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Social Value Orientation and Cooperation in Social Dilemmas: A Meta-Analysis

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This article reports a meta-analysis of 82 studies assessing the relationship between social value orientation (SVO) and cooperation in social dilemmas. A significant and small to medium effect size was found ($r = .30$). Results supported a hypothesis that the effect size was larger when participants were not paid ($r = .39$) than when they were paid ($r = .23$). The effect size was also larger in give-some ($r = .29$) as opposed to take-some ($r = .22$) games. However, contrary to expectations, the effect was not larger in one-shot, as opposed to iterated games. Findings are discussed in the context of theory on SVO and directions for future research are outlined.

KEYWORDS cooperation, meta-analysis, social dilemmas, social value orientation

People often encounter mixed-motive social dilemmas (Komorita & Parks, 1994), situations in which their immediate self-interest is at odds with what is best for their relationships, community, and/or nation. These dilemmas are pervasive in social interactions and may occur in situations as diverse as deciding who will wash the dishes, whether to conserve community resources, donating to charity, or voting in an election. Research on mixed-motive dilemmas finds considerable variation in behavior. Some people never clean the kitchen, recycle, volunteer, or vote while others do clean the kitchen, recycle, volunteer, and vote. Messick and McClintock (1968) recognized these differences and sought to develop a measurement technique to understand if a fundamental difference in individual motives underlies choices in social dilemmas. This research led to the discovery of individual differences in *social value orientations* (SVO), defined in terms of the weights people assign to their own and others' outcomes in situations of interdependence. For the past 40 years, research has attempted to link SVO with behavior in social dilemmas and, to date, several reviews of the SVO literature have been conducted (Au & Kwong, 2004; Bogaert, Boone, & Declerck, 2008; Van Lange, De Cremer, Van Dijk, & Van Vugt, 2007). While valuable, these narrative

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reviews do not provide a meta-analytic estimate of the SVO effect size in social dilemma research. To address this gap in the literature, we report what we believe to be the first meta-analysis of the SVO effect in social dilemma research. Below, we briefly review the SVO construct and suggest three possible moderators of the SVO effect.

Social value orientation (SVO)

Early research on SVO was inspired by Messick and McClintock (1968), who pioneered a technique for measuring motives in social dilemmas known as the decomposed game. In a decomposed game, participants choose between options that offer points to the self and another person. Participants are asked to imagine they will not meet or interact with the other, and they receive no feedback about the choices of the other person. These conditions eliminate strategic considerations from the choice. As such, choices in the decomposed games are usually taken as an indication of a person's social values or motives.

Table 1 shows an example of a decomposed game. Here, a *cooperator* would choose Option A, as it maximizes joint gain and equality (Van Lange, 1999), an *individualist* would choose Option B, as it maximizes own gain, and a *competitor* would choose Option C, as it maximizes one's relative advantage over the other person. A recent review on SVO by Au and Kwong (2004) suggests that most people are classified as cooperators (46%), followed by individualists (38%), followed by competitors (12%).

Prisoner's dilemmas, public goods dilemmas, and commons dilemmas

In general, research on SVO has been conducted within the context of the two-person prisoner's dilemma, the public goods dilemma, or the commons dilemma. In the two-person prisoner's dilemma, participants are faced with a two-alternative matrix like the one shown in Figure 1. Players are interdependent, since each person's outcome is dependent on their own and their partner's choice. Players often make decisions simultaneously and without knowledge of the partner's intentions. As shown in Figure 1, the largest outcome for each individual (100 points) is attained by choosing the option to defect (B or Y). But the defector will only receive 100 points when the other chooses to cooperate (A or X). When one player defects and the other player cooperates, the cooperator receives the worst outcome (0 points) possible. However, joint outcomes are maximized (60 points each) when both players choose to cooperate (A and X), and this outcome is greater than when both players choose to defect (B and Y; 40 points each).

