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Tradeoffs between Self-interest and Other-Regarding Preferences Cause Willpower Depletion

14 November 2014

Hanna Fromell[*], Daniele Nosenzo[*] and Trudy Owens[*]

Abstract:
In this paper we show that making choices that involve conflicts between self-interest and other-regarding concerns may deplete cognitive resources and willpower and thus reduce individuals' ability to exert self-control. In a lab experiment we use a series of modified dictator games to manipulate whether subjects are exposed to tradeoffs between their self-interest and the interest of others: in a Conflict treatment the option that maximizes the dictator's payoff always minimizes the recipient's payoff, whereas in the NoConflict treatment dictator's and recipient's payoffs are aligned. We then measure how decision-making in the dictator games affects subjects' performance in a subsequent and unrelated task that requires exertion of willpower. We find that subjects in the Conflict treatment perform significantly worse than those in NoConflict. This effect is particularly marked for dictators who experienced a stronger conflict during the dictator games.

Keywords: other-regarding preferences; willpower; self-control; depletion; dictator game; Stroop task.

JEL Classification Numbers: C91

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1. INTRODUCTION

There is now a large literature in economics showing that other-regarding considerations play an important role in decision making: many individuals are prepared to sacrifice their own material gain in order to increase the material gain of others, even in settings where interactions are anonymous and non-repeated and there is thus no reputation-based reason to do so (see, e.g., Camerer, 2003; Fehr and Schmidt, 2006). This suggests that individuals are not exclusively motivated by their own material interest, as assumed by standard economic theory, but also by concerns for the well-being of others. Moreover, in many cases the presence of individuals with other-regarding preferences may lead to more efficient outcomes than predicted by standard theory. For instance, other-regarding preferences have been shown to counteract free-rider incentives in social dilemmas (Ledyard, 1995; Chaudhuri, 2011), mitigate agency problems in organizations (Fehr and Fischbacher, 2002; Camerer and Weber, 2012), and promote the emergence of trust in economic exchanges (Bowles, 2003; Camerer, 2003). While other-regarding concerns can curb self-interest and therefore have positive effects on social and economic outcomes, in this paper we highlight a potential negative aspect of the conflict between other-regarding concerns and self-interest. Using a laboratory experiment, we show that facing such motivational conflict is cognitively taxing and significantly reduces individuals' ability to exercise willpower and self-control.

In many situations, the individual is faced with conflicts between different urges, motivations and desires: she may wish to save money to smooth future consumption, but at the same time may be tempted to spend it immediately; she may want to keep a healthy diet, but at the same time give in to eating high caloric food; she may wish to engage in hard work, but at the same time be tempted to procrastinate; and so on. In face of such contrasting motivations, the individual needs to exercise self-control to override the competing impulses and regulate behavior.[1] Exerting self-control is cognitively taxing: the individual needs to expend cognitive effort to influence behavior, and the resource needed to do so is known as *willpower*. In theories of self-control, willpower is modeled as a finite and depletable (albeit renewable) resource (e.g.,

[1] In theories of self-control, the need to exercise self-control usually arises to override short-term temptations and visceral impulses so as to allow the individual to reach her more deliberative, long-term goals (see, e.g. Thaler and Shefrin, 1981; Loewenstein, 1996; Fudenberg and Levine, 2006; Loewenstein and O'Donoghue, 2007; Ozdenoren et al., 2012; Koch et al., 2014).

Baumeister, 2002; Baumeister et al., 2007; Loewenstein and O'Donoghue, 2007; Ozdenoren et al., 2012). Just as a muscle gets tired from exercise, willpower can be depleted with use, resulting in a reduction of the ability to further exercise self-control and regulate behavior in subsequent decision situations.

Our aim in this paper is to test whether choices involving tradeoffs between self-interest and other-regarding concerns can also deplete willpower and reduce an individual's ability to exercise self-control. From a theoretical point of view, addressing this question is interesting as it sheds light on the linkages between self-control and other-regarding behavior. Dreber et al. (2014), for example, present a theoretical model where decision making involves the interaction between an impulsive, altruistic self and a longer-run, self-interested self, who can impose restrictions on the impulsive self's choices by exerting costly self-control. Loewenstein and O'Donoghue (2007) present a related model where the deliberative (long-run) self is more altruistic than the impulsive self. If willpower and self-control are finite and depletable resources, these models imply that choices involving tradeoffs between self-interest and other-regarding concerns may reduce individuals' ability to exercise self-control in subsequent decision making. In this paper we provide direct empirical evidence whether this is in fact the case.

Shedding light on the links between self-control and other-regarding concerns is also of applied interest. Situations where the individual is faced with tradeoffs between choices that maximize own well-being and choices that maximize the well-being of others are ubiquitous in naturally occurring environments. If facing such tradeoffs affects individuals' subsequent ability to exercise self-control in other, unrelated situations, this has potentially serious consequences for a large number of economically relevant outcomes, from savings behavior and credit-card debt to health and job related outcomes. Sutter et al. (2013), for instance, find that experimental measures of impatience predict a variety of health-related behaviors (e.g., smoking and drinking alcohol), and is positively related to body mass index in children and adolescents. Using a large sample of truck driver trainees, Burks et al. (2012) also find that impulsivity and impatience are predictors of health outcomes, as well as of credit scores and job related outcomes (e.g., job quits and training drop-out).

Empirically, there is limited research on the role of willpower in other-regarding behavior. Most of the literature has focused on studying the extent to which individuals' availability of

willpower affects their choices in settings that involve tradeoffs between self-interest and other-regarding concerns. For example, Cappelletti et al. (2011), Duffy and Smith (2014), and Schulz et al. (2014) have found that individuals who are under limitations of cognitive resources behave more pro-socially.[2] Other studies (Martinsson et al., 2012; Kocher et al., 2013) have documented a positive relation between survey measures of self-control and other-regarding behavior. In contrast to this literature, our aim is to provide evidence of the *reverse* relationship between self-control and the individual's preferences, i.e. we examine whether facing tradeoffs between self-interested and other-regarding motives causes a reduction in individuals' ability to use willpower in subsequent situations.

To do so, we run a two-part experiment where, in part one, we manipulate whether subjects are exposed to tradeoffs between self-interest and other-regarding concerns and, in part two, we measure how this affects their ability to exert willpower in an unrelated task. We expose subjects to conflicts between self-interest and other-regarding concerns by using a series of binary dictator games. We have two treatments, varying the structure of payoffs in the dictator games: in our Conflict treatment the option that maximizes the dictator's payoff always minimizes the recipient's payoff. Thus, in this treatment dictators face a tension between their self-interest and other-regarding concerns. In our NoConflict treatment we remove this tension by manipulating payoffs so that now the option that maximizes the dictator's payoff also maximizes the recipient's payoff. In part two of both treatments subjects participate in a version of the Stroop (1935) color-word task, which is often used to measure self-control and willpower depletion.

If tradeoffs between self-interest and other-regarding concerns require exertion of willpower, we would expect dictators in Conflict to use more willpower in part one of the experiment than those in NoConflict, and to be therefore comparatively less able to expend further willpower in the Stroop (1935) task of part two. Our data support this conjecture and show that dictators in Conflict perform significantly worse in the Stroop task than those in NoConflict. Moreover, we find that the lower performance levels in Conflict are strongly driven by dictators who reported high levels of unease with decision making in the dictator games,

[2] Exceptions are Hauge et al. (2009) and Friehe and Schildberg-Hörisch (2014), who find little evidence of a relation between cognitive resource depletion and other-regarding behavior in dictator games.

suggesting that willpower depletion is particularly marked for those individuals who experience a greater tension between self-interest and other-regarding preferences.

The remainder of this paper is structured as follows. In Section 2 we present our experimental design and discuss our hypotheses. In Section 3 we report the results of the experiment. Section 4 concludes.

