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True versus strategic fairness in a common resource dilemma: Evidence from the dual-process perspective

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Abstract

Common resource dilemmas involve collectively coordinating individual choices to promote group efficiency. Equal division represents one of the most important coordination rules. Previous research suggests that individuals follow the equality rule for different reasons. Some individuals behave cooperatively out of their concern for other's welfare, whereas some individuals cooperate strategically to enhance personal gains. Building on the dual-process perspective, the authors aim to differentiate strategic fairness from true fairness in solving a resource dilemma. In four experiments, the effect of cognitive processing manipulations on individual harvesting behavior in a one-shot resource dilemma was tested against participants with different social values. Results consistently showed that prosocials, who value joint outcome and equality, requested significantly less money than did proselfs, who value personal gain. More importantly, prosocials in the intuition and deliberation conditions request similar amounts, whereas proselfs in the intuition condition request more money than those in the deliberation condition. The results were further validated by a follow-up meta-analysis based on the four experiments. The implications of the dual-process perspective for social coordination research are discussed.

KEYWORDS

coordination, dual-process, equal division, social preferences, social value orientation

1 | INTRODUCTION

A resource dilemma is characterized by a conflict between individual and collective interests, in which a group of people share a limited resource pool that can be exploited to maximize personal gain; but if too many overharvest, they risk depleting the common pool (Dawes, 1980; Hardin, 1968). Overfishing and global energy consumption are examples of the resource dilemma (for reviews, see Komorita & Parks, 1995; Kopelman, Weber, & Messick, 2002).

Apart from this conflict metaphor, a resource dilemma is also about a collective puzzle of "how the people involved can efficiently coordinate their decisions" (de Kwaadsteniet & van Dijk, 2012, p. 190), especially so in almost all problems involving environmental uncertainty (e.g., Budescu, Rapoport, & Suleiman, 1990; de Kwaadsteniet, van Dijk, Wit, & de Cremer, 2006; Gustafsson, Biel, & Gärling, 1999; Rapoport, Budescu, Suleiman, & Weg, 1992). A prominent goal thus arises, that is to allocate resource in an efficient way, through which both individual interests and collective interests can be satisfied (Wilke, 1991). Therefore, resource dilemmas also involve the element of social coordination (for a review, see Abele, Stasser, & Chartier, 2010), in which the optimal use of a resource is achieved through coordinating with others' choices (de Kwaadsteniet et al., 2006).

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As to how people coordinate in resource dilemmas, several scholars point to the role of fairness, which is defined as providing group members with equal final outcomes (de Kwaadsteniet & van Dijk, 2012; Schelling, 1960; Wilke, 1991). Numerous studies on resource dilemmas show that people tend to harvest an equal share of the resource (e.g., Allison, McQueen, & Schaerfl, 1992; Allison & Messick, 1990; de Cremer, 2003; Rutte, Wilke, & Messick, 1987; van Dijk & Wilke, 1993, 1995; van Dijk, Wilke, Wilke, & Metman, 1999). Adhering to this rule results in a "fair" distribution, whereas violating such rule leads to anger and retribution (de Kwaadsteniet, van Dijk, Wit, & de Cremer, 2010).

Individuals differ concerning their preferences for equal outcomes. This individual difference is nicely illustrated by the concept of social value orientation (SVO). SVO is a dispositional variable that depicts how people prefer certain outcomes of resource allocation for themselves and others (Messick & McClintock, 1968; van Lange, 1999). The majority of individuals could be identified as either prosocials or proselfs. Specifically, prosocials assign greater value to joint outcome maximization and equality among group members; proselfs assign greater value to personal gain. In the context of resource dilemmas, consistent findings demonstrate that prosocials harvest significantly less, thus deviate less from equal division, than do proselfs (Kramer, McClintock, & Messick, 1986; Parks, 1994; Roch & Samuelson, 1997).

Nonetheless, both prosocials and proselfs are able to follow the equality rule, for different reasons (e.g., van Dijk, de Cremer, & Handgraaf, 2004). A number of studies examining the contingencies of equality as a coordination rule suggest that prosocials consistently adhere to the equal division rule, whereas proselfs adhere to the equality rule only when they perceive resource size certainty (de Kwaadsteniet et al., 2006), have strong group identification (de Cremer, van Knippenberg, van Dijk, & van Leeuwen, de Cremer, van Knippenberg, van Dijk, & van Leeuwen, 2008), or share a common understanding about the game (van Dijk, de Kwaadsteniet, & de Cremer, 2009). Stouten, de Cremer and van Dijk (Stouten, de Cremer, & van Dijk, 2005) compared reactions of prosocials and proselfs toward a violator of equality and found that prosocials showed negative emotions toward the violator irrespective of failure or success of the group outcome. Proselfs, however, showed negative emotions toward the violator only when the group outcome turned out to be a failure. These results suggest that prosocials adhere to the equality rule out of fairness concerns, whereas proselfs adhere to the equality rule out of efficiency concerns.

