The Impact of Self-Control Depletion on Social Preferences in the Ultimatum Game

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Abstract

We study the interaction of different motives and decision processes in determining behavior in the ultimatum game. We rely on an ego-depletion manipulation which consumes self-control resources, thereby enhancing the influence of default reactions, or in psychological terms, automatic processes. Experimental results provide evidence that proposers make higher offers under ego depletion. Based on findings from a closely related dictator game study, which shows that depleted dictators give less than non-depleted ones, we discard the possibility that other-regarding concerns are the default mode. Instead, we conclude that depleted proposers offer more because of a strategic 'fear of rejection' of low offers, consistent with self-centered monetary concerns. For responders, ego depletion increases the likelihood to accept offers, in line with unconditional monetary concerns being more automatic than affect-influenced reactions to reject unfair offers.

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1. Introduction

Only few human beings are completely altruistic or completely selfish. Many people donate to charity, but few will risk their livelihood to help others. Most of us are torn between selfish and other-regarding motives, and for each altruistic action there might be a selfish one waiting down the road. Many humans strive to behave in a fair way, but why should they *strive* if it came to them naturally? Each of us knows the feeling of having to control an impulse in order to live up to our ideals, and many of us know the feeling of *failing* to control it. There is no doubt that economic decisions are often the result of the interplay between several, clearly differentiated motives including selfish concerns and prosocial ones. How do individual decision makers actually balance multiple motives?

A basic assumption regarding the interplay between different motives in human decision making is that the joint determination of behavior through multiple motives involves mechanisms of self-control. Self-control plays an important role in a wide range of economic problems, ranging from intertemporal decision making (Thaler & Shefrin, 1981; Laibson, 1997) to worker performance in firms (Kaur et al., 2010) and consumer behavior (Baumeister et al., 2008; Achtziger et al., 2015d).[1] Self-control and the multiplicity of motives in economic decision making have also been explicitly incorporated in the theoretical literature on dual selves (e.g., Bénabou & Tirole, 2002, 2003, 2004; Benhabib & Bisin, 2005; Fudenberg & Levine, 2006).

[1] Self-control has been shown to have strong benefits in a broad range of everyday life issues. For instance, students high in self-control achieve higher grade-point averages in college (Duckworth & Seligman, 2005) and experience less stress in their first three months at university than students low in self-control (Achtziger & Bayer, 2013). Mischel et al. (1988) and Baumeister et al. (1994) maintain that many personal and social problems involve some degree of failure in self-control. These problems include addiction (e.g., alcohol abuse), eating disorders, debt accumulation, failure to save, criminal behavior, underachievement in school and at work, and procrastination.

One of the most prominent psychological models of self-control is the "strength model" of Muraven et al. (1998) and Baumeister (2002). This model assumes that the same self-control resource is used in an array of different tasks, including thought control, control of affect, inhibition of impulses, persistence in complex cognitive tasks, etc. Moreover, this resource is limited and acts of self-control consume it. Limiting the underlying resource by exerting self-control induces a state of *ego depletion*. In this state, people are temporarily less able or less willing to exert self-control.

The question we address in this paper is whether self-control and its possible depletion play a role for the interplay between egoistic and prosocial motives determining behavior in the ultimatum game (hereafter UG). Using an ego depletion manipulation, which taxes self-control resources, we aim to identify the "default mode of behavior", or in other words, the underlying dominant response of participants.

