.42**	.33**	.45**	.52**	.35**	.28**	.34**	–			
PDG 13	.43**	.47**	.29**	.29**	.45**	.38**	.31**	.36**	.43**	.36**	.32**	.38**	–		
PDG 14	.40**	.42**	.32**	.33**	.41**	.46**	.32**	.36**	.40**	.38**	.36**	.33**	.48**	–	
PDG 15	.29**	.34**	.46**	.28**	.34**	.30**	.49**	.39**	.32**	.25**	.38**	.45**	.39**	.37**	–
PDG 16	.22**	.30**	.38**	.43**	.34**	.34**	.43**	.53**	.31**	.27**	.40**	.41**	.33**	.31**	.42**

Note. The average correlation among the 16 PDGs is $r = .36$ (CI_{95} [.35, .37]). ** $p < .01$

Table 5.

Regression coefficients of the "best-fitting" mixed effect model (final model).

Fixed Effects	$\hat{\beta}$	Se	*z*-value	*p*	95% CI
Intercept	-0.166	0.224	-0.74	.461	[-0.60, 0.29]
Endowment (Low)	-0.729	0.182	-3.99	<.001	[-1.10, -0.37]
Symmetry (Symmetric)	1.269	0.228	5.57	<.001	[0.83, 1.74]
Non-correspondence (Low)	1.297	0.155	8.38	<.001	[1.00, 1.60]
Non-correspondence (Medium)	0.973	0.150	6.48	<.001	[0.68, 1.27]
Non-correspondence (High)	0.642	0.147	4.37	<.001	[0.36, 0.93]
Sym. (Symmetric)*Endow. (Low)	0.768	0.298	2.58	.010	[0.18, 1.36]
SVO	0.067	0.017	4.01	<.001	[0.03, 0.10]
RWA	-0.517	0.194	-2.66	.008	[-0.91, -0.14]
Random Effects:	$\hat{\sigma}$				
Subject: Intercept	5.52				
Symmetry	2.49				
Endowment	1.65				
Symmetry*Endowment	3.16				

Note. For non-correspondence, the "very high" condition is always the reference category. $\hat{\beta}$s denote the estimated regression coefficients for the fixed effects, $\hat{\sigma}$s denote the estimated standard deviations of the random effect components.

Table 6.

Regression coefficients of the mixed effect model that only contains the situational variables.

Fixed Effects	$\hat{\beta}$	Se	*z*-value	*p*	95% CI
Intercept	-0.132	0.199	-0.66	.391	[-0.53, 0.27]
Endowment (Low)	-0.651	0.132	-4.93	<.001	[-0.92, -0.39]
Symmetry (Symmetric)	1.154	0.140	8.23	<.001	[0.88, 1.44]
Non-correspondence (Low)	1.153	0.141	8.21	<.001	[0.87, 1.44]
Non-correspondence (Medium)	0.867	0.138	6.30	<.001	[0.59, 1.15]
Non-correspondence (High)	0.573	0.135	4.23	<.001	[0.30, 0.85]
Sym. (Symmetric)*Endow. (Low)	0.738	0.196	3.76	<.001	[0.35, 1.14]
Random Effects:	$\hat{\sigma}$				
Subject	4.44				
Game	0.00				

Note. For non-correspondence, the "very high" condition is always the reference category. $\hat{\beta}$s denote the estimated regression coefficients for the fixed effects, $\hat{\sigma}$s denote the estimated standard deviations of the random effect components.

Table 7.

Correlations between the individual difference measures and the cooperation rates, separately for the different situational game variants.