The above literature points to the importance of revealing the cognitive underpinnings of prosocial decision making (for a review, see Zaki & Mitchell, 2013). In line with this notion, the present research focuses on cognitive processes that impact individual harvest in resource dilemmas from a dual-process perspective. Dual-process theories propose that individual decisions are the products of two paralleling cognitive processing systems, namely intuition and deliberation. Compared with intuition, which is relatively automatic, fast, and effortless, deliberation is more controlled, slower, effortful, and relies more heavily on cognitive resources (Gilovich, Griffin, & Kahneman, 2002; Sloman, 1996). Therefore, deliberation is more susceptible to cognitive-processing manipulations. Following this logic, if a decision results from true fairness concerns, it is unlikely to be affected by manipulations of cognitive processing. Alternatively, if the decision is camouflaged with strategic concerns, impeding deliberation is likely to change the decision.

The social heuristic hypothesis (SHH; Rand et al., 2014) offers some important insights into the roles intuition and deliberation play in social interactions. The central argument of the SHH is that when individuals have learned social strategies that have been typically successful in daily life, these strategies become automatic, intuitive responses (e.g., Kiyonari, Tanida, & Yamagishi, 2000; Rand et al., 2014). Therefore, given prevalent mechanisms such as reciprocity, reputation, signaling, and punishment that facilitate cooperation (Axelrod & Hamilton, 1981; Fudenberg & Maskin, 1990; Nowak & Sigmund, 2005; Jordan, Hoffman, Bloom, & Rand, 2016; van Veelen, García, Rand, & Nowak, 2012; Hoffman, Yoeli, & Nowak, 2015), most people should be intuitively cooperative (for a review, see Rand & Nowak, 2013). Deliberation, however, can undermine intuitive responses and cause individuals to adopt other strategies that favor self-interest in specific decision contexts (Peysakhovich & Rand, 2015; Rand et al., 2014). This would generate two contrasting predictions concerning the role of deliberation. In decision contexts where there is no self-interested motive to cooperate, such as lack of future consequences or sanction, one should not cooperate from a perspective of self-interest. Hence, deliberation is likely to adjust one's behavior toward a more self-serving end. In decision contexts where there is a self-interested motive to cooperate, say in the face of salient coordination rules or reputational concerns, deliberation should encourage cooperation. Results from a meta-analysis lend support to these hypotheses (Rand, 2016).

2 | THE CURRENT RESEARCH

Many prior experiments have examined intuition/deliberation in decision contexts where there is no self-interested motive to cooperate (for a review, see Rand, 2016). There has been substantially less work on situations where there is a self-interested motive for cooperation when considering individual difference moderators. We aim to fill this gap by comparing prosocial and proself individuals' harvesting behavior in a one-shot resource dilemma.

The self-interested motive for cooperation in a one-shot resource dilemma lies in the existence of a prominent coordination rule, namely equality. When all members adhere to the equality rule, they realize the optimal use of resources and achieve a perfect balance between personal and collective interest[1] (de Kwaadsteniet et al., 2006). Therefore, deliberation is likely to favor equal division. Nonetheless, given consistent findings showing that prosocials and proselfs differ

[1]Many scholars argue that, compared with the prisoner's dilemma, the coordination game could be more appropriate in understanding the resource dilemma (Baland & Platteau, 1996; Kollock, 1998; Ostrom, Gardner, Walker, & Walker, 1994). The coordination game, also known as the assurance game, is a social dilemma game in which the payoff for unilateral defection is lowered to the same payoff as for mutual cooperation, thus removing the temptation to free-ride. Compared with the prisoner's dilemma, the coordination game generates incentives to cooperate. Cooperation is thus a personally rational choice, if one expects others to cooperate (for a review, see Van Lange, Joireman, Parks, & van Dijk, 2013).

concerning their intuitions toward cooperation (Balliet & Joireman, 2010; Cornelissen, Dewitte, & Warlop, 2011), we suggest that the effect of deliberation on cooperation could be different for prosocials and for proselfs. Specifically, we expect that for prosocials, promoting deliberation would not change the level of cooperativeness, given that they adhere to the equality rule intuitively, and deliberation further corroborates with this decision. For proselfs, promoting deliberation would increase the level of cooperativeness, given that they make selfish responses intuitively, and deliberation adjust the decisions toward equal division.

In this paper, we refer "strategic fairness" to equal share decisions made in a deliberative mode; we refer "true fairness" to equal share decisions made in an intuitive mode. In four experiments, we disentangle strategic fairness (van Dijk et al., 2004) from true fairness by manipulating individuals' cognitive-processing modes using ego depletion,[2] cognitive load, and thinking mode induction.

3 | EXPERIMENT 1

3.1 | Methods

3.1.1 | Participants

A total of 115 undergraduates (75 men; average age is 20.8 years; *SD* = 2.3 years) participated in with a reward of 50 HKD and a possible bonus from experimental tasks.

3.1.2 | Procedure and materials

The experiment was conducted in a computer laboratory over several sessions. We framed the study as an investigation of color perception and decision-making. When participants arrived at the lab, they were assigned to a computer. After signing a consent form, they completed a test measuring their SVO, followed by a 96-trial Stroop task (Wright, Stewart, & Barnett, 2008), which was used to manipulate ego depletion. Then, they engaged in three rounds of resource dilemma games. The experiment was a 2 (SVO: prosocial vs. proself) × 2 (cognitive load: high vs. low) between-subjects design.