Closely related to the prisoner's dilemma are public goods dilemmas and commons dilemmas. The public goods dilemma is a 'give-some' dilemma in which participants are given an endowment and asked to make a contribution to a group fund or public good, which then accumulates interest (e.g. is doubled) and is evenly distributed among group members, regardless of contribution decision. By contrast, the commons dilemma is a 'take-some' dilemma in which there is a common resource from which each member of a group decides how much to harvest. Typically, if the collective consumption exceeds the size of the common resource, the

Table 1. Example of a decomposed game for assessing social value orientation

	Option		
	A	B	C
Allocation			
Points to Self	500	600	500
Points to Other	500	200	0

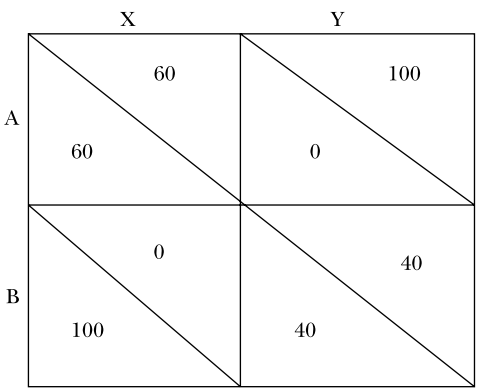

Figure 1. Prisoner's dilemma matrix.

common resource is depleted and no additional trials are allowed.

Moderators of the SVO effect

From the beginning, researchers have been interested in understanding how SVO interacts with features of the situation to predict behavior. In two of the earliest studies, researchers explored how decision makers with different SVOs responded to partners who pursued different strategies such as 100% cooperative, tit-for-tat, or 100% competitive (e.g. Kelley & Stahelski, 1970; Kuhlman & Marshello, 1975). Subsequent studies have explored additional moderators including the perceived honesty of one's partner (Van Lange & Kuhlman, 1994), group identity (De Cremer & Van Dijk, 2002), and level of uncertainty concerning the size of a shared resource (de Kwaadsteniet, Van Dijk, Wit, & De Cremer, 2006). While each of these moderators is interesting, the small number of studies in any given category does not lend itself to a comprehensive comparison across studies. Several additional features of SVO studies do, however, allow for a comparison across studies, and these potential moderators offer both theoretical and practical implications. In the present study, we focus on three moderators, including whether participants (a) are or are not paid for their decisions; (b) play a one-shot vs. an iterated game; and (c) play a resource dilemma vs. a public goods dilemma.

Paid vs. not paid Some studies pay participants for outcomes in social dilemmas, while other studies utilize hypothetical dilemmas that involve no monetary consequences. For two reasons, we believe that the SVO effect will be smaller when participants are paid according to their decisions.

First, introducing monetary consequences may lead participants to apply a business frame to the decision (Biel & Thorgersen, 2007; Liberman, Samuels, & Ross, 2004; Tenbrunsel & Messick, 1999). While a business (or economic) frame may be the default for proselfs (individualists and competitors combined), a community frame may be default for prosocials. Indeed, prosocials and proselfs hold different interpretations regarding the rationality of cooperation in social dilemmas. Whereas prosocials view cooperation as the rational choice, proselfs view non-cooperation as the rational choice (Van Lange, Liebrand, & Kuhlman, 1990). Prosocials and proselfs also differ in how they frame the social dilemma decision itself: whereas prosocials view the decision as a choice between moral and immoral behavior, proselfs view the decision as a choice between strong and weak behavior (Liebrand, Jansen, Rijken, & Suhre, 1986). Given these differing construals, it seems reasonable to assume that prosocials may typically view a social dilemma as a 'community game', while proselfs may typically view the decision as an 'economic game'. And, it is possible that by paying participants, researchers are either subtly or not so subtly cueing a business frame, which could potentially turn prosocials into proselfs, but leave proselfs' level of cooperation unchanged.

A second reason for expecting the SVO effect to be smaller when participants are paid is that payment may affect participants' expectations of what others are likely to do. Specifically, prosocials, who tend to expect more cooperation from others, relative to proselfs (Van Lange, 1992), may expect others to defect more often in paid social dilemmas. This is important because expectations of non-cooperation are likely to reduce the cooperation of prosocials, but have little impact on the cooperation of proselfs (De Cremer & Van Lange, 2001), thereby reducing or eliminating the effect of SVO on cooperative behavior. In sum, we predict that the SVO effect will be smaller in studies in which participants are paid according to their choices.