Our experiment consists of two parts. The second part is a standard ultimatum game (Güth et al., 1982). In this game, the proposer offers a split of a fixed monetary amount and the responder decides whether to accept it (in which case it is implemented as proposed) or reject it (in which case both players receive nothing). We investigate both proposer and responder behavior. The first part is an *ego-depletion manipulation* which induces a state of diminished self-control in participants before their interaction in the game. Following the logic of the strength model of self-control (e.g., Baumeister et al., 1998, 2007; Bayer et al., 2010), both parts require self-control for participants in the depletion treatment. Participants in the control treatment also complete two parts, with the main difference being that the first part requires no self-control.[2]

[2]The literature on ego depletion reports a large number of different manipulations along these lines. Hagger et al. (2010) review over 80 studies involving ego depletion. It is well established that depleted subjects have more difficulties exercising willpower than non-depleted controls, and are hence more likely to give up in tasks requiring persistence (Baumeister et al., 1998), overeat (Vohs & Heatherton, 2000), shop impulsively (Vohs & Faber, 2007), give up sooner on unsolvable puzzles (Baumeister et al., 1998), ex-

Results show that proposers with exhausted self-control resources made higher offers. At first glance, these results can be interpreted as evidence for fairness concerns being more implicit and being implemented more automatically than "cold" monetary/egoistic concerns. This is, however, not the only motive prescribing more generous offers: it is well known that proposers strategically make higher offers to avoid rejection (e.g. Ochs & Roth, 1989). Based on offers in a closely related dictator game (Achtziger et al., 2015b), in which strategic concerns of proposers are removed, we can rule out the conjecture of higher offers being driven by pure fairness concerns. Since depleted dictators are regularly shown to give less (e.g., Achtziger et al., 2015b; Xu et al., 2012; Halali et al., 2013), we can conclude that higher offers of depleted proposers are rather a result of an (implicit) strategic element of "fear of rejection" of low offers. Our explanation is also consistent with the observation that the effect of higher average offers made by depleted proposers wears off almost completely with enough repetitions of the game. Depleted responders exhibited lower rejection rates, which is evidence for automatic money valuations ('take the money and run') being more pronounced than the automatic emotional reactions ('reject unfair offers'), but effects of the manipulation are more subtle than those for proposers.

Our study contributes to the literature in a number of aspects. We explicitly employ monetary incentives (in the depletion task and in later decision tasks), and our design captures not only one-shot behavior but also its dynamics over time. The latter has, to the best of our knowledge, not been investigated even though many economic interactions and self-control problems are of a repeated nature. Results of the repeated game hence shed light on the persistence of the depletion effect in the presence of other effects, most prominently learning. Furthermore, our findings add to the robustness of previously

hibit lower performance in creativity tasks (Bayer et al., 2010), rely more on heuristics in decision making (Masicampo & Baumeister, 2008), and even cheat when reporting their own performance (Mead et al., 2009).

found ego-depletion effects, as our study relies on a relatively large sample size ($N = 288$) compared to previous experiments on ego depletion in psychology (e.g. Carter & McCullough, 2013, 2014; Schimmack, 2012).[3] In summary, and in line with previous studies, our results show that weakened self-control has a significant effect on behavior.

From a more general point of view, we pursued in this paper the idea that the distinction between automatic and controlled processes can also be useful for understanding the different motives underlying economic decisions. In contrast to psychology, economics has only recently started to recognize the need to look beyond purely behavioral data and identify more *process data* in order to gain better insights into the foundations of human economic behavior.[4] If different motives (in an economic sense) correspond to different processes (in a more psychological sense), then process data and standard psychological manipulations will allow us to recover the correspondence between the two. To this end, we discuss the importance of the dominant response of individuals for identifying which of the active processes is more automatic (which ultimately determines prosocial vs. selfish behavior).

[3] Carter & McCullough (2013) for instance presented evidence showing that the effects of self-control depletion in psychological studies might have been overestimated due "small study effects", which amounts to publication bias favoring small studies with large effect sizes. See, however, Hagger & Chatzisarantis (2014).

[4] Recent studies relating response times and economic decision making include Achtziger & Alós-Ferrer (2014) and Alós-Ferrer et al. (2015). There is also an increasing number of studies investigating the relationship between selfish/prosocial behavior and response times in economics (e.g., Rubinstein, 2007; Piovesan & Wengström, 2009; Cappelletti et al., 2011; Fischbacher et al., 2013; Rand et al., 2012; Tinghög et al., 2013; Rand et al., 2014). Another example is the emerging field of neuroeconomics, which has provided direct evidence on the existence of differentiated processes determining economic behavior using fMRI (e.g. Sanfey et al., 2003; McClure et al., 2004) and EEG (e.g. Achtziger et al., 2014, 2015a).