SVO was measured by the triple dominance measure of social values (van Lange, de Bruin, Otten, & Joireman, 1997). In each of the nine decomposed games, individuals chose among three outcome allocations between themselves and an imaginary partner. Each allocation indicated individualistic, competitive, or cooperative orientations. Following common practices, competitors, and individualists were classified as proselfs (e.g., Cremer & Lange, 2001; de Dreu & van Lange, 1995; van Lange & Liebrand, 1991). Among the 115 participants, 101 were classified as either proselfs (*N* = 45) or prosocials (*N* = 56). Participants were randomly assigned to a high (26 proselfs and 26 prosocials) and a low ego-depletion condition (19 proselfs and 30 prosocials). The other 14 participants could not be classified and were discarded from further analysis.

To manipulate ego depletion, we had participants engage in a 96-trial Stroop color-naming task (e.g., Bray, Martin Ginis, Hicks, & Woodgate, 2008; Webb & Sheeran, 2003). In each trial, a word printed in an incongruent color appeared at the center of the computer screen. For example, the word red was printed in blue. Participants were asked to press the S or L key randomly assigned to word meaning or ink color as quickly and accurately as possible. Half of the participants responded to word color as is typical in the Stroop task; the other half responded to word meaning. Given that responding to word meaning is more automatic and intuitive, responding to word color should tax more self-control resources and cause higher ego depletion (Hagger, Wood, Stiff, & Chatzisarantis, 2010). After participants completed the Stroop color-naming task, they completed a questionnaire assessing whether the ego-depletion test made them feel tired and whether it was difficult on a 7-point Likert scale ranging from 1 (*not at all*) to 7 (*extremely*). The two items served as our manipulation check of ego depletion.

After the color perception task, participants engaged in a series of one-shot resource dilemma games. They were told that they would play the games for several times with other participants in the same room anonymously and independently. Although each participant was told that in each round of the game she/he would be randomly assigned to her/his position in a certain group, in reality, each participant was assigned to the first position to make a request without genuine grouping. The three common resource dilemma games varied in pool size and group size: seven members shared 300 HKD, nine members shared 320 HKD, and five members shared 258 HKD. The setup was actually a positional protocol that participants had to make decisions knowing their position only but not the amount that the others requested (Budescu, Au, & Chen, 1997; Budescu, Suleiman, & Rapoport, 1995). In the three games, participants were asked to make their individual requests based on information concerning position, group size, and pool size. They were told that one participant in each experimental session, by drawing lots, would get a monetary bonus contingent on his/her performance in the decision tasks only if the total group requests did not exceed the pool size.[3] They were only allowed to type in integer numbers. Finally, participants were debriefed, paid, and dismissed. No participants showed suspicion that they were interacting with real group members.

3.2 | Results and discussion

The ego-depletion manipulation was successful: participants in the high ego-depletion condition felt that the task was more difficult

[2]Ego depletion has been shown to alter the effects of intuitive and deliberative processing on behavior (for a review, see Hofmann, Friese, & Strack., 2009) by interfering with working memory and impairing cognitive and self-regulation capacities (Barrett, Tugade, & Engle, 2004). Therefore, we consider it a valid method of manipulating cognitive processing.

[3]At the end of each experimental session, an experimenter randomly chose one among the three resource dilemma games and provided participants with information regarding the success or failure of their requests in that game. Instead of receiving genuine feedback concerning their group performance, participants were provided with bogus feedback with a threshold of 100 HKD (roughly 1/3 of the pool size). That is, if the participant requested no more than 100 HKD, he/she received the actual amount of money requested as the extra bonus. Otherwise, the participant was informed that the group failed, and received no bonus.

(M = 2.98 vs. 2.25) and laborious (M = 3.56 vs. 2.68) than those in the low ego-depletion condition ($ts \geq 1.9$, $ps < 0.05$).

Internal consistency of the three individual requests was high (Cronbach's alpha = 0.93). To eliminate the potential influence of pool size and group size on individual requests, the three individual requests were individually multiplied by a weight (i.e., the value of equal division in each round, 300/7, 320/9, and 258/5) before summing to a single average value: relative individual request, with larger values indicating lower cooperativeness and 1 indicating a choice of equal division. A 2 (SVO: prosocial vs. proself) × 2 (ego depletion: high vs. low) analysis of variance (ANOVA) on individual requests yielded a significant main effect of SVO, $F(1, 97) = 4.28$, $p < 0.05$, $\eta_p^2 = 0.041$, suggesting that proselfs (M = 2.91, SD = 2.29) requested significantly more than did prosocials (M = 1.99, SD = 1.72).

As expected, we found a significant SVO and ego depletion two-way interaction effect (Figure 1), $F(1, 97) = 5.15$, $p < 0.05$, $\eta_p^2 = 0.050$. Simple main effect analyses showed that proselfs requested significantly more money in the high ego-depletion condition (M = 3.52, SD = .38) than in the low ego-depletion condition (M = 2.07, SD = 0.45), $F(1, 97) = 6.05$, $p < 0.05$, $\eta_p^2 = 0.059$. Prosocials in the high ego-depletion condition (M = 1.81, SD = 0.38) and the low ego-depletion condition (M = 2.15, SD = 0.36) did not make significantly different requests, $F(1, 97) = 0.43$, $p > 0.05$. These findings suggest that proselfs in the low ego-depletion condition were more cooperative than proselfs in the high ego-depletion condition. The manipulation had no effect on prosocials.