One-shot vs. multi-trial games Another potential moderator is whether participants play a one-shot game or an iterated game in which they interact with another person or group over a series of trials. In a one-shot game, participants' choices are most likely a function of their disposition, as the participant often has little additional information on which to base their decision. In an iterated context, by contrast, behavior is not only directed by dispositional

social motives, but also by others' prior behavior. Kelley and Stahelski (1970) showed that when initial cooperators in a prisoner's dilemma are paired with initial competitors, the cooperators conform to the low level of cooperation demonstrated by their competitive partners, a process known as behavioral assimilation. Kuhlman and Marshello (1975) replicated the behavioral assimilation effect for cooperators and individualists, and demonstrated that competitor's behavior doesn't change in response to another competitor. Taken together, this line of reasoning suggests that behavioral assimilation will reduce the initial differences among SVO subgroups across the trials of an iterated game, and hence, that SVO effects will be smaller in iterated games than in one-shot games.

Give-some vs. take-some games The framing of the dilemma as a give-some or a take-some dilemma may also moderate the extent to which SVO predicts behavior. A fundamental difference between give-some and take-some dilemmas is that in the former, players start with an amount of resource that is contributed, and in the latter, players start with nothing and resources are gained. Prospect theory suggests that in economic decision making, losses loom larger than gains (Kahneman & Tversky, 1979). Applying prospect theory to social dilemmas, De Dreu and McCusker (1997) reasoned there is a greater discrepancy between the utility of cooperation and defection in loss frames, relative to gain frames. Moreover, these researchers explicitly extend this reasoning to give-some dilemmas (loss frames) and take-some dilemmas (gain frame). Since prosocials combine outcomes and choose options that maximize these combined outcomes, while proselfs may either consider only their own outcomes or subtract others' outcomes from their own, then defection will be even more attractive for proselfs in a give-some game, while cooperation will be even more attractive for prosocials in the same dilemma. Indeed, De Dreu and McCusker (1997) found that SVO was more predictive when dilemmas were framed according to losses, relative to gains. Another reason to expect moderation by the type of game is that there may be more salient norms guiding behavior in take-some dilemmas, which should weaken the effect of SVO on cooperation. For example, de Kwaadsteniet et al. (2006) have found that when the equality norm is salient, SVO is less predictive of behavior in dilemmas. This is important, because Van Dijk and Wilke (1995) have found that individuals are more likely to try to minimize differences in resource dilemmas than in public goods dilemmas. This suggests that an equality norm is more salient in take-some dilemmas, which in turn suggests that the SVO effect will be smaller in resource dilemmas.

Having advanced this line of reasoning, it is important to note two dissenting lines of research. First, some researchers have questioned whether it is appropriate to apply prospect theory's focus on losses vs. gains to the distinction between give-some and take-some dilemmas, respectively (Van Dijk & Wilke, 1995). Indeed, Van Dijk and Wilke argue that a give-some dilemma can just as easily be viewed as a gain frame, given that participants can potentially receive a public good. Second, at least one study has found that SVO is more predictive in take-some dilemmas than in give-some dilemmas (Parks, 1994). In the end, there appear to be arguments for and against the hypothesis that the SVO effect should be stronger in give-some as opposed to take some dilemmas. As such, we treat this as an open research question.

Method

Locating studies

The articles for the meta-analysis were collected in several ways. First, we used relevant search engines to find published papers. Second, references were searched in all relevant articles. Third, all researchers who attended the 12th International Conference for Social Dilemmas were contacted and solicited for both published and unpublished studies. This yielded an additional 18 unpublished studies.

Criteria for selecting studies

There were several criteria for the selection of studies. First, we decided to only examine

research on adults (defined as aged 18 years and above), since there are only very few studies which have measured SVO of children. Second, we only included studies that measured SVO. Third, we coded effect sizes with a dependent variable that could be considered an instance of cooperation within a social dilemma. There was considerable variation in the types of games included in this analysis (e.g. prisoner's dilemmas, public goods dilemmas, and resource dilemmas). The games could be both give-some or take-some. Also, we limited the analysis to lab paradigms of social dilemmas and did not include any applied studies examining this relationship. Lastly, only a single effect size from each study was included in the analysis. However, for manuscripts with multiple studies, we coded an effect size for each separate study. These procedures resulted in a total sample of 82 eligible effect sizes. All studies included in the meta-analysis are listed in Appendix A.