2. Background: Processes, Motives, and Self-Control

In examining the determinants of human behavior, psychologists have found it useful to draw a sharp distinction between motives and processes (for an overview, see Heckhausen & Heckhausen, 2008). In a nutshell, motives correspond to the ultimate reasons behind specific choices, that is, they explain the "why" behind a decision. Processes refer to the mechanisms translating a motive into a specific action, that is, they explain the "how" behind a decision.

Motives are broadly classified as *implicit* or *explicit* (McClelland et al., 1989; Brunstein, 2008). Implicit motives are enduring, affectively charged predispositions ("habitual propensities") deeply rooted into an individual's personality; in non-psychological terms, one could speak of "basic motives". Roughly speaking, implicit motives are often the reasons behind more impulsive decisions, whereas explicit motives correspond to consciously reflected goals or standards that decision makers set for themselves.

The distinction between these two kinds of motives is closely related to an even more basic distinction between different types of processes. More generally, *dual-process theories* organize and differentiate processes along a number of dimensions (see Kahneman, 2003; Strack & Deutsch, 2004; Alós-Ferrer & Strack, 2014; see also Evans, 2008; Weber & Johnson, 2009 for detailed reviews). The chief postulate is that the human mind is mainly influenced by two kinds of processes, called *automatic* and *controlled*. Automatic processes are defined as immediate, fast, unconscious, and efficient in the sense of requiring few cognitive resources. In contrast, controlled processes are slow, consume cognitive resources, are not instigated immediately, and are reflected upon consciously. Implicit motives are usually thought of as being activated automatically, that is, quickly and without conscious intent. On the other hand, explicit motives correspond to consciously reflected goals and therefore require more controlled processes. The distinction is not purely academic. Since automatic and controlled processes differ functionally (e.g., in their consumption of cognitive resources), the balance between different processes *and hence motives* within a

decision maker is susceptible to manipulation through a number of psychological techniques (and we will concentrate on a particular one).

The distinctions between implicit and explicit motives and between automatic and controlled processes are similar in spirit to the economists' distinction between a heuristic and a rationality benchmark (see also Kahneman, 2003, 2011). In this sense, quick reactions compete for determining actual behavior with more reflected, "rational" processes which need to inhibit and control the former but require more time and resources. An increasing number of "dual selves" models in economics, especially in the realm of intertemporal choice, follows this logic (e.g., Bernheim & Rangel, 2004; Benhabib & Bisin, 2005; Fudenberg & Levine, 2006).

The joint determination of behavior through implicit and explicit motives, channeled through automatic and controlled processes, is only possible through mechanisms of self-control. In action psychology, self-control is defined as the capacity of human beings to modify, change, or override their impulses, desires, and habitual responses (Baumeister & Heatherton, 1996; Mischel, 1996; Baumeister, 2002). Overriding implicit motives or (the corresponding) automatic processes requires the exercise of self-control and the consumption of certain associated mental resources. These resources are, however, limited, and hence a decision maker will "give in" to implicit motives more often in their absence, opening the door to a number of experimental manipulations, including *ego depletion*. Since it is hypothesized that implicit motives are activated automatically, whereas explicit motives strongly rely on controlled processes, our manipulation allows us to test the nature (implicit vs. explicit) of motives influencing agents' behavior in the ultimatum game.[5]

[5] A different possibility is to tax the cognitive resources employed by controlled processes, for instance by means of *cognitive load* manipulations. The involved resources are not necessarily related to self-control, and hence the link to implicit and explicit motives is harder to establish.