4 | EXPERIMENT 2

In Experiment 2, we manipulated cognitive-processing modes by asking participants to memorize and recall an eight-digit string of numbers, letters, and punctuation marks. Complex strings are expected to cause high cognitive load (Cornelissen et al., 2011). Consequently, we expected the task to sap cognitive resources necessary for working memory, leaving less cognitive ability to think deliberately.

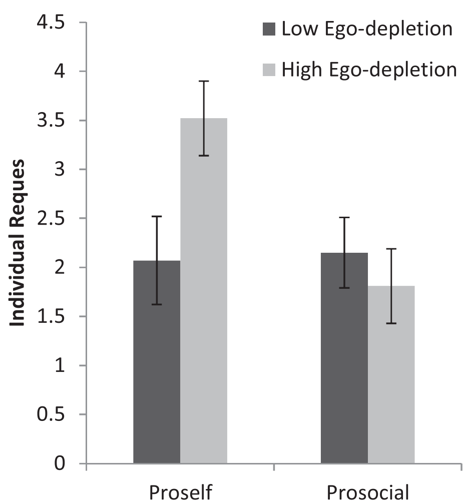

FIGURE 1 Relative individual requests as a function of ego depletion and social value orientation

Participants in the high cognitive load condition would rely more on intuitive than deliberative processing to make decisions.

4.1 | Methods

4.1.1 | Participants

A total of 87 undergraduates (63 women, average age = 20.8 years, SD = 1.6 years) participated in the experiment for 50 HKD and a possible bonus from experimental tasks.

4.1.2 | Procedure and materials

As in Experiment 1, Experiment 2 was conducted in a computer laboratory over several sessions following identical procedures except that we manipulated cognitive-processing modes with a memorization task that has been confirmed by prior research (Cornelissen et al., 2011).

Participants first took the same test used in Study 1 to measure their SVO. As a result, 78 of the 87 participants were classified as either prosocials (N = 37) or proselfs (N = 41) and were randomly assigned to high cognitive load (21 proselfs, 16 prosocials) and low cognitive load conditions (20 proselfs, 21 prosocials). The other nine participants could not be classified and were eliminated from further analysis.

Then participants were informed that they would be required to recall a string of numbers, letters, and punctuation marks that appeared on their computer screen for 8 s. Participants in the high cognitive load condition memorized a complex string: “6!w9z8*4.” Participants in the low cognitive load condition memorized a simpler string: “908070@t.” They were expected to rehearse the eight-digit string throughout the decision tasks.

Next, participants proceeded to the decision tasks—the three resource dilemma games. Finally, they were asked to recall the eight-digit string. Participants reported whether the memory task was difficult and whether it interfered with the decision tasks, on a 7-point scale from 1 (*not at all*) to 7 (*extremely*). The experiment was a 2 (SVO: prosocial, proself) × 2 (cognitive load: high, low) between-subjects design.

Finally, after completing their demographic information, participants were debriefed, paid, and dismissed.

4.2 | Results and discussion

Participants in the high cognitive load condition perceived the memory task to be significantly more difficult (M = 4.46 vs. M = 2.48, $t(85) = 5.55$, $p < 0.001$) and more interfering (M = 3.63 vs. M = 2.22, $t(85) = 3.96$, $p < 0.001$) than those in the low cognitive load condition, suggesting that our cognitive load manipulation was successful.

As in Experiment 1, we averaged relative individual requests in the three common resource dilemma games as the behavioral indicator, with larger value indicating lower cooperativeness (Cronbach's alpha = 0.92). We conducted a 2 (SVO) × 2 (cognitive load) ANOVA on relative individual requests. We found a significant main effect of SVO, $F(1, 74) = 12.45$, $p < 0.01$, $\eta_p^2 = 0.14$: proselfs requested significantly larger amounts of money (M = 2.84, SD = 2.32) than prosocials requested (M = 1.41, SD = 1.02).

More importantly, we found a significant SVO and cognitive load two-way interaction effect (Figure 2), $F(1, 74) = 4.05$, $p < 0.05$, $\eta_p^2 = 0.052$. Simple main effect analyses showed that proselfs in the high cognitive load condition (M = 3.61, SD = 2.57) requested significantly more money than did proselfs in the low cognitive load condition (M = 2.02, SD = 1.74), $F(1, 74) = 8.42$, $p < 0.01$, $\eta_p^2 = 0.10$; but prosocials in the high cognitive load condition (M = 1.40, SD = 0.66) and the low cognitive load condition (M = 1.42, SD = 1.24) made similar requests, $F(1, 74) = .001$, $p > .05$.

In Experiment 2, we used cognitive load to manipulate cognitive-processing modes and further revealed that SVO moderated the relationship between cognitive processing and cooperation in resource dilemma games. We found that taxing cognitive resources produced effects similar to the effects of the ego-depletion manipulation. Our findings indicated that ego depletion and cognitive load have parallel effects on cooperative behavior.