Coding procedure

Paid vs. not paid Studies were first coded in terms of whether participants were paid ($N = 48$), given a lottery or chance to win money ($N = 9$), or given no compensation ($N = 25$) in the dilemma. In the studies coded as 'paid', participants received real money for their decisions in the social dilemma. In the studies coded as 'lottery', participants were either awarded lottery tickets for their decisions in a social dilemma or they were randomly selected at the end of the study to win their respective earnings. We decided to separate these lottery studies from the paid category since it is well known that people discount the value of probabilistic rewards (Hinson, Whitney, & Jameson, 2006). In the studies coded as 'not paid', participants were not paid any compensation and they made decisions about hypothetical amounts of money. Often these studies asked participants to imagine that they were playing for money, and their decisions never resulted in any actual monetary loss or gain.

One-shot vs. iterated games Next, we coded whether participants engaged in a one-shot ($N = 40$) or an iterated game ($N = 42$). The effect of SVO on cooperation in iterated games is examined by averaging over all the trials.

Give-some vs. take-some dilemmas Finally, we coded studies as either give-some dilemmas ($N = 48$), take-some dilemmas ($N = 14$), or other ($N = 20$). Studies coded as 'other' were unable to be classified into one of the two main categories, and include mostly matrix games, such as the prisoner's dilemmas ($N = 8$).

Effect size: computation and analyses

The current sample of studies is not inclusive of the population of studies examining the relationship between SVO and cooperation in social dilemmas. In fact, we did collect several studies that were unable to be analyzed because of a lack of required statistical information. Therefore, since a fixed effects model assumes analysis of the population of studies, a mixed-effects model is considered most appropriate for our analyses. Two assumptions of this model are: (1) study characteristics may moderate effect size and (2) after such analyses, there is still variance, either systematic or random, in the effect size distribution (Lipsey & Wilson, 2001). We assume systematic variation in the effect size distribution, and therefore, a mixed-effects model is more appropriate than a random effects model which assumes only random variation which cannot be explained.

Our meta-analysis uses the correlation coefficient as the measure of effect size. The correlation coefficient was chosen because in all studies SVO is a measured variable that is later related to a measure of cooperation in a social dilemma.

For the overall analyses, the SVO classification, proself and prosocial, is always coded as 1 and 2, respectively. In some studies, researchers classified SVO as altruists, cooperators, individualists, and competitors. In the overall analysis, we collapsed the altruists and cooperators into a prosocial group, and individualists and competitors into a proself group while calculating the effect size. However, in a separate analysis we also consider the difference between competitors (coded 1) and individualists (coded 2).

Also, the effects recorded for take-some dilemmas are always reverse coded to be positive, if prosocials took less (and so cooperated more) than proselfs. This coding is done to make all positive correlations interpretable as prosocials cooperating more than proselfs in the social dilemma. All analyses were conducted using the Hedges-Olkin (Hedges & Olkin, 1985) approach with Comprehensive Meta-Analysis software version 2.

Results

Analysis of effect size

Table 2 provides a summary of all studies along with their coding and effect size. The overall analysis ($N = 82$) suggests the distribution of effect size contains more variation than would be expected by sampling error alone, $Q(81) = 248$, $p < .001$. A significant Q value supports our choice to test a mixed effect model which assumes systematic variation in the effect size distribution. As expected, a mixed effects analysis of the overall distribution results in a small positive relationship between SVO and cooperation, $r = .30$, *95% CI*, $LL = .26$, $UL = .33$, meaning prosocials cooperate more than proselfs. A reduced analysis only considering the first study in each manuscript ($N = 51$) using a mixed effects model again results in the same conclusion, $r = .32$, *95% CI*, $LL = .27$, $UL = .36$. As shown in Table 2, all studies, except one, reported a positive relationship between SVO and cooperation, with most reporting statistically significant results. It is possible that there is a publication bias in the overall analysis and a set of several non-significant results would reduce the average effect size to a non-significant level. To test this, we computed Orwin's (1983) fail-safe *N*, a statistic designed to estimate the number of results with zero correlation necessary to reduce the overall average effect to non-significance ($r = .04$). In the present study, Orwin's fail-safe *N* was 510. According to Hedges and Olkin (1985), to assure confidence in the results, Orwin's fail-safe *N* should be five times the number of studies (here $5 \times 82 = 410$), plus 10 ($410 + 10 = 420$). Accordingly, the effect size in the current study appears to be robust against the presence of a large number of unpublished studies finding a null result.