3. Experimental Hypotheses

According to Baumeister (2002), self-control might serve the purpose of restricting selfish motivations in order to increase acceptance by others.[6] This finding implies that people usually inhibit their tendency to be egoistic and, instead, present themselves as suitably social under ordinary circumstances. Hence, when their self-control resources are depleted, people are less successful at behaving in a socially accepted manner. This implies that self-control depletion can help determine whether selfishness and prosocial concerns in the UG correspond to more implicit motives (and more automatic processes) or more explicit ones (and possibly more controlled processes). Differences in activated motives and processes for proposers and responders lead to different hypotheses regarding their behavior in the game.

3.1. Proposer motivation

It is usually argued that behavior of proposers in the UG results from a conflict between purely monetary, self-centered concerns and prosocial motives. Purely selfish proposers should attempt to keep a large part of the allocation for themselves.[7] Yet, there are several possible motives which prescribe more gen-

[6] Baumeister & Leary (1995) presented extensive evidence that human beings display a strong *affiliation motive*, and it has been argued (Heatherton & Vohs, 1998) that this motive ultimately conflicts with people's selfish impulses. In accordance with these considerations, people high in self-control report better and more stable interpersonal relationships and more successful control of negative affect (i.e., anger) compared to people low in self-control (Baumeister, 2002; Tangney et al., 2004). Vohs et al. (2005, Study 8) reported that ego-depleted subjects described themselves as more arrogant and egoistic than nondepleted subjects.

[7] Experimental results on the UG, starting with Güth et al. (1982), have shown that proposers typically offer non-negligible amounts and that responders do reject positive but low offers. The first observation contradicts the joint hypothesis of purely monetary preferences and subgame perfection (which leads to a prediction where the proposer offers a minimal amount and the responder accepts every offer) but is compatible with Nash equilibrium. The second is incompatible with Nash equilibrium under monetary preferences.

erous offers. The first is other-regarding preferences, that is, a concern for fairness or socially desirable outcomes (Fehr & Schmidt, 1999; Bolton & Ockenfels, 2000; Charness & Rabin, 2002). There is, however, a second and at least equally important motive. Proposer behavior contains a strategic element, because self-interest dictates (as long as common knowledge of sequential rationality is not assumed) to make positive offers in order to avoid rejections. That is, rational proposers will foresee that responders might exhibit a negative (affective) reaction to low offers and reject them. As a consequence, the desire to avoid rejection, motivated merely by monetary concerns, leads to *as if* social behavior (see, e.g., Ochs & Roth, 1989; Loewenstein et al., 1989).

We hypothesized that selfishness is an implicit motive implemented through a rather automatic process. Our hypothesis is based on findings by, e.g., Vohs et al. (2005) implying that people usually control their tendency to be egoistic when they have full self-control resources. We can also provide more direct evidence on this assumption. The dictator game (Forsythe et al., 1996) removes all strategic concerns from the UG by transforming responders in passive spectators who cannot object to the allocation decided by the proposer (dictator). In a related study, Achtziger et al. (2015b) employed the same procedures and the same ego-depletion manipulation as in this paper and showed that depleted dictators made lower offers. These results indicate that preferences for selfishness are implemented more automatically than nonstrategic, prosocial motivations.

In summary, we hypothesized that the behavior of proposers is driven by the interaction between a basic, implicit motive oriented towards monetary rewards and possibly several explicit motives leading to more social behavior. As a consequence, proposers with weakened self-control capacity were predicted to be less able to control the impulse (an automatic process) to act purely on selfish (monetary) concerns, and hence to make lower offers.

There are, however, competing hypotheses. Zaki & Mitchell (2013) review recent evidence showing that, in some cases, prosocial behavior (and not selfishness) might be more automatic. It has to be mentioned that the evidence, on which the competing hypothesis is largely based, is not uncontested (e.g.,

Tinghög et al., 2013, Lohse et al., 2014, Verkoeijen & Bouwmeester, 2014, Myrseth & Wollbrant, 2015, Recalde et al., 2015). In any case, we would still obtain an experimental prediction. For, independently of what the result of the conflict between controlled processes is, ego depletion should cause a switch towards more automatic processes.