2. EXPERIMENTAL DESIGN AND PROCEDURES

2.1 Experimental Design

The experiment included two parts plus a questionnaire. Subjects were informed about this structure at the beginning of the session but received detailed instructions about part two only after everyone had completed part one. In all sessions, part one consisted of a series of 16 binary dictator games, which we vary across two treatments to manipulate whether subjects are exposed to a conflict between self-interest and other-regarding concerns. In both treatments, part two consisted of a version of the Stroop (1935) color-word task, which we use to measure subjects' ability to exert willpower after the games conducted in part one.[3]

At the beginning of part one, subjects were randomly matched into pairs. Within each pair, one subject was then allocated the role of dictator and the other the role of recipient. Pairs and roles were kept fixed across all 16 games of part one. In each game, dictators could choose between two possible options, A or B, each implying a different distribution of money between themselves and the recipient. We had two between-subject treatments that only differed in the payoff structure of the 16 games of part one. Table 1 shows the different versions of the games used in the two treatments.[4]

[3] Dual-task experiments are frequently used in the self-control literature (Hagger et al., 2010). These experiments, like ours, consist of a first task that is used to deplete willpower among subjects in the treatment group (with subjects in the control group performing a neutral version of the task), and a second subsequent task that also demands the use of willpower and that is used to measure the difference in ability to exert willpower between treatment and control.

[4] We had dictators face 16 decision problems in part one because there is evidence in the ego depletion literature that the extent to which willpower is depleted is positively related to the duration of the depleting task (Hagger et al., 2010). We varied the payoffs from the two alternatives across the 16 games so that dictators were forced to reconsider their choice each time a new game was presented to them. Payoffs were manipulated to vary: i) the dictator's endowment (either GBP 10, 12 or 16); ii) the opportunity cost of making the choice that most benefited the recipient; iii) whether an equal split of money was available in the choice set; and iv) whether making the own payoff-maximizing choice reduced joint payoffs.

TABLE 1
Payoffs in the binary dictator games

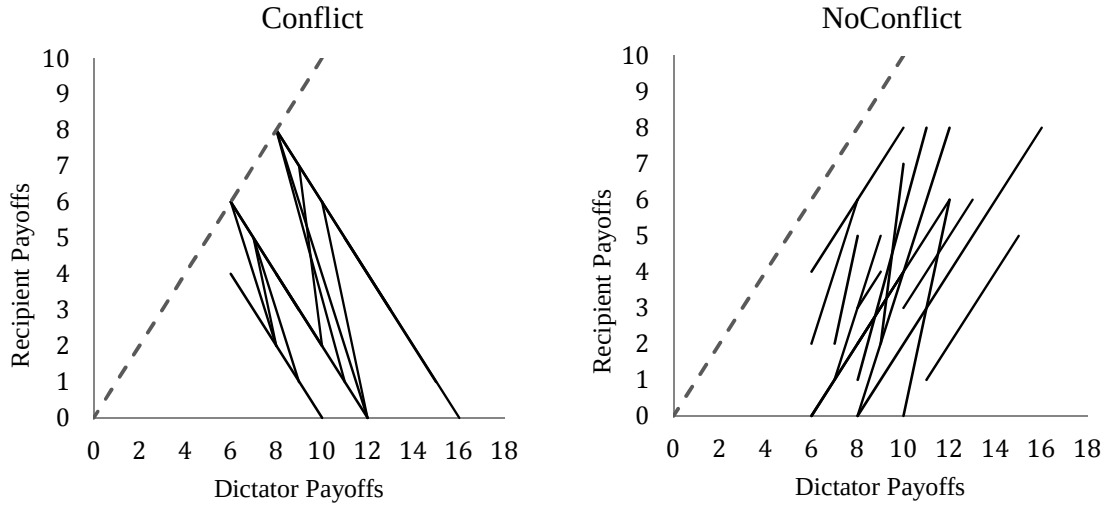
	Conflict		NoConflict	
Game	Option A	Option B	Option A	Option B
1	8; 8	12; 0	8; 0	12; 8
2	11; 1	8; 8	11; 8	8; 1
3	9; 1	7; 5	9; 5	7; 1
4	7; 5	8; 2	7; 2	8; 5
5	10; 6	12; 0	10; 0	12; 6
6	8; 8	16; 0	8; 0	16; 8
7	6; 6	8; 4	6; 4	8; 6
8	10; 2	9; 7	10; 7	9; 2
9	12; 0	6; 6	12; 6	6; 0
10	11; 5	15; 1	11; 1	15; 5
11	8; 4	10; 2	8; 2	10; 4
12	9; 3	8; 4	9; 4	8; 3
13	10; 6	8; 8	10; 8	8; 6
14	13; 3	10; 6	13; 3	10; 3
15	6; 6	8; 2	6; 2	8; 6
16	10; 0	6; 4	10; 4	6; 0

Note: in each cell, the first number indicates the dictator's payoff and the second number the recipient's payoff (both displayed in GBP). In both treatments the 16 games were presented to subjects in the same order as shown in the Table.

In each game of the Conflict treatment, the option that gave the highest possible payoff to the dictator gave the lowest possible payoff to the recipient. For example, in game 3 of Table 1 option A gave a payoff of GBP 9 to the dictator and a payoff of GBP 1 to the recipient, whereas option B gave payoffs of GBP 7 and 5 to the dictator and the recipient respectively. In contrast, in the NoConflict treatment the recipients' payoffs were flipped across options A and B of each game, while the dictators' payoffs were the same as in Conflict. For example, in the version of game 3 used in NoConflict, the recipient received GBP 5 from option A (and the dictator GBP 9) and GBP 1 from option B (and the dictator GBP 7). Thus, in each game of the NoConflict treatment, the option that gave the highest possible payoff to the dictator also gave the highest possible payoff to the recipient.

Hence, our two treatments differ in whether dictators face a tension between self-interest and other-regarding concerns in part one. This is illustrated in Figure 1, where each game of our Conflict and NoConflict treatments is represented by a line connecting its two available payoff distributions. In both treatments, all lines lie below the 45-degree line, showing that in no game did dictators earn less than recipients. In Conflict, all lines are downward sloping, indicating that the payoffs of the dictator and the recipient were misaligned in this treatment in the sense that the option that maximized the dictator's payoff minimized the recipient's payoff. Thus, in all games of the Conflict treatment, there was a tension between dictators' self-interest and the interest of the recipient. In contrast, in NoConflict all lines are upward sloping as dictators' and recipients' payoff were perfectly aligned in this treatment, and dictators faced no tension between self-interest and other-regarding concerns.

FIGURE 1
Differences in the alignment of payoffs across the two treatments



Note: each game is represented by a line connecting the two distribution options available to the dictator. The dashed line marks the 45-degree line from the origin along which payoffs for both subjects are equal.

Because only dictators in our Conflict treatment faced tradeoffs between self-interest and other-regarding concerns, we hypothesize that on average they will use more willpower to regulate their behavior across the 16 games of part one than dictators in NoConflict. Therefore, our hypothesis is that dictators in Conflict will have on average less willpower available after part one compared to those in NoConflict.

However, this hypothesis neglects the possibility that subjects may be heterogeneous in their other-regarding concerns.[5] Some individuals may have little or no concern for others and their behavior may be almost entirely regulated by self-interest. Other individuals may instead have strong other-regarding concerns that dominate any self-interested considerations. Finally, some other individuals may be driven by both self-interest and other-regarding considerations. In this case, we would expect that the tradeoff between self-interest and other-regarding concerns built into our Conflict treatment will cause a depletion of willpower only among subjects in the latter category, who are torn between self-interest and other-regarding concerns. On the contrary, subjects in Conflict who are mostly driven by their own self-interest, or alternatively mostly driven by other-regarding concerns, are less likely to need willpower to regulate behavior.[6]

In order to test this more refined version of our hypothesis, we need to compare willpower depletion between the dictators in NoConflict and the subgroup of dictators in Conflict who are driven by both self-interest and other-regarding concerns, and therefore did experience a conflict between these different behavioral motives. In order to identify this subgroup, we included in the post-experimental questionnaire two questions aimed at measuring the extent to which dictators experienced a conflict during the dictator games of part one.[7] These questions measure dictators' unease with their choices in part one by asking subjects to describe how hard they found the choices in part one and to express their experienced discomfort with such choices.[8]

[5] In fact, there is ample evidence in the experimental literature suggesting other-regarding concerns are heterogeneous. For example, Andreoni and Miller (2002) use a modified version of the dictator game to measure subjects' preferences for altruism and find that about 25 percent of subjects are selfish payoff maximizers while the remaining 75 percent show different degrees of altruism. In the context of public goods games, Fischbacher et al. (2001) find that, while 50 percent of subjects are conditional cooperators, another 30 percent of participants are pure free riders. Similar distributions of cooperation types are reported by Kocher et al. (2008), Fischbacher and Gächter (2010) and Abeler and Nosenzo (forthcoming).