The overall analysis compared prosocials (cooperators) and proselfs (individualists and competitors). Originally, research on SVO classified people as cooperators, individualists, and competitors. Are competitors less cooperative than individualists? We consider this question by examining the effect size in reported studies that used this classification ($N = 19$). We coded competitors as 1 and individualists as 2, so that a positive correlation is interpreted as more cooperation by individualists. As expected, individualists are more cooperative than competitors, $r = .27$, *95% CI*, $LL = .19$, $UL = .34$. The sample contains more variation than would be expected by sampling error alone, $Q(18) = 33.9$, $p = .013$. Using the criteria above, we computed the Orwin's Fail-safe *N* as 110, which indicates confidence that this effect is not due to a publication bias.

Moderator analyses

Paid vs. not paid We conduct a meta-regression by coding studies paid = 1, lottery = 2, and non-paid = 3, and expect a positive slope for effect size. Using this method of coding, the analysis obtained a statistically significant positive effect of participant payment on SVO-cooperation effect size, $Q(2) = 20.6$, $p < .001$. Indeed, there was a larger effect size in the not paid studies ($r = .39$, *95% CI*, $LL = .33$, $UL = .45$) than in the lottery studies ($r = .36$, *95% CI*, $LL = .23$, $UL = .47$) and paid studies ($r = .23$, *95% CI*, $LL = .20$, $UL = .26$).

One-shot vs. iterated games The effect size was not significantly larger in the one-shot studies ($r = .31$, *95% CI*, $LL = .26$, $UL = .35$) than in the iterated studies ($r = .29$, *95% CI*, $LL = .24$, $UL = .34$), $Q(1) = .157$, $p = .692$.

It may be that repeated play only reduces the effect of SVO on cooperation when feedback of prior trials is provided to participants. Therefore, we coded for when feedback was provided to participants and conducted a moderator analysis when removing 11 studies without feedback. The results were qualitatively the same as above.

Table 2. Studies used in meta-analysis

Study	Country	N	% Prosocials	P/NP/L	GS/TS/ PD/O	OS/IT	*r*
Balliet (2008)	SG	85	58	P	PD	IT	.30
Brucks & Van Lange (2007)	NL	133	51	L	TS	IT	.17
Budescu et al. (1997)	US	84	54	P	TS	IT	.27
De Cremer (2000)	NL	51	63	NP	GS	OS	.34
De Cremer & Van Dijk (2002)	NL	142	51	P	GS	OS	.59
De Cremer & Van Lange (2001)	NL	68	57	NP	GS	OS	.61
Study 2	NL	52	58	NP	GS	OS	.55
De Cremer & Van Vugt (1999)	NL	96	59	P	GS	OS	.43
Study 2	GB	93	66	P	GS	OS	.43
Study 3	GB	94	61	P	GS	OS	.45
De Dreu & McCusker (1997)	NL	74	24	L	O	IT	.52
De Hooge et al. (2007)	NL	126	39	P	GS	OS	.16
de Kwaadsteniet et al. (2006)	NL	111	44	P	TS	IT	.20
Eeks & Garling (2006)	SE	54	63	NP	PD	OS	.46
Eeks et al. (2002)	SE	36	50	P	O	IT	.35
Feyer et al. (2007)	DE	64	N/A	P	PD	IT	.22
Garling (1999)	GB	172	77	NP	TS	OS	.26
Hulbert et al. (2001)	GB	55	57	L	PD	IT	.32
Study 2	GB	60	42	NP	PD	IT	.28
Joireman et al. (in press)	US	84	82	NP	TS	IT	.20
Study 2	US	86	44	NP	TS	IT	.27
Klapwijk & Van Lange (2008)	NL	204	59	P	O	IT	.01
Study 2	NL	122	59	P	O	IT	.24
Study 3	NL	137	53	P	GS	IT	.10
Klapwijk et al. (2008)	NL	126	52	P	GS	IT	.14
Study 2	NL	109	50	P	O	IT	.11
Kramer et al. (1986)	US	53	49	P	TS	IT	.37
Liebrand (1984)	NL	130	51	P	TS	IT	.23
Study 2	NL	97	61	P	TS	IT	.25
Liebrand, Wilke et al. (1986)	NL	126	46	P	O	IT	.31
Liebrand & Van Run (1985)	US/NL	246	61	P	TS	IT	.19
Loomis et al. (1995)	US	66	50	P	TS	IT	.27
McClintock and Liebrand (1988)	US	123	32	P	O	IT	.43
Mulder (2000)	NL	89	65	P	GS	OS	.23
Study 2	NL	184	64	P	GS	OS	.37
Study 3	NL	99	44	P	GS	OS	.25
Study 4	NL	43	57	P	GS	OS	.42
Study 5	NL	80	51	P	GS	OS	.32
Study 6	NL	103	48	P	GS	OS	.11
Study 7	NL	145	34	P	GS	OS	.15
Study 8	NL	123	39	P	GS	OS	.28
Study 9	NL	64	63	P	GS	OS	.40