3.2. Responder motivation

Responders are presented with a specific stimulus (the proposer's offer) and have to react to it. In contrast to proposer behavior, responder behavior is free of strategic concerns and is usually assumed to be the result of the interaction between monetary concerns and affective processes leading to the rejection of "unfair" offers. We expected choices of responders to differ depending on the motive that is active in a given moment. Unfair offers in the UG are typically assumed to elicit emotional reactions such as anger, disgust (Chapman et al., 2009), or envy (Kirchsteiger, 1994). Emotions are the paradigmatic example leading to the activation of implicit motives and automatic processes. In this situation, the monetary motive becomes more explicit in comparison to the more implicit emotional, impulsive response.

We hypothesized that the most relevant implicit motive when confronted with an unfair (i.e., clearly unequal) offer is the impulse to punish the proposer by rejecting the allocation. In this case, the dominant explicit motive might correspond to the responders' "rational" goal of making as much money as possible. Clearly, the implementation of the latter motive requires the inhibition of an automatic rejection impulse, which requires exerting self-control. If responders are not able to consciously draw back on this explicit motive because of weakened self-control capacity, implicit motives might become more dominant and result in higher rejection rates for unfair offers for responders. This hypothesis is consistent with the recent literature. In a small-scale study ($N = 54$) conducted simultaneously to ours, Halali et al. (2014) examined responder behavior in the UG (the study relied on deception in that there were actually no proposers). They used a different ego-depletion manipulation and found that

depletion increased the rate of rejected unfair offers.

It is, however, also worth speculating what the predictions would be if we stuck to the idea we followed for proposer behavior, namely that selfishness is always more automatic than other-regarding concerns. In such a case, the direction of the hypothesized effect would be simply reversed.

3.3. Dynamics of Behavior

We start the analysis by considering the effects of ego depletion on the one-shot game (first-period), which allows a clean test of its effects on strategic behavior. Because we use a setting with repeated observations (perfect stranger design), we can also examine whether ego-depletion effects are long-lasting, that is, persist in the repeated game. This can be understood as a robustness test, but it is also of independent interest. The reason is that Vohs et al. (2008) have shown that ego-depletion effects intensify when repeated decisions are made subsequently (as each subsequent decision requires self-control), but such effects have not yet been examined in strategic games. Following (Vohs et al., 2008), we did not expect the effects of our manipulation to vanish over time.

Independently of our self-control manipulation, some learning effects are well-known in repeated UG experiments. Responders tend to reject less as they gain experience, and proposers react by making smaller offers (Roth et al., 1991; Mitzkewitz & Nagel, 1993; Slonim & Roth, 1998; List & Cherry, 2000).[8] These observations indicate that proposer behavior is likely to depend on past acceptances and rejections by responders, and responder behavior is likely to depend

[8] As observed by Mitzkewitz & Nagel (1993) (in an incomplete-information version of the UG), proposers tend to reduce their offers after an acceptance and increase them after a rejection. However, these effects are not large and need high stakes and/or enough observations. Slonim & Roth (1998) find little evidence for responder learning. List & Cherry (2000) observe that detecting responder learning requires a design inducing a significant proportion of unfair offers. Cooper & Dutcher (2011) conduct a meta-study focusing on responder behavior. Pooling data from six different UG experiments with repeated observations, they find that extremely low offers are more likely to be rejected with experience, but the opposite is true for low but not extremely low offers.

on past offers by proposers. Our analysis of repeated interactions takes these effects into account for both player roles. Another important reason for choosing a design with repeated interactions is that, otherwise, we would not expect enough variance in the data to properly analyze responder behavior. Because our hypothesis regarding responder behavior is based precisely on emotional reactions to actual behavior, we elicited decisions directly and not through the rather "cold" strategy method.[9]

3.4. Ego Depletion and Incentives

Muraven & Slessareva (2003) and Boucher & Kofos (2012) found that depletion effects are *mitigated* by monetary incentives for tasks following the depletion part. This effect is attributed to the fact that financial rewards for a task can increase participants' motivation and thereby, at least partially, override the loss in self-control generated in the depletion part. This implies that the effects of incentives which we use in both the depletion task and the subsequently played UG, go, by design, *against* the effects of diminishing self-control caused by ego depletion. So, if we find significant differences, the results are made stronger by this observation.