5 | EXPERIMENT 3

In Experiments 1 and 2, cognitive-processing modes were manipulated through tasks that effectively interfered with deliberative processing. Drawing on the resource-demanding nature of deliberation, these two experiments consistently showed that deliberation promoted cooperation in proselfs, but it had no effect in prosocials. In Experiment 3, we manipulated cognitive-processing modes by instructing participants to make decisions based on intuition or deliberation, a method that should effectively induce cognitive-processing modes, as shown in prior research (Ferreira, Garcia-Marques, Sherman, & Sherman, 2006). Compared with the intuitive instruction, the deliberative instruction should increase one's reliance on deliberation. The instructions should have no impact on intuition, which is automatic and unaffected by goals (Kahneman & Frederick, 2002; Sherman & Corty, 1984).

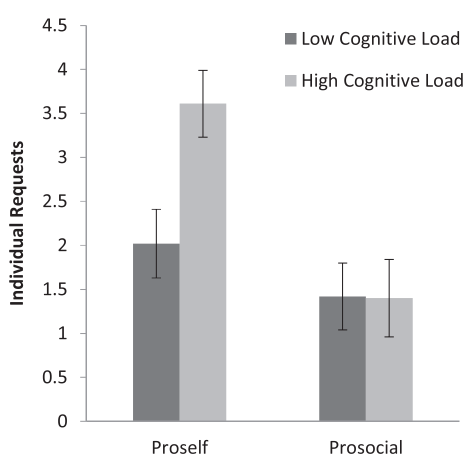

FIGURE 2 Relative individual requests as a function of cognitive load and social value orientation

5.1 | Methods

5.1.1 | Participants

A total of 87 students (57 women, average age = 20.2 years, SD = 1.3 years) participated in the experiment for 50 HKD and a possible bonus from experimental tasks. Students that participated in the first and the second experiment were filtered out by student ID.

5.1.2 | Procedure and materials

The procedure was identical to that in Experiments 1 and 2, except we manipulated thinking styles. Eighty participants were classified as either prosocials (N = 43) or proselfs (N = 37). They were then randomly assigned to either the intuitive thinking (20 proselfs, 21 prosocials) or the deliberative thinking condition (17 proselfs, 22 prosocials). The other seven participants could not be classified and were discarded from further analysis.

Participants were instructed to use either intuitive or deliberative thinking in making decisions in three resource dilemma games. The experiment was a 2 (SVO: prosocial, proself) × 2 (thinking modes: intuitive, deliberative) between-subjects design.

To induce intuitive and deliberate thinking styles, we followed prior research (Ferreira et al., 2006; Usher, Russo, Weyers, Brauner, & Zakay, 2011) by asking participants to try to avoid their habitual thinking patterns and to think either intuitively or deliberately. In the intuitive thinking condition, participants were instructed to use their first hunch in determining how much money they would request; in the deliberative thinking condition, they were told to rationally and logically decide how much money they would request by fully utilizing available information. After the decision tasks, participants reported how extensively they followed instructions and whether they based their decisions on deliberative or intuitive thinking, on a 5-point scale from 1 (*not at all*) to 5 (*extremely*).

5.2 | Results and discussion

Participants in the intuitive thinking condition reported higher levels of intuitive thinking than did those in the deliberative thinking condition (M = 3.80 vs. M = 3.21, $t(85) = 2.32$, $p < 0.05$). Similarly, participants in the intuitive thinking condition reported lower levels of deliberative thinking than did those in the deliberative thinking condition (M = 3.30 vs. M = 3.81, $t(85) = 2.28$, $p = 0.09$). The two groups were not significantly different in terms of how extensively they followed instructions ($p = 0.14$). These results suggest that thinking styles were successfully induced.

As in Experiments 1 and 2, we averaged relative individual requests in the three rounds of resource dilemma games as the behavioral indicator, with larger numbers indicating lower cooperativeness (Cronbach's alpha = 0.94). We conducted a 2 (SVO) × 2 (thinking mode) ANOVA on relative individual requests. We found a significant main effect of SVO, $F(1, 76) = 10.83$, $p < 0.01$, $\eta_p^2 = 0.13$, as proselfs requested more money for themselves (M = 2.56, SD = 1.81) than did prosocials (M = 1.43, SD = 1.18).

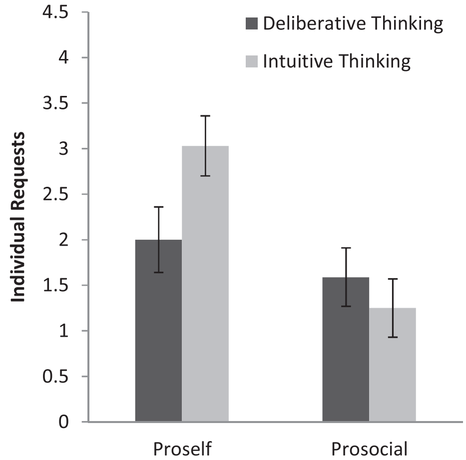

FIGURE 3 Relative individual requests as a function of processing mode and social value orientation

As expected, we found a significant SVO and thinking mode two-way interaction effect (Figure 3), $F(1, 76) = 4.34$, $p < 0.05$, $\eta_p^2 = 0.054$. Simple main effect analyses showed that proselfs requested significantly more money when they thought intuitively ($M = 3.03$, $SD = 2.04$) than when they thought deliberatively ($M = 2.00$, $SD = 1.35$; $F(1, 76) = 4.54$, $p < 0.05$, $\eta_p^2 = 0.056$). Prosocials' requests in the two conditions did not differ significantly ($M = 1.25$ $SD = 0.44$ vs. $M = 1.59$, $SD = 1.60$, $F(1, 76) = 0.58$, $p > 0.05$).