(*Continued*)

(*Table 2 Continued*)

Study	Country	N	% Prosocials	P/NP/L	GS/TS/ PD/O	OS/IT	*r*
Mulder & Van Prooijen (2007)	NL	111	68	P	GS	OS	.26
Study 1	NL	49	43	P	GS	OS	–.05
Study 2	NL	96	52	P	GS	OS	.04
Study 3	NL	172	58	NP	GS	OS	.08
Study 4	NL	104	29	P	GS	OS	.05
Nelissen et al. (2007)	NL	249	41	L	GS	OS	.34
Offerman et al. (1996)	GB	171	29	P	GS	IT	.20
Parks & Rumble (2001)	US	240	33	L	O	IT	.54
Perugini & Gallucci (2001)	GB	107	37	NP	O	OS	.39
Roch & Samuelson (1997)	US	172	51	P	TS	IT	.19
Sanna et al. (2003)	US	83	51	P	TS	IT	.26
Sattler & Kerr (1991)	US	151	46	P	TS	IT	.14
Sheldon (1999)	US	65	23	NP	PD	IT	.39
Simpson (2004)	US	97	61	P	PD	OS	.36
Smeesters et al. (2008)	NL	69	48	NP	GS	IT	.55
Study 2	NL	68	50	NP	GS	OS	.51
Smeesters et al. (2003)	BE	102	44	NP	GS	OS	.33
Study 2	BE	192	49	NP	GS	OS	.40
Study 3	BE	132	48	NP	GS	OS	.42
Study 4	BE	167	52	NP	GS	OS	.49
Stouten et al. (2005)	NL	79	27	P	GS	OS	.29
Utz (2004)	NL	102	50	NP	O	IT	.74
Study 2	NL	71	36	NP	GS	IT	.25
Utz et al. (2004)	NL	78	36	L	GS	IT	.45
Study 2	NL	113	46	L	GS	IT	.20
Van den Bergh et al. (2006)	BE	48	56	P	GS	IT	.24
Van Dijk et al. (2002)	NL	140	N/A	P	GS	IT	.19
Study 2	NL	54	N/A	P	GS	IT	.40
Van Lange (1992)	NL	123	42	NP	PD	IT	.34
Van Lange (1999)	NL	118	42	NP	GS	OS	.46
Study 2	NL	164	56	P	GS	OS	.32
Van Lange & Kuhlman (1994)	US/NL	334	61	NP	O	IT	.27
Van Lange & Liebrand (1989)	NL	78	58	P	GS	IT	.34
Van Lange & Liebrand (1991a)	NL	59	64	P	GS	OS	.39
Study 2	US	56	57	NP	GS	OS	.34
Van Lange & Liebrand (1991b)	NL	55	56	P	GS	OS	.36
Study 2	NL	60	38	NP	GS	OS	.42
Van Lange & Visser (1999)	NL	141	47	L	O	IT	.14
Van Lange & Semin-Goossens (1998)	NL	21	48	NP	GS	OS	.77
Weber & Murnigham (2008)	US	35	N/A	L	GS	IT	.43