A related question concerns the monetary incentives associated with the depletion task itself. The depletion and self-control literature implicitly assumes that depletion phenomena are relevant beyond laboratory settings, and specifically in the workplace. That is, depletion is caused by work. But work is remunerated. Hence, if we are interested in the effects of depletion in economic settings, we should consider depletion manipulations which are explicitly incentivized. This point has received very limited attention in psychology. An exception is Muraven et al. (2007), who found that performance-contingent rewards in the depletion task lead to lower performance in nonsocial self-control

[9] Under the strategy method, responders are asked for their reaction to a set of hypothetical offers. We consider this design less suited to our research question as hypothetical offers increase emotional distance. Further, the strategy method effectively reproduces a normal-form version of the game but not the actual decision structure we are interested in.

tasks than flat rates. However, Achtziger et al. (2015b) employed both flat-rates and performance-contingent payment for the exact same depletion task we use in the present paper and found no differences in behavior in the dictator game. In this study, we follow the payment methods of Achtziger et al. (2015b) to discard potential confounds.

4. Experimental Design

We ran 12 experimental sessions in Spain at the experimental economics laboratory of a large Spanish university. Twenty-four subjects (12 proposers and 12 responders) participated in each session (with 288 subjects in total). No subjects were excluded from the analysis. A session lasted approximately 60 minutes and participants earned on average 12.91 Euros. Participants were university students recruited from the laboratory's subject pool, which is managed using a custom-made online recruitment system. Students majoring in either economics or psychology were not eligible for participation. The experiment was programmed in z-Tree (Fischbacher, 2007). The experiment consisted of two parts and followed a between-subject design in which treatments differed along two dimensions: the degree of ego depletion and the incentives provided in the depletion task.

Part 1. Following Baumeister et al. (1998), we let participants work on two consecutive, non-interactive tasks. In each of the two tasks, participants were provided with 3 paragraphs (also referred to as blocks) of text on paper, each containing 8 rows of text taken from an introductory physics textbook. In each task, participants had 5 minutes to cross out each instance of the letter "e" in the text according to a precise rule using a pencil (before entering the number of counted "e"s for each paragraph into the computer). In task 1, the habituation task, participants counted every letter "e" in as many paragraphs as possible. Participants received a flat payment of 4 experimental currency units (ECU) for working on the task. In task 2 (the actual ego-depletion task), the rule for counting "e"s was determined by the treatment to which participants were

randomly allocated.

In the high ego-depletion treatment (HED), "e"s had to be crossed unless either there was another vowel at a distance of exactly two letters (in either direction) from it (e.g., do not cross the "e" in "frenar", but cross it in "veo"), or a vowel different from "u" preceded the letter (e.g., do not cross the "e" in "niebla", but cross it in "pueblo"). This task is a slight variation of a task by Baumeister et al. (1998), with the second exception rule changed to account for the differences in diphthong frequencies between English and Spanish. A correct application of this rule requires a high amount of self-control (to break the impulsive response to cross out every "e"). Executing this complex rule was intended to weaken participants' impulse-control abilities, which are necessary for controlling one's affect (e.g., anger; see Hagger et al., 2010). In contrast, participants in the low ego-depletion (LED) treatment were instructed to again use the same rule as in task 1. This treatment is clearly easier and requires far less cognitive effort since participants did not need to inhibit their well-learned responses (i.e., find the letter "e"). The aim of the control treatment was to keep participants busy for five minutes without overly exhausting their cognitive resources.