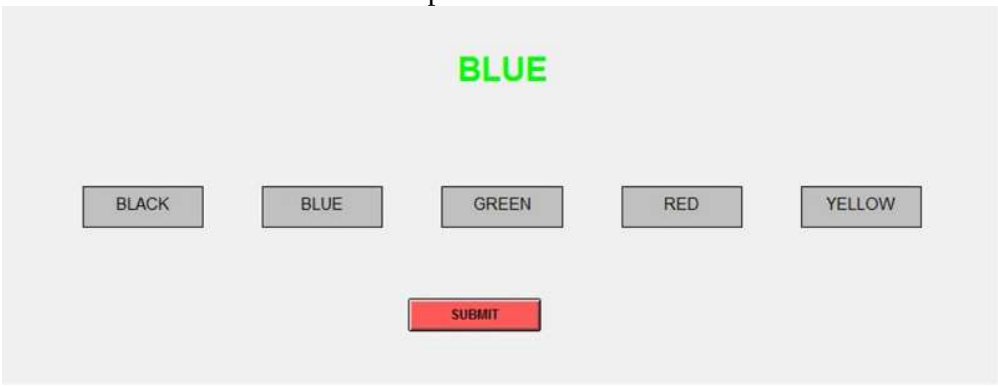
[6] This argument is in line with Loewenstein and O'Donoghue (2007) model of self-control whereby decisions are driven by both a deliberative system, favoring other-regarding behavior, and an affective system that may favor either self-interested or other-regarding behavior. In their model, the need for self-control arises when the deliberative and affective systems are not aligned and the individual is torn between other-regarding and self-interested motivations.

[7] A similar approach has been used, for example, by Kocher et al. (2013). Note that it would be difficult to identify this subgroup of dictators by using their choices in the dictator games. For example, observing an own payoff-maximizing choice in a game does not reveal whether this has been made by an entirely self-interested dictator, who experienced no conflict in making such choice, or by an other-regarding dictator who was conflicted in her decision but ultimately opted for the selfish option.

[8] The questions read: "Overall, how hard was it to choose between option A and option B in the 16 situations of Part 1?", and "Overall, to what extent did you experience discomfort in making your choices in the 16 situations of Part 1?". Subjects responded to both questions using an 11-point scale, ranging from 0 ("not at all") to 10 ("very much").

We test our hypotheses by measuring how our treatments affect dictators' ability to exert willpower in a computerized version of the Stroop (1935) color-word task that subjects were administered in part two of the experiment. In the task subjects were shown a series of words of color names printed in various font colors. Both color names and font colors could be either black, blue, green, red, or yellow. The font colors and color names were randomly matched so that, for each word, the font color did not correspond to the color name. For example, as shown in Figure 2, the word "blue" could have been displayed to subjects in green. The task was to indicate, for each word, which color it was printed in, and not the color that the word read. For example, for the word shown in Figure 2, the correct answer was "green" and not "blue". If a correct answer was given, a new word appeared on the screen; if the answer was incorrect the same word remained on the screen. Subjects performed the Stroop task for five minutes and were rewarded with GBP 0.10 for each correct answer.

FIGURE 2
Stroop color-word task



The Stroop color-word task has been used frequently in the literature to measure self-control and willpower depletion.[9] The Stroop task requires regulation of choice because, in order to submit a correct answer, subjects have to override their initial automatic impulse to respond by

[9] MacLeod (1991) reviews the psychology literature using the Stroop task. In dual-task paradigm studies, the Stroop task has been used both as a task to measure willpower depletion and as a willpower-depleting task. Hagger et al. (2010) show that the task is particularly sensitive to willpower depletion relative to other commonly used tasks (e.g. math or mental arithmetic or solvable anagrams). They also show that the task is relatively less effective than others when used as a willpower-depleting instrument. In the economics literature, the Stroop task has been predominantly used as a willpower-depleting task to study, for example, the effects of willpower depletion on procrastination (Burger et al., 2011), sensitivity to framing effects (de Haan and van Veldhuizen, 2013) and time preferences (Kuhn et al., 2014). In contrast, Spears (2011) uses the Stroop task as a dependent measure to study the impact of poverty on willpower depletion.

reading the color name of the word, and look at its font color instead. Thus, the task demands continuous exertion of willpower by the participant. Our hypothesis is that dictators in the Conflict treatment will be less able to exert willpower in the Stroop task than dictators in NoConflict, and thus will give fewer correct answers in this task. Moreover, as discussed above, we expect this effect to be particularly strong for those dictators who experienced a stronger conflict between self-interest and other-regarding concerns in part one of the experiment.

2.2 Experimental Procedures

The experiment was programmed in z-Tree (Fischbacher, 2007) and was conducted at the University of Nottingham using students from a wide range of disciplines recruited through the online recruitment system ORSEE (Greiner, 2004).[10] We conducted six sessions in total, with 32 subjects per session. In each session we randomly allocated 16 subjects to the Conflict treatment and 16 subjects to the NoConflict treatment. Thus, we have 96 subjects per treatment. Whether a subject was allocated to the Conflict or NoConflict treatment depended on the computer terminal he or she was randomly assigned to at the beginning of the session. All instructions and procedures during the session were kept identical across treatments. The only difference between treatments was in the payoffs of the 16 games of part one, which were shown to subjects privately on their computer screens.

At the start of the session, the experimenter distributed preliminary instructions explaining the general two-part structure of the experiment. These were read aloud to the participants.[11] Participants were then provided with detailed instructions for part one, which were again read aloud. These instructions included a series of control questions aimed at testing subjects' understanding of part one. Part one was started once all subjects had answered all questions correctly.

At the beginning of part one, subjects were asked to type their first name on their computer screen. This was then shown to the person they were paired with throughout part one.[12] Subjects were then randomly assigned either the role of dictator or recipient. Dictators made their choices

[10] The average age in the sample was 21 years, 43 percent of subjects were male and 13 percent were studying economics.
[11] The instructions are reproduced in Appendix A.
[12] At the beginning of the experiment subjects read an informed consent form stating that their first names would be collected and shown to another participant in the experiment. All of our subjects consented to these procedures.

in the 16 games of part one. Recipients did not have any choices to make but were informed about the dictator's decisions in each of the games, and had to confirm that they had seen each decision before a new game was presented to the dictator.[13]

Once everyone had completed part one, instructions for part two appeared on subjects' computer screens. These instructions explained the Stroop task and illustrated how to submit answers on the computer. After performing the Stroop task, which lasted for five minutes, subjects completed a post-experimental questionnaire collecting standard socio-demographic measurements (such as gender, age, nationality). The questionnaire also included two questions to measure the extent to which dictators were at unease with their choices in the 16 games of part one. We will use these responses to construct an index of dictators' unease with their choices in part one.

After completing the questionnaire, subjects were shown their payoffs from part one and two of the experiment. We used a random incentive lottery system to pay subjects. At the end of each session, one of the two parts of the experiment was selected at random and subjects were paid according to their earnings from the selected part. If part one was selected one of the 16 games was chosen at random and subjects were paid according to their earnings from this game. Sessions lasted approximately 50 minutes and earnings ranged between GBP 1 and GBP 18.10, averaging GBP 10.90 (st.dev. 5.02).