Note: N = a study's reported number of participants who were classified as prosocial and proself, P = paid participants, NP = participants not paid, L = lottery payment for participants, GS = give-some game, TS = take-some game, PD = Prisoner's Dilemma, O = Other, OS = one-shot dilemma, and IT = iterated dilemma.

Give-some or take-some dilemmas Finally, the SVO-cooperation effect size was larger in the give-some studies ($r = .29$, *95% CI*, $LL = .25$, $UL = .34$) than in the take-some studies ($r = .22$, *95% CI*, $LL = .17$, $UL = .27$), $Q\,(1) = 5.26$, $p = .022$.

Discussion

The present meta-analysis revealed a small to moderate relationship between SVO and cooperation in social dilemmas. Overall, SVO explained approximately 9% of the variance of cooperation in social dilemmas. A practical implication of the small effect size is that researchers hoping to avoid making a type II error should include a large number of participants in studies in order to increase the power of their statistical test. Beyond the overall SVO effect, we identified two moderators of that effect. First, SVO was found to be more predictive of cooperation in public goods dilemmas, as opposed to resource dilemmas. Second, the SVO effect was larger when participants were not paid for choices in the dilemma, than when they were paid according to their choices. However, one-shot vs. iterated play failed to moderate the effect size. Below, we discuss the theoretical and practical implications of our findings.

Paid vs. not paid studies

We find the SVO effect is smaller when participants are paid according to their decisions. At the outset, we reasoned that payment may lead people to adopt a business or economic frame to the dilemma and/or increase expectations of non-cooperation. Each explanation predicts a decrease in cooperation by prosocials, but little to no change among proselfs, resulting in a reduction of the SVO effect size. Future research directly testing these hypotheses would make a meaningful contribution to the SVO literature. Other research might profitably explore whether people hold lay theories about the effects of money on cooperation, which may subsequently affect expectations of cooperation or possibly even general trust in others.

Our first moderation result may also have several implications for future researchers interested in assessing the relationship between SVO and cooperation. First, it may be that researchers are overestimating the relationship between SVO and cooperation when participants are asked to make decisions regarding hypothetical amounts of money. In real-life social dilemmas, people make decisions with real consequences, involving money, effort, time, or social rewards/costs. Although there has been some research that demonstrates SVO predicts cooperation outside the lab (for review see, Bogaert et al., 2008), it is possible that unpublished studies are failing to detect an effect for SVO in the field due to a smaller effect size in real-life contexts. If correct, future studies on the ecological validity of the SVO–behavior relationship should consider large sample sizes to accommodate this potentially smaller effect size. Second, the smaller effect size for paid studies might suggest that factors other than social values influence responses to SVO measures (e.g. social desirability; Iedema & Poppe, 1994). If some degree of social desirability is built into the SVO measure, but not into the relevant outcome measure, the relationship between SVO and that outcome could become smaller. For example, if paid dilemmas are construed as a business-type decision, then cooperation may not be viewed as socially desirable, relative to non-paid dilemmas, and so SVO would explain less variance in these paid dilemmas. If correct, perhaps researchers can consider devising alternative measures of SVO that are less affected by social desirability. For example, researchers might consider employing a bogus pipeline procedure (e.g. Iedema and Poppe, 1994) in combination with the standard SVO measure, or using an alternative measure of SVO such as implicit evaluation of others' goals (Ferguson, 2007). Implicit measures of goals, relative to explicit measures, can avoid the influence of social desirability and even be more predictive of behaviors that are difficult to control, e.g. overriding the immediate temptation to defect in social dilemmas (Ferguson, 2007). That said, it is important not to overstate the problem, as a number of studies have already found that SVO predicts behavior in the field.