Independently of the ego-depletion treatment, half of the participants were randomly assigned to the flat-payment condition (F) and the other half to the performance-based incentive (P) condition for payment in task 2. In the former, participants received 4 ECU for working on the task. In the latter, participants received 4 ECU for each paragraph for which the correct number of "e"s was found and 2 ECU whenever the stated number was almost correct, that is, either exactly one unit above or one unit below the correct one. Subjects were informed about their earnings (in condition P determined by the number of correctly solved blocks) from this task only after the last decision-making part of the experiment.

Part 2. The ultimatum game started immediately after the completion of the depletion tasks as a delay is generally thought to reduce the effects of the ego-depletion manipulation. Participants interacted in a repeated UG for 12

rounds. Before the start of the game, half of the participants in a session were randomly assigned to the role of proposers (player role 'A') and the other half the role of responders (player role 'B'). Every proposer interacted anonymously with 12 different responders and vice versa, ensuring that no participant interacted twice with the same player (perfect-stranger matching).

The stage game was implemented sequentially. The proposer offered a split (an integer value) of the fixed endowment of 7 ECU.[10] Then, the responder decided whether to accept or reject the proposed split. In case the offer was accepted by the responder, the split was implemented as proposed, whereas if it was rejected both players received a payoff of zero. The design of the stage game also ensured that participants did not have to take decisions under time pressure. At the end of each round, participants were informed about their round's payoffs. Before the experiment was concluded, the participants' demographic information and various personality attitudes were elicited in an ex-post questionnaire.

With regards to experimental procedures, participants were given written instructions and part 1 started immediately after all understanding questions were answered by the experimenter. The instructions described all parts of the experiment to minimize any delay between the depletion tasks and the decisions made in the UG. The only exception are explanations concerning the exact rules used in tasks 1 and 2 of the depletion manipulation, which contained the text paragraphs and the exact phrasing of the rule for counting "e"s. Those were presented in written form prior to each respective task. After the last decision-making part, the experimental currency units (ECU) accrued during

[10] We intentionally chose the size of the endowment to be 7 to make the equal 50:50 split infeasible. The reason is that Güth et al. (2001) found that the possibility of equal splits significantly increases the proportion of fair offers. However, this is most likely not due to fairness concerns, but merely to the fact that an equal split constitutes, by symmetry reasons, a focal point. Indeed, Schelling (1960, p.61) used a coordination game where participants had to decide on how to split $100 as one of his focal point questions, and reported that most people choose the 50:50 allocation.

the experiment by a participant were added up and converted into Euros at an exchange rate of 4 ECU = 1 Euro (approximately 1.30 USD at the time of the experiment). Participants received their earnings in cash privately at the end of the experiment.

5. Results

We present first summary statistics on the ego-depletion manipulation and investigate the effects of the incentive conditions on the depletion task and behavior in the subsequent game. Then, we present the results of proposer and responder behavior, for the one-shot game and repeated interactions.

5.1. Depletion Manipulation and Incentive Conditions

Manipulation check. Subjects in the low ego-depletion (LED) treatment worked on average on 2.566 blocks and those in the high ego-depletion (HED) treatment on 1.438 blocks, which reflects the difference in the complexity of the two rules. The difference was highly significant according to a two-sided, two-sample Wilcoxon rank-sum (WRS) test ($z = 12.474$, $p = 0.000$).[11] This large difference is supported by comparing the average number of correct blocks worked between treatments (1 point for a correct answer and 0.5 for an almost correct answer). The average number of correctly solved blocks was 0.688 in the LED treatment and only 0.097 in the HED treatment (WRS, $z = 8.562$, $p = 0.000$). In the LED treatment, 38% of the participants solved zero blocks, 24% solved half a block, 17% solved one block, and the remaining top 21% solved between 1.5 and 3 blocks correctly. Of the participants in the HED treatment, 85% solved zero blocks, 10% solved half a block and only 5% solved one block correctly. Given these figures, we are confident that the HED treatment was more cognitively demanding than the LED treatment and that participants in both treatments took the manipulation tasks seriously. We also ensured

[11] The same qualitative results obtain for the number of blocks worked and the performance-based earnings in the main depletion task if we analyze proposer and responder data separately.

participants' involvement in the task by counting the number of text blocks actually worked by participants (paper and pencil).