Variables	Endowment size		Asymmetry		Non-correspondence			
	Low	High	Symm	Asymm	Low	Medium	High	Very High
Social Value Orientation	.28**	.30**	.33**	.23**	.23**	.23**	.29**	.32**
Dispositional Trust	.19**	.22**	.20**	.20**	.22**	.21**	.15*	.18*
Right-Wing Authoritarianism	-.23**	-.22**	-.23**	-.20**	-.19**	-.22**	-.23**	-.18*
Social Dominance Orientation	-.25**	-.24**	-.24**	-.23**	-.22**	-.19**	-.29**	-.21**
Fairness	.01	.06	.06	.01	.02	-.06	.01	.14
Altruism: Scale 1	.19**	.19*	.17*	.19**	.20**	.13	.19*	.18*
Altruism: Scale 2	.21**	.22**	.23**	.19*	.14*	.16*	.23**	.26**
Social Welfare Concerns	.15*	.17*	.12	.18*	.16*	.12	.19**	.14
Greed	-.14	-.17*	-.19*	-.11	-.12	-.11	-.15*	-.18*
Fear	-.00	-.07	-.01	-.05	-.01	-.02	-.04	-.06
Competitiveness	-.11	-.13	-.16*	-.08	-.08	-.12	-.11	-.13
Concern for Others: Scale 1	.17*	.15*	.20**	.11	.12	.15*	.18*	.15*
Concern for Others: Scale 2	.07	.09	.11	.05	.13	.06	.07	.04
Psychological Entitlement	-.27**	-.19**	-.23**	-.22**	-.23**	-.19**	-.23**	-.22**
Disadvantageous Inequality Aversion	-.11	-.12	-.14	-.08	-.04	-.15*	-.10	-.12
Advantageous Inequality Aversion	.17*	.17*	.16*	.17*	.19**	.10	.13	.21**
Risk Aversion	-.08	-.10	-.03	-.13	-.09	-.08	-.08	-.08
Factor 1: Prosocial Motives	.21**	.21**	.21**	.20**	.22**	.15*	.22**	.21**
Factor 2: Proself Motives	-.19**	-.21**	-.24**	-.16*	-.16*	-.17*	-.20**	-.23**
Factor 3: Fearful Motives	.01	.05	-.02	.07	.01	.05	.04	.02

Note. * $p < .05$, ** $p < .01$.

Appendix A

Detailed Description of the Motivations

Fairness

The fairness motive is characterized by the desire to reach fair outcomes. It has widely been demonstrated in the literature that fairness significantly affects cooperation (Kerr, 1986; Messe, Dawson, & Lane, 1973; Pepitone, 1971). However, because prior research suggests that equality is at the heart of the fairness concept (see Messick & Sentis, 1983; also see Samuelson, 1993; Stouten, De Cremer, & Van Dijk, 2005), in the Prisoner's Dilemma Game (PDG) the fairness motive can lead to cooperation as well as non-cooperation, depending on which choice is expected to promote the highest degree of equality in both players' outcomes (Kerr, 1986).

Altruism

Altruism reflects the motivation to maximize the benefit of others, and this regardless of the outcomes for oneself (Berkowitz, 1972; Romer, Gruder, & Lizzadro, 1986; Rushton, 1980). A host of studies has shown that altruism leads to cooperative behavior (e.g., Kuhlman, Brown, & Teta, 1992; Kuhlman, Camac, & Cunha 1986; Liebrand, 1984; Unger, 1991).

Social Welfare Concerns

Social welfare concerns comprise the extent to which people are concerned with the welfare of our society in general (Charness & Rabin, 2002; Thielmann, Böhm, & Hilbig, 2015). Similar to altruism, it can hence be expected that in the PDG the social welfare motive also leads to cooperative behavior, since this option has the potential to lead to the highest joint outcomes (see Thielmann et al., 2015).

Greed

Greed is defined as the desire to always want to earn as much as possible, and thus reflects an active seeking of self-interest (Krekels & Pandelaere, 2015). As with fairness, greed can lead to cooperation or non-cooperation, dependent on which choice leads to the highest own payoff (Coombs, 1973). Indeed, prior research has shown that greed generally results in non-cooperation, unless self-interest is best served by cooperating (e.g., Kuhlman & Marshello, 1975).