3. RESULTS

In this section we present the main results from the experiment. We start by looking at how dictators' behavior in part one differs across the two treatments. We then examine performance differences between the treatment groups in part two of the experiment.

3.1 Dictators' Behavior in Part One of the Experiment

The 16 games of part one were designed so that dictators in Conflict would face tradeoffs between their self-interest and other-regarding concerns, whereas dictators in NoConflict would

[13] We chose to decrease dictator-recipient anonymity and to have recipients interact with dictators throughout part one as a way of reducing social distance between dictators and recipients and thus increase the pull of other-regarding concerns and create a starker conflict with the self-interest motive. Decreasing social distance has been shown to significantly increase giving in previous dictator-game experiments (e.g. Bohnet and Frey, 1999; Charness and Gneezy, 2008). Dictator giving has also been shown to increase when recipients interact with dictators (e.g., Yamamori et al., 2007).

face no such tradeoffs. In this sub-section we provide evidence that this was indeed the case in the experiment.

Table 2 shows that in the 16 games of part one the proportion of subjects choosing the own payoff maximizing option is substantially smaller in the Conflict treatment than in the NoConflict treatment. In Conflict the proportion of own payoff maximizing choices varies between 25.0 and 66.7 percent across games, whereas for NoConflict it is nearly 100 percent across all games. For each of the 16 games, we can strongly reject the hypothesis that the proportion of own payoff maximizing choices is the same across treatments (χ^2 tests, all p-values = 0.000).[14] At the individual level, we also find that in the Conflict treatment most dictators made some choices that maximized their own payoff as well as some choices that maximized the recipient's payoff. In contrast, in NoConflict nearly all dictators chose the own payoff maximizing option in all games.[15]Averaging across the 16 games, the number of own payoff maximizing actions taken by a dictator is 8.13 in Conflict and 15.90 in NoConflict (Mann-Whitney rank-sum test, p-value = 0.000, two-sided). In line with findings from the existing literature (see, e.g., Camerer, 2003; Engel, 2011), this data shows that a sizeable fraction of dictators in Conflict took both the recipient's and their own interests into consideration when making their choices.

[14] All tests reported in the paper use the individual as independent unit of observation and are based on 48 individuals per treatment, unless otherwise stated.

[15] In Conflict, only 17 percent of dictators chose the own payoff maximizing option in every game and 19% chose the option that maximized the recipient's payoff in all games. In NoConflict, 92 percent of dictators chose the own payoff maximizing option (that also maximized the recipient's payoff) in every game.

TABLE 2
Percentage of subjects choosing the own payoff maximizing option

Game	Conflict		NoConflict	
	Payoffs from A vs. B	% own payoff maximizing choices	Payoffs from A vs. B	% own payoff maximizing choices
1	(8; 8) vs. (12; 0)	45.8	(8; 0) vs. (12; 8)	97.9
2	(11; 1) vs. (8;8)	41.7	(11; 8) vs. (8;1)	100
3	(9; 1) vs. (7; 5)	45.8	(9; 5) vs. (7; 1)	95.8
4	(7; 5) vs. (8; 2)	35.4	(7; 2) vs. (8; 5)	97.9
5	(10; 6) vs. (12; 0)	35.4	(10; 0) vs. (12; 6)	100
6	(8; 8) vs. (16;0)	66.7	(8; 0) vs. (16;8)	100
7	(6; 6) vs. (8; 4)	60.4	(6; 4) vs. (8; 6)	100
8	(10; 2) vs. (9; 7)	25.0	(10; 7) vs. (9; 2)	100
9	(12; 0) vs. (6;6)	64.6	(12; 6) vs. (6;0)	100
10	(11; 5) vs. (15;1)	62.5	(11; 1) vs. (15;5)	100
11	(8; 4) vs. (10; 2)	52.1	(8; 2) vs. (10; 4)	100
12	(9; 3) vs. (8; 4)	45.8	(9; 4) vs. (8; 3)	100
13	(10; 6) vs. (8; 8)	66.7	(10; 8) vs. (8; 6)	97.9
14	(13; 3) vs. (10; 6)	54.2	(13; 6) vs. (10; 3)	100
15	(6; 6) vs. (8; 2)	45.8	(6; 2) vs. (8; 6)	100
16	(10; 0) vs. (6; 4)	64.6	(10; 4) vs. (6; 0)	100

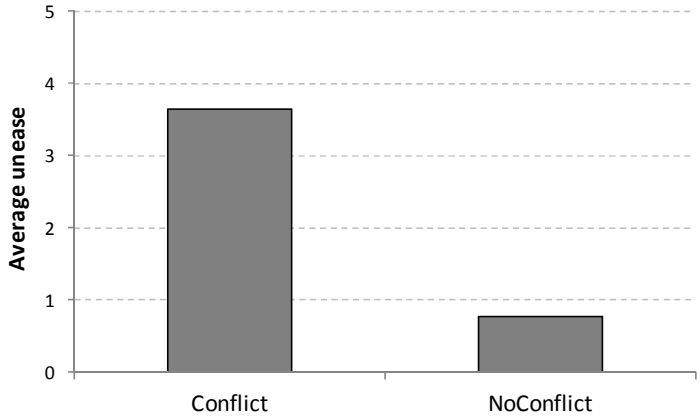
Note: in each cell of the column "Payoffs from A vs. B", the first number indicates the dictator's payoff and the second number the recipient's payoff (both displayed in GBP).

Moreover, we find that facing this tradeoff between self-interest and the recipient's interest is costly to dictators. Figure 3 shows the extent that dictators were at unease with their decisions in part one of the experiment in the Conflict and NoConflict treatments. We measure unease as the mean of dictators' responses to the questionnaire items eliciting how hard they found making their choices in part one and their experienced discomfort with these choices.[16] Dictators in Conflict experienced significantly more unease during part one than those in NoConflict (3.64 vs. 0.77; Mann-Whitney rank-sum test, p-value = 0.000, two-sided). In fact, in Conflict our measurement of unease was zero for only 13 percent of dictators, while it rated at or above the

[16] To remind the reader, these items were: "Overall, how hard was it to choose between option A and option B in the 16 situations of Part 1?", and "Overall, to what extent did you experience discomfort in making your choices in the 16 situations of Part 1?". Responses were collected on a scale from 0 to 10. The average response to the two questions was respectively 3.13 and 4.15 in Conflict, and 0.77 and 0.77 in NoConflict.

midpoint of the response scale for 33 percent of dictators. In contrast, in NoConflict unease was zero for 60 percent of dictators and at or above the scale midpoint for only 4 percent of dictators.

FIGURE 3
Average unease across treatments

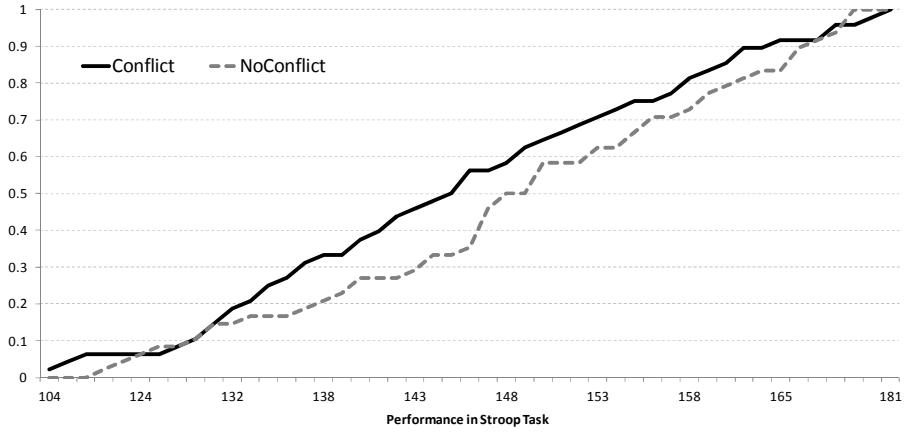


Taken together, these results suggest that the tradeoff that dictators faced in part one of the Conflict treatment exposed them to a tension between two different motivations, self-interest and other-regarding concerns. Our hypothesis is that, in order to regulate this tension, dictators in Conflict expended significantly more willpower in part one of the experiment than those in NoConflict.