The findings suggest that deliberative thinking can make proselfs become more cooperative but has no effect on prosocials. Thus, our results in Experiment 3 are consistent with findings in Experiments 1 and 2. Moreover, Experiment 3 confirms that the effects of thinking mode induction echoed the effects of ego depletion and cognitive load in influencing cooperation.

6 | EXPERIMENT 4

To check the robustness of the above findings, we conducted an additional preregistered study to replicate Experiment 1.[4]

6.1 | Methods

6.1.1 | Participants

Given that effect size f in Experiments 1–3 ranges from 0.24 to 0.33, we assume an effect size of 0.25 in the preregistered study. Therefore, we recruited 236 undergraduates (161 women, average age = 20.7 years, $SD = 3.5$) to participate in this experiment in exchange for 60 HKD and a possible bonus from experimental tasks.

6.1.2 | Procedure and materials

The materials and procedure were identical to those used in Experiment 1.

[4]The details of the preregistration study can be found at https://osf.io/ycbgj/?view_only=b9a4660039a04ea7980697dab9d9f83b.

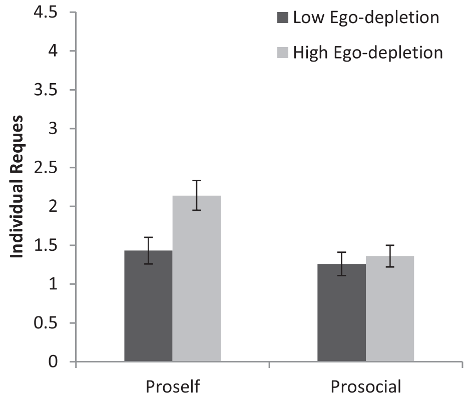

FIGURE 4 Relative individual requests as a function of ego depletion and social value orientation

6.2 | Results and discussion

Among the 236 participants, 216 were classified as proselfs ($N = 82$) or prosocials ($N = 134$). Participants were randomly assigned to either a high (36 proselfs, 72 prosocials) or a low ego-depletion condition (46 proselfs, 62 prosocials). The other 20 participants could not be classified and were discarded from further analysis.

In the high ego-depletion condition, participants rated the task as more difficult ($M = 2.65$ vs. 2.10) and more laborious ($M = 3.72$ vs. 3.22) than in the low ego-depletion condition ($ts \geq 2.3$, $ps < .05$), suggesting an effective ego-depletion manipulation.

Following the same procedures, we then averaged the relative requests in the three trials as the behavioral indicator (Cronbach's alpha = 0.95), with 1 indicating equal division, and larger numbers indicating lower cooperativeness. A 2 (SVO) × 2 (ego depletion) ANOVA on mean relative request yielded a significant main effect of SVO, $F(1, 212) = 8.75$, $p < 0.01$, $\eta_p^2 = 0.040$, suggesting that proselfs ($M = 1.74$, $SD = 1.47$) requested significantly more money than did prosocials ($M = 1.31$, $SD = 0.94$). Ego depletion also had a main effect, $F(1, 212) = 6.44$, $p < 0.05$, $\eta_p^2 = 0.029$, suggesting that participants requested significantly more money in the high ego-depletion condition ($M = 1.62$, $SD = 1.37$) than in the low ego-depletion condition ($M = 1.32$, $SD = 0.96$).

The expected SVO and ego-depletion interaction was marginally significant, $F(1, 212) = 3.32$, $p = 0.070$, $\eta_p^2 = 0.015$.[5] Simple main effect analyses showed that, as expected, proselfs requested significantly more money in the high ego-depletion condition ($M = 2.14$, $SD = 1.77$) than in the low ego-depletion condition ($M = 1.43$, $SD = 1.11$), $F(1, 212) = 7.64$, $p < 0.01$, $\eta_p^2 = 0.035$. Prosocials in the high ego-depletion condition ($M = 1.36$, $SD = 1.03$) and the low ego-depletion condition ($M = 1.25$, $SD = 0.83$) made similar requests, $F(1, 212) = 0.34$, $p > 0.05$ (Figure 4).

Although the expected interaction was not significant at a 0.05 level, the pattern found in Experiment 4 is consistent with the previous three experiments. We speculate that although the sample size in this study is sufficient to test a medium-sized effect as indicated by G*power, its statistical power may fall short of a smaller effect.

[5]Excluding four participants that failed to pass the 50% accuracy in the Stroop task led to similar result: $F(1, 208) = 3.39$, $p = 0.067$, $\eta_p^2 = 0.016$.