Fear

Fear refers to feelings of insecurity about oneself as well as uncertainty about other people's intentions (Bruins, Liebrand, & Wilke, 1989; Simpson, 2006). It is important to note that prior research has indicated that different fear dimensions can be distinguished (see Van Hiel, Vanneste, & De Cremer, 2008). For instance, fear of being betrayed by others and fear of being socially excluded are two dimensions that can lead to different behaviors in mixed-motive situations (i.e., non-cooperation and cooperation, respectively, see Hine & Gifford, 1996). Although fear is clearly not a one-dimensional construct, former studies indicate that fear in more general terms is likely to evoke non-cooperative behavior (see Dawes & Thaler, 1988; Markóczy, 2004).

Competitiveness

Individuals who are driven by competitiveness want to increase the difference between themselves and others, and this even at the cost of their own absolute gain (Markóczy, 2004). As such, competitiveness tends to evoke non-cooperative behavior (e.g., Kuhlman et al., 1986).

Concern for Others

Concern for others basically refers to the extent in which individuals are concerned with the interests and welfare of other people (Van Hiel et al., 2008). Prior research suggests that

concern for others is linked to prosocial behavior (e.g., Eisenberg & Miller, 1987; McNeely & Meglino, 1999; Rushton, 1980).

Psychological Entitlement

Psychological entitlement refers to the phenomenon in which individuals consistently believe that they deserve preferential rewards and treatment, with little consideration of their actual deservingness (Naumann, Minsky, & Sturman, 2002; Snow, Kern, & Curlette, 2001). Prior research has revealed that high entitled individuals report less cooperation than low entitled individuals (e.g., Campbell, Bonacci, Shelton, Exline, & Bushman 2004).

Inequality Aversion

The concept of inequality aversion is defined as the extent to which an individual prefers equal outcomes above unequal outcomes (Engelmann & Strobel, 2004). Inequality can be in a person's disadvantage (receiving less than others) or advantage (receiving more than others, see Loewenstein, Thompson, & Bazerman, 1989; Schmitt, Gollwitzer, Maes, & Arbach, 2005). Depending on the type of equality that is being avoided, inequality aversion can lead to non-cooperation or cooperation. That is, in the context of the PDG, it can be expected that high levels of disadvantageous inequality aversion lead to non-cooperation, whereas high levels of advantageous inequality aversion lead to cooperation.

Risk Aversion

Finally, individuals also differ with respect to the amount of risk they are willing to take in a given situation (Mandrik & Bao, 2005). Risk aversion has been defined as an individual's preference for a guaranteed outcome over a probabilistic one (Qualls & Puto, 1989). The motive to avoid risks may lead to the non-cooperative choice in the PDG, thereby avoiding the detrimental outcome of unilateral cooperation (cf. Sabater-Grande & Georgantzis, 2002).

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Appendix B

Outcome Structure of the 16 Prisoner's Dilemma Games

PDG 1: High endowment, symmetric, low non-correspondence (*K*-index = .80)

Participant's decision	Other Player's decision	
	Cooperate	Defect
Cooperate	18, 18	0, 20
Defect	20, 0	2, 2

Note. If the participant and the other player both select the cooperative option, they both receive 18 points (CC). If the participant selects the cooperative option and the other player the defective option, the participant receives 0 points and the other player 20 points (CD). If the participant selects the defective option and the other player the cooperative option, the participant receives 20 points and the other player 0 points (DC). If the participant and the other player both select the defective option, they both receive 2 points (DD).

K-index = (CC-DD) / (DC-CD) = (18-2) / (20-0) = .80.