3.2 Dictators' Performance in the Stroop Task

Figure 4 shows the cumulative distributions for the number of correct answers in the Stroop task by dictators in the Conflict and NoConflict treatments. For each performance level, the graph shows the percentage of dictators who performed at that level or worse. The performance distribution for dictators in Conflict tends to lie above that of dictators in the NoConflict treatment, indicating that the former performed worse than the latter. On average, dictators in Conflict gave 144.90 correct answers, compared to 148.98 in NoConflict. These differences are marginally significant according to a Mann-Whitney rank-sum test (p-value = 0.092, one-sided) and just above the 10 percent significance threshold according to a more conservative Kolmogorov-Smirnov test (p-value = 0.125, one-sided).

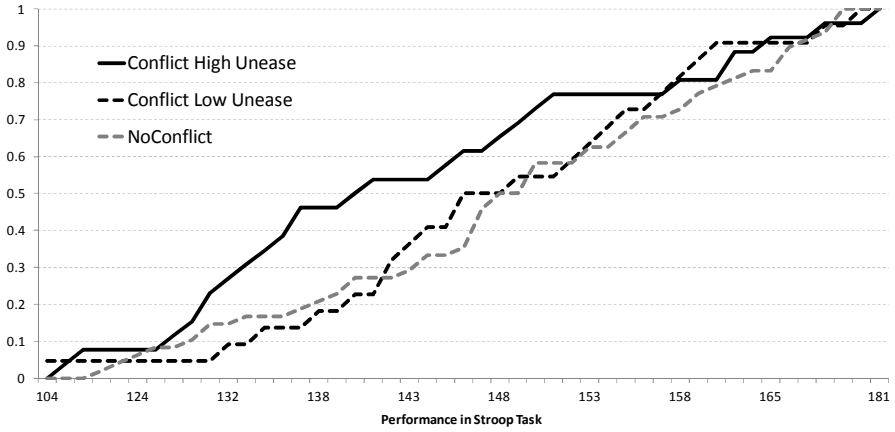
FIGURE 4
Performance in the Stroop task, CDFs



As discussed in the previous section, a more refined version of our hypothesis is that the Conflict treatment caused depletion of willpower only among those dictators who experienced a sufficiently strong tension between self-interest and other-regarding concerns in part one of the experiment. We identify this group of dictators by using our measurement of unease. In particular, we split the sample of dictators in the Conflict treatment into two subgroups depending on whether their level of unease is above or below the median value for that treatment.[17] Figure 5 shows the cumulative distribution functions of the number of correct answers, separately for high-unease and low-unease dictators in Conflict as well as for dictators in NoConflict.

[17] The median value of unease was 3 in the Conflict treatment. The level of unease was equal or above the median for twenty-six dictators and below the median for twenty-two dictators.

FIGURE 5
Performance in the Stroop task disaggregated by unease, CDFs



The performance distributions of low-unease dictators in Conflict and dictators in NoConflict are very similar. In contrast, the performance distribution of high-unease dictators in Conflict lies above the distributions of the other two groups. The gap between these distributions is quite large. On average, high-unease dictators gave 142.46 correct answers. This compares to an average of 147.77 answers for low-unease dictators in Conflict and 148.98 answers for dictators in NoConflict. Using a Mann-Whitney rank-sum test we can reject at the five percent level the hypothesis that the performance distribution of high-unease dictators in Conflict is the same as the distribution of NoConflict dictators (p-value = 0.041, one-sided).[18] We reach a similar conclusion using the more conservative Kolmogorov-Smirnov test (p-value = 0.079, one-sided). We do not find any significant difference, instead, between the performance of low-unease dictators in Conflict and dictators in NoConflict (Mann-Whitney rank-sum test p-value = 0.728; Kolmogorov-Smirnov test p-value = 0.848; both two-sided).

We further analyze these differences in performance by using regression analysis. Table 3 reports OLS regressions of dictators' performance in the Stroop task. To test our hypotheses, in Model (1) we include a treatment dummy ("Conflict") taking value 1 for observations from the Conflict treatment and 0 for observations from the NoConflict treatment. In Model (2) we split the sample of dictators in Conflict into two subgroups depending on their level of unease. Thus, we include two dummy variables, one taking value 1 for the observations in the subgroup of

[18] Note that this and the following tests are based on comparisons involving 48 observations in NoConflict, 26 observations in Conflict High Unease and 22 observations in Conflict Low Unease.

high-unease dictators in Conflict ("Conflict High Unease") and 0 otherwise, and another one taking value 1 for the observations in the subgroup of low-unease dictators in Conflict ("Conflict Low Unease") and 0 otherwise. In both models the reference category is the group of dictators in NoConflict.

TABLE 3
Performance in the Stroop task

	(1)	(2)
Conflict	-7.09*	--
	(4.04)	--
Conflict High Unease	--	-7.76*
	--	(4.28)
Conflict Low Unease	--	-5.17
	--	(4.99)
No. Own Payoff Max. Choices	-0.30	-0.23
	(0.38)	(0.38)
Time Spent in Lab (sec.)	-0.25**	-0.24**
	(0.10)	(0.10)
Male	-1.64	-2.22
	(2.75)	(2.78)
Age	-1.01	-0.96
	(1.05)	(1.06)
UK	0.02	0.12
	(4.40)	(4.39)
Economics	3.00	3.33
	(3.77)	(3.80)
Constant	368.25***	361.52***
	(83.41)	(82.14)
Session dummies	Yes	Yes
R^2	0.21	0.22
F(12, 83)	1.87	1.74
Prob > F	0.05	0.07
N	96	96

Note: OLS regressions, robust standard errors in parentheses. In both models the dependent variable is the number of correct answers in the Stroop task. Significance levels: * 10%; ** 5%; *** 1%.

In both models, we control for observable characteristics of the subjects by including the following variables: *No. Own Payoff Max. Choices* measures the number of own payoff maximizing choices made by subjects in part one of the experiment; *Time Spent in Lab* measures

the amount of time subjects spent in the lab between the beginning of part one and the beginning of the Stroop task to control for the impact of any time-related factors such as boredom or opportunity to rest; *Male* is a dummy variable taking value 1 for male subjects and 0 for female subjects; *Age* is the subjects' age; *UK* is a dummy variable taking value 1 if subjects' nationality was British and 0 otherwise; and *Economics* is a dummy variable taking value 1 if subjects studied economics and 0 otherwise. Both models also include session dummies to control for session-specific effects, although these are not reported in Table 3.[19]

Table 3 confirms that dictators in the Conflict treatment performed significantly worse in the Stroop task than those in NoConflict. Model (1) estimates that dictators in Conflict gave on average seven fewer correct answers than those in NoConflict, and the effect is significant at the 10 percent level. Model (2) shows that this negative effect on performance is driven by the subgroup of dictators with high levels of unease. Dictators with low levels of unease do not perform differently from dictators in NoConflict.

Among the control variables, we find that the time spent in the lab before the Stroop task has a negative effect on performance. This is in line with findings from the existing literature using the dual-task experimental paradigm that show that the duration of the depleting phase of the experiment is positively related to its depletion effect (Hagger et al., 2010). More generally, this may reflect fatigue or boredom, which could also negatively affect performance. None of the other controls has a significant impact on performance.