TABLE 1 Summary for effect size

		n1	n2	d
Proself	Study 1	26	19	0.700
	Study 2	21	20	0.787
	Study 3	20	21	0.515
	Study 4	36	46	0.497
Prosocial	Study 1	26	30	−0.158
	Study 2	16	21	−0.014
	Study 3	17	22	−0.213
	Study 4	72	62	0.088

Therefore, we conducted a meta-analysis based on findings of all four experiments to more accurately evaluate the effective size of our interest and make maximal use of the combined statistical power of the individual experiments.

7 | META-ANALYSIS

7.1 | Methods

To determine the effect size of the interaction effect between SVO and cognitive-processing manipulation, we used the formula[6] by Rand (2016) to calculate the effect size for the simple effect of cognitive-processing manipulations on relative individual requests by prosocials and proselfs, respectively. Table 1 shows a summary for effect sizes in the four studies. We performed a random-effects meta-analysis in SPSS using the syntax on effect size expressed as d (Meta_Basic_d.sps) recommended by Field and Gillett (2009, 2010).

7.2 | Results and discussion

As expected, the meta-analysis showed a highly significant negative overall effect of increased intuitive processing on relative individual requests for proselfs, effect size = 59.9 percentage points, 95% confidence interval (CI) = [32.0, 87.8], z = 4.21, p < 0.0001. No evidence was found for a significant overall effect of increased intuitive processing on relative individual requests for prosocials: effect size = −2.2 percentage points, 95% confidence interval (CI) = [−26.3, 22.0], z = 0.18, p = 0.86. These estimates confirm strategic fairness in individuals with a proself value orientation but not in individuals with a prosocial value orientation.

8 | GENERAL DISCUSSION

How can we determine whether individuals adhere to the equality rule out of a strategic concern or a true concern for fairness? The current research attempts to answer this question from the dual-process perspective. In a situation that involves self-interested motive to cooperate, namely a one-shot resource dilemma, we compared the effects of cognitive processing manipulations on harvesting behavior of people with different SVOs. Through four studies and a meta-analysis, our results consistently showed that SVO moderated the relationship between processing mode (intuitive versus deliberative) and cooperation. Specifically, proselfs generally requested less money from the resource pool when making decisions in a deliberative mode than in an intuitive mode, suggesting that their concern for fairness is strategic. Prosocials made similar requests in both conditions, suggesting a tendency to follow the equality rule intuitively.

In responding to Rand, Brescoll, Everett, Capraro, and Barcelo's (2016) proposal that understanding cognitive underpinnings of prosocial decision making requires further inquiries into individual differences, we showed, for the first time, that although cognitive processing manipulations had little effect on prosocials, deliberative processing substantially promoted cooperation among proselfs. This finding fits well with the predictions of a recent mathematical model based on the social heuristics hypothesis (Bear, Kagan, & Rand, 2017; Bear & Rand, 2016), arguing that people who develop their strategies in a context that strongly supports cooperation (i.e., prosocials) may intuitively cooperate. Therefore, in the context where there is a self-interested motive to cooperate, they cooperate regardless of whether they use intuition or deliberation. Conversely, people who develop their strategies in a context that is less supportive of cooperation (i.e., proselfs) may intuitively defect. However, when they deliberate and realize their personal goals have to be attained through collective goals, they become more cooperative.

Similar to Rand (2016), Bogaert, Boone, and Declerck (2008) discussed factors that moderate the relation between SVO and cooperative behavior. One factor of particular relevance to our study, is the "extrinsic incentives to cooperate" signaling that a cooperative action will be more beneficial than a self-interested action. Such contextual cues indicate that personal goals may be aligned with collective goals. For example, in our case, individual goals to harvest successfully from the common-resource pool are aligned with the collective goal to make optimal use of the common-resource pool. In such contexts, prosocials would not change their behavior because they already assign a higher weight to collective outcomes, by default. However, extrinsic incentives would motivate proselfs to cooperate. We validated and extended those propositions by showing that proselfs were motivated to cooperate only when they were prompted to use deliberation rather than intuition. This finding is also consistent with neuroimaging research showing that cooperative behavior of proselfs is highly reliant on a cognitive control system that processes extrinsic cooperative incentives (Declerck, Boone, & Emonds, 2013).

The present research contributes to the coordination literature by showing that although coordination is a built-in module of prosocials, successful coordination of proselfs relies heavily on deliberation. This is consistent with previous research showing that prosocials spontaneously coordinate with others by synchronizing with the movement of an interactive partner to a greater extent than do proselfs (Lumsden, Miles, Richardson, Smith, & Macrae, 2012). These results highlight the importance of deliberation for proselfs, such that they are only able to realize the coordination nature of a game when they are prompted to "think." This also implies that they are more prone to egocentric biases that hinder coordination. Similarly, literature in negotiation concludes that proselfs draw to their egocentric tendencies that result in poorer joint outcomes (de Dreu, Weingart, & Kwon,

[6] $d = (R_{intuition} - R_{deliberation})/R_{deliberation}$. Larger relative individual requests indicate lower cooperativeness, so the d here denotes percentage change associated with increased intuition, with larger ds indicating lower cooperativeness.