PDG 2: Low endowment, symmetric, low non-correspondence (*K*-index = .80)

Participant's decision	Other Player's decision	
	Cooperate	Defect
Cooperate	9, 9	0, 10
Defect	10, 0	1, 1

PDG 3: High endowment, asymmetric, low non-correspondence (*K*-index = .80)

Participant's decision	Other Player's decision	
	Cooperate	Defect
Cooperate	18, 9	0, 10
Defect	20, 0	2, 1

PDG 4: Low endowment, asymmetric, low non-correspondence (*K*-index = .80)

Participant's decision	Other Player's decision

	Cooperate	Defect
Cooperate	9, 18	0, 20
Defect	10, 0	1, 2

PDG 5: High endowment, symmetric, medium non-correspondence (*K*-index = .60)

Participant's decision	Other Player's decision	
	Cooperate	Defect
Cooperate	16, 16	0, 20
Defect	20, 0	4, 4

PDG 6: Low endowment, symmetric, medium non-correspondence (*K*-index = .60)

Participant's decision	Other Player's decision	
	Cooperate	Defect
Cooperate	8, 8	0, 10
Defect	10, 0	2, 2

PDG 7: High endowment, asymmetric, medium non-correspondence (*K*-index = .60)

Participant's decision	Other Player's decision	
	Cooperate	Defect
Cooperate	16, 8	0, 10
Defect	20, 0	4, 2

PDG 8: Low endowment, asymmetric, medium non-correspondence (*K*-index = .60)

Participant's decision	Other Player's decision	
	Cooperate	Defect
Cooperate	8, 16	20, 0
Defect	10, 0	2, 4

PDG 9: High endowment, symmetric, high non-correspondence (*K*-index = .40)

Participant's decision	Other Player's decision	
	Cooperate	Defect
Cooperate	14, 14	0, 20
Defect	20, 0	6, 6

PDG 10: Low endowment, symmetric, high non-correspondence (*K*-index = .40)

Participant's decision	Other Player's decision	
	Cooperate	Defect
Cooperate	7, 7	0, 10
Defect	10, 0	3, 3

PDG 11: High endowment, asymmetric, high non-correspondence (*K*-index = .40)

Participant's decision	Other Player's decision	
	Cooperate	Defect
Cooperate	14, 7	0, 10
Defect	20, 0	6, 3

PDG 12: Low endowment, asymmetric, high non-correspondence (*K*-index = .40)

Participant's decision	Other Player's decision	
	Cooperate	Defect
Cooperate	7, 14	0, 20
Defect	10, 0	3, 6

PDG 13: High endowment, symmetric, very high non-correspondence (*K*-index = .20)

Participant's decision	Other Player's decision	
	Cooperate	Defect
Cooperate	12, 12	0, 20
Defect	20, 0	8, 8

PDG 14: Low endowment, symmetric, very high non-correspondence (*K*-index = .20)

Participant's decision	Other Player's decision	
	Cooperate	Defect
Cooperate	6, 6	0, 10
Defect	10, 0	4, 4

PDG 15: High endowment, asymmetric, very high non-correspondence (*K*-index = .20)

Participant's decision	Other Player's decision	
	Cooperate	Defect
Cooperate	12, 6	0, 10
Defect	20, 0	8, 4

PDG 16: Low endowment, asymmetric, very high non-correspondence (*K*-index = .20)

Participant's decision	Other Player's decision	
	Cooperate	Defect
Cooperate	6, 12	0, 20
Defect	10, 0	4, 8

Appendix C

Results of our Sensitivity Power Analysis

A sensitivity power analysis (using the simr package in R) demonstrated that our study had:

- 78.3% power to detect a treatment effect that leads to a 10% increase (or decrease) in cooperation rates at an average cooperation rate of 50%. Or, in the case of a continuous predictor: 78.3% power to significantly detect any effect in which an increase (or decrease) of 1 standard deviation corresponds with a 10% increase (or decrease) in cooperation rates.
- 84.4% power to detect an effect that leads to a 10% increase in cooperation rates at an average cooperation rate of 60% (the average in our study).
- 98.4% power to detect an effect that leads to a 15% increase in cooperation rates at an average cooperation rate of 50%.
- 99.6% power to detect any (standardized) effect that leads to a 15% increase in cooperation rates at an average cooperation rate of 60% (the average in our study).