To summarize, we find that dictators who were exposed to tradeoffs between self-interest and other-regarding concerns in our Conflict treatment performed significantly worse in the Stroop task than dictators in the NoConflict treatment, who did not face any such conflict. This effect is particularly marked among those dictators in Conflict who experienced a greater tension between self-interest and other-regarding concerns in the experiment (captured by our unease measurement). Overall, these results provide evidence that conflicts between the contrasting behavioral motivations of self-interest and other-regarding concerns demand the use of cognitive resources and willpower. In line with theories of self-control, the use of willpower to regulate

[19] None of the session dummies were statistically significant. Full results are available upon request.

choice in the presence of such motivational tradeoffs reduces the individual's ability to regulate behavior in other choice domains that also require the use of willpower.[20]

4. CONCLUSIONS

We provide experimental evidence showing that individuals may experience a depletion of willpower and self-control if faced with choices that expose them to a conflict between their own self-interest and the interest of others. The experiment consists of two parts where, in part one, we manipulate whether subjects are exposed to a conflict between self-interest and other-regarding concerns and, in part two, we measure how this affects their ability to exert willpower in a subsequent task. Our results show that the subjects who have been exposed to such a conflict perform significantly worse compared to those who have not. We further show that this depletion effect is driven by subjects who have experienced a stronger conflict between self-interest and other-regarding concerns in part one of the experiment.

These findings provide support for the existence of a link between other-regarding behavior and self-control, which has been postulated in recent behavioral theories (Loewenstein and O'Donoghue, 2007; Dreber et al., 2014). In particular, our data shows that when other-regarding considerations are at odds with self-interested considerations, this creates a motivational conflict that requires exertion of self-control to regulate behavior.

The fact that conflicts between self-interest and other-regarding concerns are cognitively taxing may have important consequences for a large number of economically relevant situations where the individual needs to exercise self-control in order to achieve long-term goals against the pull of short-term temptations. Examples include the pursuit of saving goals against the temptation of immediate consumption, the fulfillment of work deadlines against the temptation to procrastinate, and the adoption of healthy behaviors in the face of unhealthy temptations. Our findings suggest that when individuals are exposed to strong conflicts between their self-interest and the interest of others, their ability to regulate behavior in these other choice domains is impaired. This may be particularly relevant, for example, for individuals living in poor

[20] Also in line with some theories of self-control (see, e.g., Vohs et al., 2008 and Wang et al., 2010), our data suggests that the depletion of willpower occurs through the *act of choosing* in the presence of contrasting behavioral motivations, and not merely through *contemplation* of such conflicting motives. In fact, we do not find any difference in the Stroop task performance among recipients in the Conflict and NoConflict treatment. See Appendix B for details.

communities where there is often a strong emphasis on sharing norms (see, e.g., Platteau, 2000). It has been argued that some of the choice anomalies observed in such communities (e.g., overspending and excessive borrowing) can be explained by limitations in individuals' ability to exert willpower and self-control (e.g., Spears, 2011; Mani et al., 2013). Our findings suggest that the sharing norms that are prevalent in these communities may also contribute to this impairment of cognitive functions, by exacerbating the conflict between other-regarding preferences and self-interested faced by individuals in these communities.

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APPENDICES

Appendix A: Experimental Instructions and Informed Consent

PRELIMINARY INSTRUCTIONS

Welcome! You are about to take part in a decision-making experiment. This experiment is run by the "Centre for Decision Research and Experimental Economics" and has been financed by various research foundations.

There are other people in this room, who are also participating in the experiment. Everyone is participating for the first time, and all participants are reading the same instructions. It is important that you **do not communicate with any of the other participants** during the experiment. If you have a question at any time, raise your hand and an experimenter will come to your desk to answer it.

The experiment consists of two parts: **Part 1 and Part 2**.

In each part of the experiment you will be asked to make decisions, and will have a chance to earn money. Decisions that will be made in one part of the experiment will not affect decisions or earnings in the other part of the experiment.

You will be informed of your earnings from Part 1 and Part 2 of the experiment once everyone in the room has completed Part 2. Therefore everyone will make their decisions in Part 2 without knowing their earnings from Part 1.

Only **one part of the experiment will be taken into account in determining your final earnings** from today's experiment. At the end, we will toss a fair coin. If the coin lands heads, all participants in today's experiment will be paid according to their earnings from Part 1. If the coin lands tails, all participants will be paid according to their earnings from Part 2. Your earnings will be paid out to you in private and in cash.

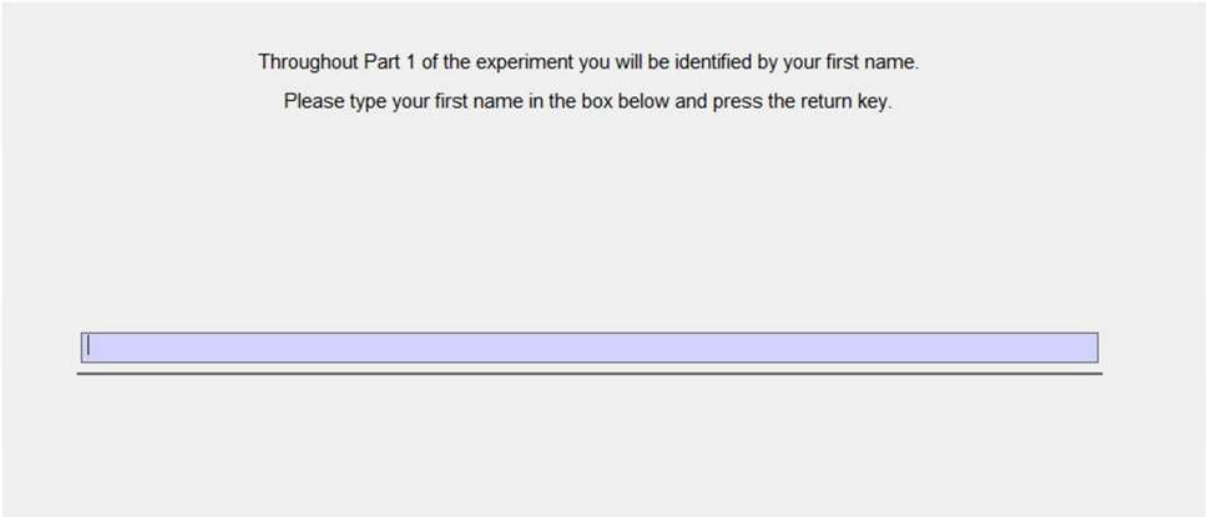
Shortly, you will receive detailed instructions about Part 1 of the experiment. You will receive detailed instructions about Part 2 directly on your computer screen once you have completed Part 1.

If you have a question now, please raise your hand and an experimenter will come to your desk to answer it.

PART 1 INSTRUCTIONS

At the beginning of PART 1 you will be **randomly paired with another person** in this room. You will remain paired with this person for the whole duration of PART 1. At the end of PART 1 the pair will be dissolved, and you will not be matched with this person again during today's experiment.