Give-some vs. take-some dilemmas

The SVO effect was larger in give-some than in take-some dilemmas. In the introduction, we outlined arguments for and against this prediction. On the one hand, at least one study involving a head-to-head comparison of the two dilemmas showed that SVO is more predictive of behavior in take-some dilemmas (Parks, 1994). On the other hand, at least two other studies suggested the effect should be stronger in give-some dilemmas. De Dreu and McCusker (1997) reasoned that since individuals are more sensitive to losses than gains, and this increases the discrepancy between the utility of defection and cooperation in loss as opposed to gain frames, cooperation should be even more attractive to prosocials in loss frames, compared to gain frames, while defection should be even more attractive to proselfs in loss frames. De Dreu and McCusker suggest that this logic can be applied to the distinction between give-some dilemmas (loss frames) and take-some dilemmas (gain frames). This line of reasoning would suggest that the SVO effect would be larger in give-some dilemmas. A plausible alternative explanation is that equality norms are more salient in take-some dilemmas, and this norm reduces the effect of SVO on behavior in that context (de Kwaadsteniet et al., 2006). In the end, our analysis indicated that the SVO effect was larger in give-some dilemmas. As such, future research directly testing the latter two explanations is encouraged.

One-shot vs. iterated games

Our analysis failed to support the prediction that the SVO effect would be larger in one-shot, compared to iterated games. One reason for this finding might be that prosocials are more forgiving of others in a social dilemma (Smeesters, Warlop, & Van Avermaet, 2008). If prosocials, compared to proselfs, are more forgiving, then these individuals will continue to cooperate with others who defect in a dilemma. However, this perspective is contrary to prior research on behavioral assimilation, which demonstrates that others tend to compete with other competitors in dilemmas, regardless of SVO (Kuhlman & Marshello, 1975). It might be, however, that even though prosocials compete with competitors, prosocials will forgive these competitors and make subsequent attempts to re-initiate a cooperative relationship. It may also be that since many of the iterated dilemma studies included in this analysis provide real feedback of others' behavior, which contains greater variation in behavior than manipulated preprogrammed strategies, it could take much longer for behavioral assimilation to occur and these studies are not iterated long enough to capture the phenomena. Clearly, additional research is needed to better understand how the dynamics of cooperation between prosocials and proselfs unfold over time.

A plausible alternative interpretation of the results of this meta-analysis is that paid dilemmas and take-some games represent strong situations, which in turn reduce the effect of dispositions on behavior. Strong, relative to weak, situations will often generate a relative consensus for appropriate behavior by providing clear incentives, a supportive learning environment, or normative expectations (Mischel, 1977). Subsequent research may consider testing this speculation by systematically examining if paid dilemmas and take-some games generate uniform construal and expectancies, as well as adequate incentives for appropriate behavior, relative to non-paid and give-some games, respectively (Cooper & Withey, 2009). Future research on SVO will benefit by a detailed analysis comparing the specific contexts in which SVO does and does not predict behavior.

Limitations and future directions

Several limitations of the current meta-analysis should be noted. First, there were some SVO studies that were unable to be included in this analysis due to a lack of statistical information. Second, in the interests of parsimony, there were other types of games, relevant to cooperation, but not strictly social dilemmas, that were excluded from our analysis (e.g. ultimatum bargaining, dictator's game, and negotiations). Third, we focused on only three moderators. As such, there might be other factors that could

potentially moderate the relationship between SVO and cooperation (e.g. group size, expectations, or social identity). Finally, we did not explore the effect size for other personality variables (e.g. agreeableness, trust, or interpersonal orientation) which are also relevant to cooperation. As additional studies are published, future meta-analyses may be in a better position to address these unanswered questions.

Conclusion

Social dilemmas are pervasive in social interactions. One approach to understanding behavior in social dilemmas has been to study individual differences in SVO. While our analysis suggests that the size of the SVO effect varies based on the situation, the take-home message of the present analysis is that the individual difference variable introduced by Messick and McClintock (1968) over 40 years ago remains alive and well: SVO indeed affects cooperation in social dilemmas. Moreover, the future seems bright for the SVO construct. As new studies explore its relevance across different domains, we will no doubt gain additional insight into the dynamics of cooperation across an array of interdependent settings.

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Appendix A: Meta-analysis studies

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