2000), whereas prosocials stick to equality, consensus, and joint gain that facilitate negotiation success (Bazerman, Curhan, Moore, & Valley, 2000; de Dreu, 2004; Pruitt, 1981). Our results qualified this finding by showing that this is especially the case when individuals are prompted to use intuition.

In addition, the current study showed that individual requests consistently deviated from an equal division, and this was the case even for prosocials. We suggest that this could be due to positional advantage in the scenarios. Being the "first" in the sequence to make a request has been shown to decrease cooperation (Abele & Ehrhart, 2005; Au & Ngai, 2003; Budescu et al., 1997). Our findings highlight the importance of contextual cues in influencing decision-making in social dilemmas.

The current research has several limitations. First, we adopted resource dilemma games varied in group size and pool size without counterbalancing the order of the games. Prior research has shown that both group size and pool size could affect individual decisions in social dilemmas (Allison & Messick, 1990; Brewer & Kramer, 1986; Isaac & Walker, 1988; Marwell & Ames, 1979; Oliver & Marwell, 1988). Although we computed the weighted average of individual requests across the three trials (Cronbach's alphas >0.92) to eliminate potential influence of the group size and the pool size, we still could not rule out the possibility of a sequence effect. Second, we did not include a control group compared with our manipulation groups. Apparently, even low ego depletion and low cognitive load conditions still involve cognition-consuming tasks. For instance, participants in Experiment 2 were asked to memorize and rehearse a simple string "908070@t" throughout the decision tasks. Such simple job could still interfere with deliberation. Therefore, future research should include a control condition, in which no cognitive load/ego depletion is induced. In doing so, we would be able to observe how participants make decisions when deliberation remains intact. Third, in the current study, we did not use real grouping, which might limit external validity of our conclusion. Therefore, further study is needed to investigate the impact of individual decisions on collective efficiency in a "real" resource dilemma.

These findings provide the following insights for future research. Although many studies support predictive validity of SVO as a trait-level preference in social dilemma settings (e.g., Au & Kwong, 2004; Balliet, Parks, & Joireman, 2009; Bogaert et al., 2008; van Lange, de Cremer, van Dijk, & van Vugt, 2007), others argue that SVO measures are susceptible to deliberation and computation (Balliet & Joireman, 2010), self-presentation (Iedema & Poppe, 1994), and question framing (de Dreu & McCusker, 1997). Therefore, designing a subtler measurement, such as using the Implicit Association Test (Greenwald, McGhee, & Schwartz, 1998), to scrutinize implicit social preferences could potentially complement the current SVO measurements. In addition, given that affect can influence people's executive functioning (for a review, see Mitchell & Phillips, 2007), it is reasonable to expect that affect could mediate the effect of cognitive processing manipulations on cooperative decisions. Some researchers showed that cognitive control depletion did not give rise to changes in affect that could have meditated the effect of manipulations on decision tasks (e.g., Balliet & Joireman, 2010; Bieleke, Gollwitzer, Oettingen, & Fischbacher, 2017; Stucke & Baumeister, 2006; Vohs et al., 2008; Xu, Bègue, & Bushman, 2012), whereas a recent meta-analysis showed a significant effect size on negative affect (Hagger et al., 2010). Therefore, future investigation is needed to provide more evidence regarding the role of affect in people's decisions in social dilemmas. Finally, although it seems that prosocials are less affected by external incentives to cooperate, this does not mean that they are not sensitive to decision contexts (Declerck et al., 2013; Kelley & Thibaut, 1978). For instance, prosocials are found to be more responsive to cues that signal trustworthiness (for a review, see Bogaert et al., 2008). Therefore, more systematic research concerning the interplay of social values and contextual influence is needed to enrich understanding of cooperation, coordination, and negotiation.

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APPENDIX: INSTRUCTIONS FOR THE DECISION TASKS

Imagine your group has won a monetary bonus from a lucky draw. Each group member can request some money from this monetary pool. Specifically, in each round you will read information regarding the pool size and group size, your sequence of request, and you will then decide the amount of money you would like to take from the monetary pool. You will be randomly grouped with other participants in this room, and complete the task for several times. The sequence of making requests is randomized and all group members' requests will be kept confidential.

Important Note

Below is information concerning the contingencies upon which you will and will not be able to get an extra bonus.

1. The amount of bonus you could get will be determined by two lucky draws conducted by the end of this experiment. The first lucky draw determines which one participant will get an extra bonus. The second lucky draw determines which round of tasks of that lucky person will be considered.
2. Whether the lucky person will get a bonus is contingent upon the total requests in his/her group in that round. He/she will get what he requested in that round only if the sum of his group would not exceed the bonus size (i.e., a successful allocation). Otherwise, he/she won't get the bonus.

Once participants click "I understand the rules of decisions, the decision tasks begin", they proceed to the next screen page, showing "Grouping, please wait" for a few seconds. Then on the next screen, participants read the following information:

> *"There are **SEVEN** members in your group.*
> *Your group receives a bonus of **300 HKD.***
> *You are the **first** to make a request".*

"The amount of money you request from the monetary pool (in integer): _____HKD."

After they submit their request, they proceed to the next screen page, showing "Grouping, please wait" for a few seconds. And then the next decision task begins.