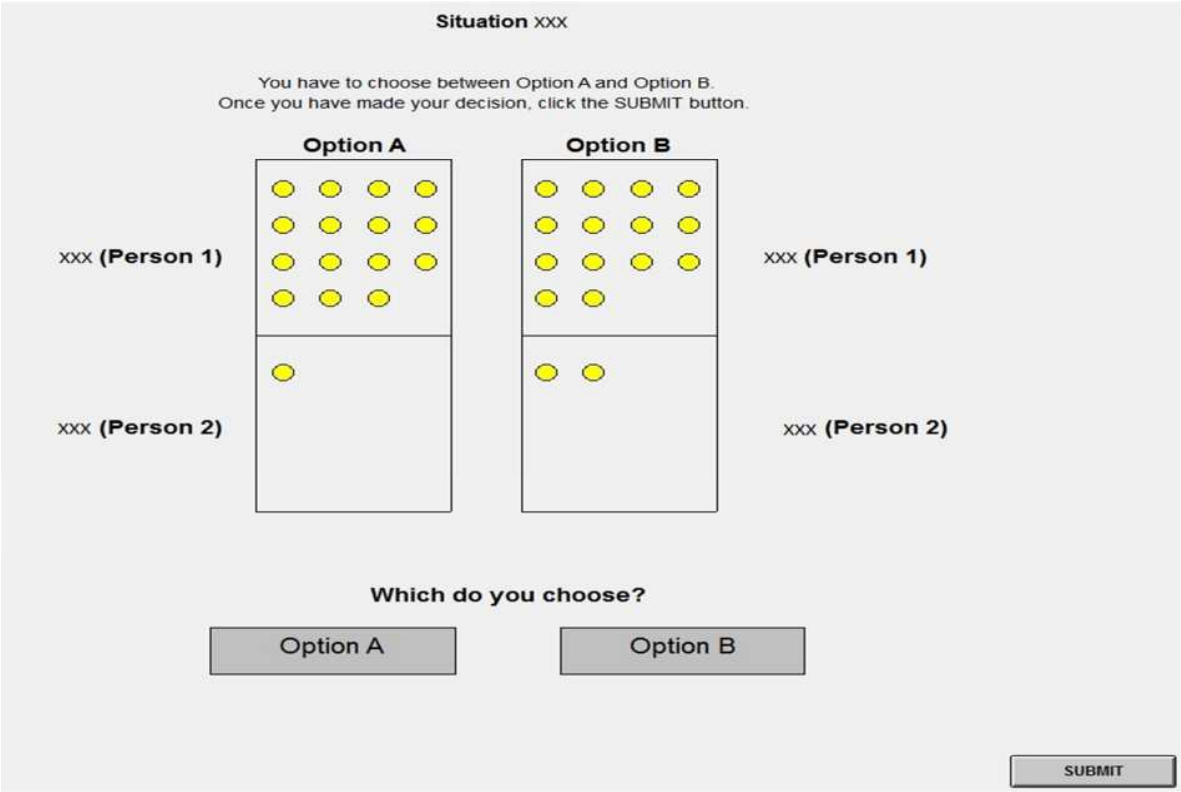
Throughout PART 1 you and the person you are paired with will be **identified by your first names**. At the beginning of PART 1 you will be asked to type your first name in a screen like the one below. Please enter your first name exactly as shown on your ID card and then press the return/enter key on your keyboard. On the following screen you will be shown the name of the person you are paired with in PART 1 of the experiment.



Each person in the pair will then be **randomly assigned a role**, either 'Person 1' or 'Person 2'. The computer will inform you of your role, which will stay the same throughout PART 1 of the experiment.

The participant in the role of **Person 1** will then be asked to make choices in a series of **16 situations**. For each situation he/she will have to choose between two options: Option A or Option B. Each option specifies an amount of money that Person 1 will receive and an amount of money that Person 2 will receive (all amounts are in British pounds).

For example, a possible situation may look as follows:



In this example situation, if Person 1 chooses Option A, Person 1 receives £15 and Person 2 receives £1. If Person 1 chooses Option B, Person 1 receives £14 and Person 2 receives £2.

The participant in the role of **Person 2** will have no choices to make in PART 1 of the experiment. However, Person 2 will be informed in real time of the choices made by Person 1 in each of the 16 situations, and will have to confirm that he/she has seen each choice before a new situation will be presented to Person 1.

At the end of the experiment **one of the 16 situations will be selected at random** by the computer. Your final earnings in PART 1 of the experiment will be based on this randomly selected situation. Each situation has an equal chance of being selected, so please consider each situation carefully. If PART 1 is selected for payment you will be paid this amount in private and in cash.

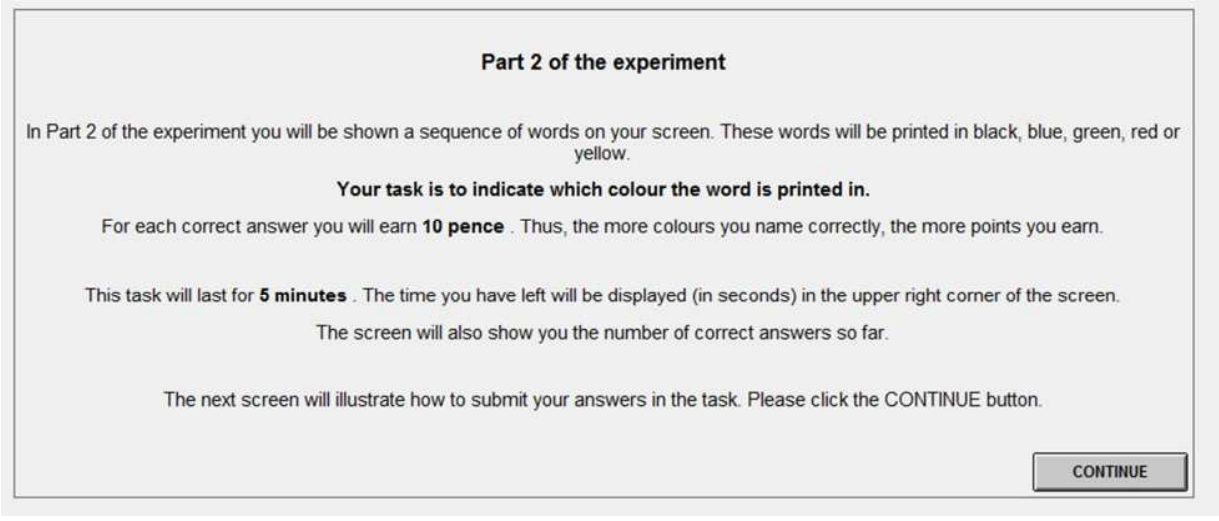
Please raise your hand if you have any questions.

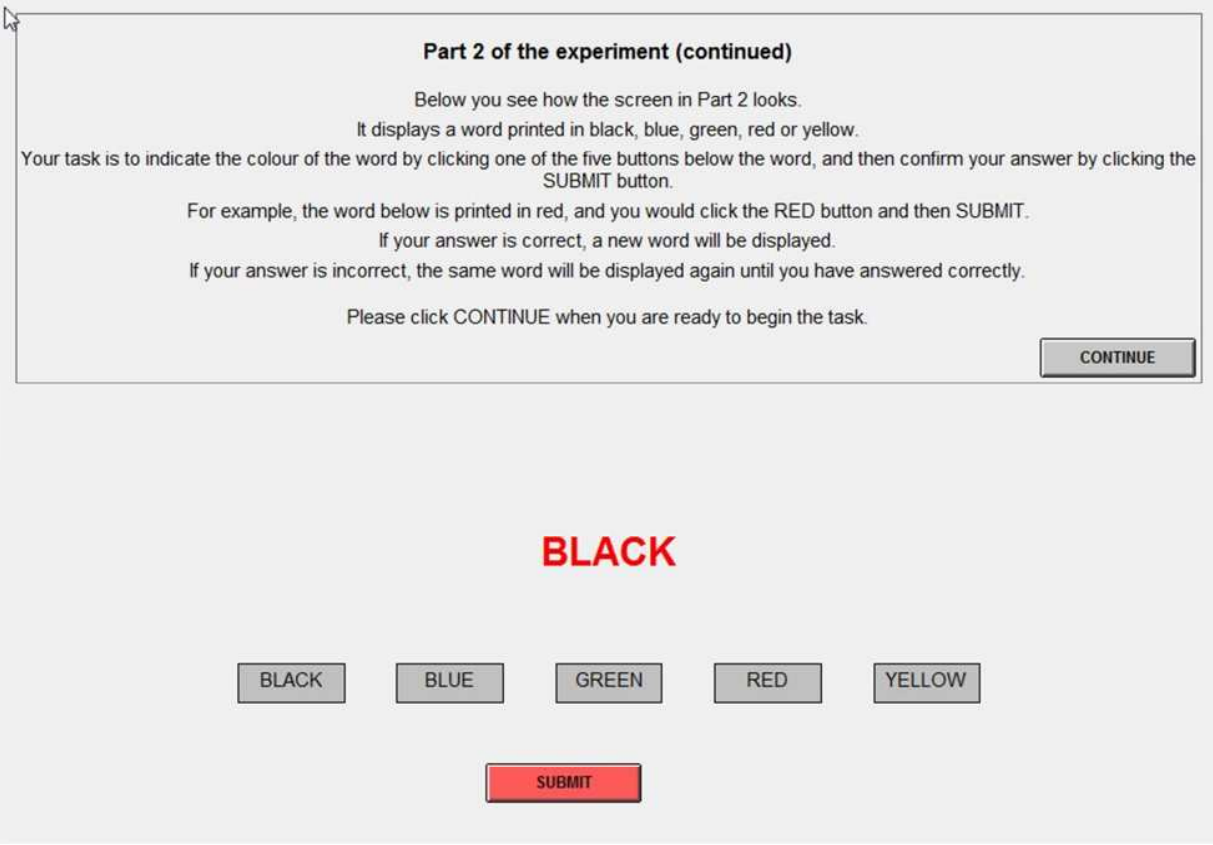
To make sure that everyone understands the instructions, please complete the questions below. In a couple of minutes an experimenter will come to your desk to check the answers.

Questions about PART 1:

1. How many choices will Person 1 make in total in PART 1? _____
2. Is the following statement true or false: you will be paired with the same person throughout PART 1 of the experiment _____
3. Suppose you are randomly assigned the role of Person 1. What will be the role of the other person in your pair? _____
4. Is the following statement true or false: if you are Person 2, you will not learn the choices made by Person 1 during PART 1 _____
5. Is the following statement true or false: your final earnings in PART 1 will be based on one of the 16 situations, which will be randomly selected at the end of the experiment _____

PART 2 INSTRUCTIONS





Form of consent

In this experiment participants' first name will be revealed to one other participant in the same experiment. In order to take part, we need your consent to the above mentioned procedure. Your identity will not be revealed to any other party in any other way.

If you do not agree to the above, you may not participate in this experiment and we kindly ask you to leave the experiment now.

If you understand and agree to the above described procedures please sign below.

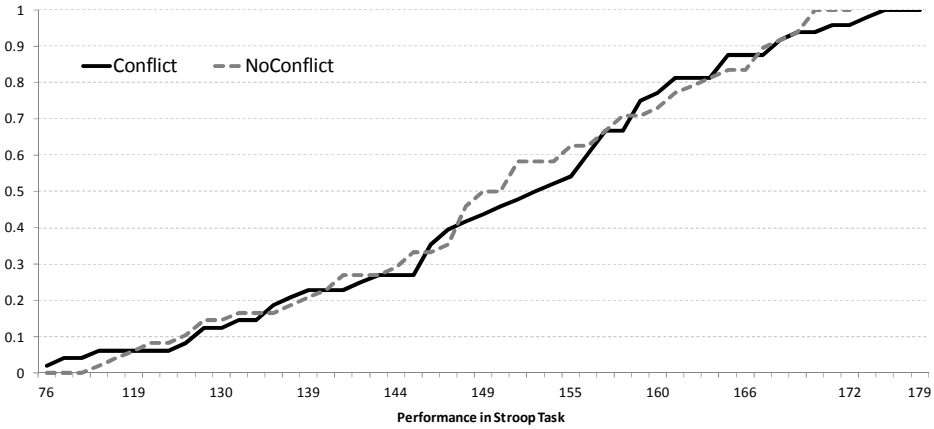
Date: _____ **Signature:** _____

Print name: _____

Appendix B: Recipients' Performance in the Stroop Task

In this section we compare performance in the Stroop task between recipients' in the Conflict and NoConflict treatments. Figure B.1 illustrates the cumulative distribution for the number of correct answers in the Stroop task by recipients in our two treatments. For each performance level, the graph shows the percentage of recipients who gave that many or fewer correct answers. The two distributions are very similar, suggesting that the treatment manipulation had little effect on recipients' performance. Recipients in Conflict perform slightly better than those in NoConflict: average performance by recipients was 148.71 and 147.33 in Conflict and NoConflict, respectively. This difference is not statistically significant according to a Mann-Whitney rank-sum test (p-value = 0.369, two-sided) or a Kolmogorov-Smirnov test (p-value = 0.518, two-sided).

FIGURE B.1
Recipient's performance in the Stroop task, CDFs



Note: The distribution functions are based on 48 observations in each treatment.

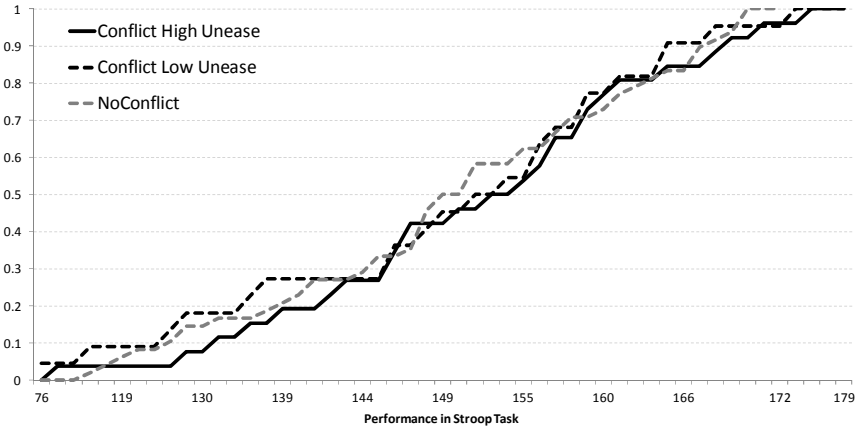
We next split the sample of recipients in the Conflict treatment into two subgroups, depending on their level of unease with dictators' decisions in part 1 of the experiment. In the case of recipients, we measure unease using the following questions included in the post-experimental questionnaire: "Overall, did the decisions made by your matched participant in the 16 situations of Part 1 make you feel upset?" and "Overall, do you think that the decisions made by your matched participant in the 16 situations of Part 1 were fair?". Responses were elicited using an 11-point scale, ranging from 0 ("not at all") to 10 ("very much"). We create an index of

unease for recipients by computing the average of their responses to these two questions. The average level of unease among recipients in the Conflict treatment is 4.72, whereas average unease in NoConflict is 1.68. Thus, recipients in Conflict experienced significantly more unease than those in NoConflict (Mann-Whitney rank-sum test p-value = 0.000, two-sided).

We split the sample of recipients in Conflict into two subgroups depending on whether their level of unease is above or below the median value for that treatment (the median value of unease is 5 in the Conflict treatment; unease is equal or above the median for twenty-six recipients and below the median for twenty-two recipients). Figure B.2 presents the cumulative distribution functions for recipient performance for each of the three groups separately: recipients who experienced low unease in Conflict, recipients who experienced higher unease in Conflict, and recipients in NoConflict.

FIGURE B.2

Recipients' performance in the Stroop task disaggregated by unease, CDFs



Note: The distribution functions are based on 26 observations in Conflict High Unease, 22 observations in Conflict Low Unease, and 48 observations in NoConflict.

Again, there is little difference between the performance distributions of the three groups. Average performance among recipients is 147.33 in the NoConflict treatment and 150.69 and 146.36 among recipients in Conflict with high and low unease, respectively. We cannot reject the hypothesis that the performance distribution of high-unease recipients in Conflict is the same as that of recipients in NoConflict (Mann-Whitney rank-sum test p-value = 0.339; Kolmogorov-Smirnov test p-value = 0.594; both two-sided). We also cannot reject the hypothesis that there is no difference in performance between low-unease recipients in Conflict and NoConflict

recipients (Mann-Whitney rank-sum test p-value = 0.631; Kolmogorov-Smirnov test p-value = 0.807; both two-sided).

Overall, our results show that recipients in the Conflict treatment do not perform differently from those in NoConflict. This stands in contrast with our findings on dictators' performance, whereby dictators in the Conflict treatment performed significantly worse compared to dictators in NoConflict. In line with findings from the self-control literature (Vohs et al., 2008; Wang et al., 2010), this suggests that depletion of willpower occurs through the act of making choices that resolve the tension between contrasting behavioral motivations, rather than through the mere contemplation of tradeoffs involving such conflicting motives.