Incentives and performance. Incentive conditions had no significant effect on performance in the depletion task. In the LED treatment, the average number of blocks worked was 2.625 in the flat-payment (F) condition and 2.507 blocks in the performance-based payment (P) condition (WRS, $z = 1.355$, $p = 0.175$). In the HED treatment, participants in condition F worked on average of 1.480 blocks and in condition P on 1.396 blocks (WRS, $z = 1.478$, $p = 0.139$), consistent with findings in Achtziger et al. (2015b) which employed the same depletion task. There was a significant increase in the number of correctly solved blocks between incentive conditions in the LED treatment, with an average of 0.556 in LED-F and 0.819 in LED-P (WRS, $z = -2.348$, $p = .019$), the latter leading to average earnings of 3.276 ECU (compared to the fixed earning of 4 ECU in LED-F). The difference was not significant for the HED treatment, with an average of 0.111 for HED-F and 0.083 for HED-P participants (WRS, $z = 0.704$, $p = 0.482$), the latter leading to average earnings of 0.332 ECU (compared to the fixed earning of 4 ECU in HED-F). These results are in line with previous findings that incentives increase performance in easy but not necessarily in difficult tasks, presumably due to ceiling effects.[12]

Incentives and UG behavior. More importantly, we test whether performance-based incentives, to which participants were exposed in the depletion task, may attenuate the effect of ego depletion and hence influence behavior in the UG. For HED proposers, the first-period offer was 3.361 in condition F and 3.528 in condition P. A WRS test reveals no significant impact of the

[12]It is well known (see Camerer & Hogarth, 1999) that performance-based incentives, such as piece rates, can be ineffective or even detrimental if the task is of high cognitive complexity, because then performance is not a strictly increasing function of effort. The depletion task in the HED treatment is a case in point: whereas performance in the depletion task increases in the performance-based incentive condition in the LED treatment, there is no difference in performance between incentive conditions for participants in the HED treatment.

incentive condition ($z = -0.136$, $p = 0.892$).[13] Similar results obtain for LED proposers, whose first-period average offers are 3.167 in condition F and 2.972 in condition P (WRS, $z = .915$, $p = 0.360$). Results in each ego-depletion treatment are robust to replacing first-period offers by average offers. Turning to responder behavior, the first-period acceptance rate of HED responders was 0.817 in condition F and 0.944 in condition P (WRS, $z = -1.185$, $p = 0.236$). For LED responders, the first-period acceptance rate in conditions F and P were identical (0.889). Again, the same results obtain when considering average acceptance rates instead of first-period acceptances.

We find no support for the notion that different incentive schemes in the ego-depletion condition impact performance in the depletion task or induce carry-over effects to behavior in the UG. For the analysis below, we pool data across incentive conditions (F and P) in the depletion task and focus on differences between the variables of primary interest, that is on behavior of depleted and non-depleted participants in the UG. Nevertheless, we control for possible effects of incentive conditions in the regression analysis.

5.2. Proposer Behavior

As a first illustration, Figure 1 depicts the histogram of offers at the population level, showing that more lower offers were made by non-depleted (LED) proposers than by depleted (HED) proposers. Defining *unfair* offers as those of 3 or less, proposers in the LED treatment made 10% more unfair offers than those in the HED treatment.[14]

First-period offers. As discussed above, it is well-known that strategic

[13] Although most experimental hypotheses have a clear directional prediction of the effects of ego depletion on behavior, note that in the statistical analysis reported here we take the more conservative approach of reporting only results on non-parametric, two-tailed tests.

[14] An additional hint at treatment differences is that participants exhibit a large difference in extreme forms of behavior. Call a proposer "very selfish" if he made 8 or more (out of 12) unfair offers. We then find that 14% LED proposers (10 out of 72) acted very selfishly, compared to only 1.4% HED proposers (1 out of 72).

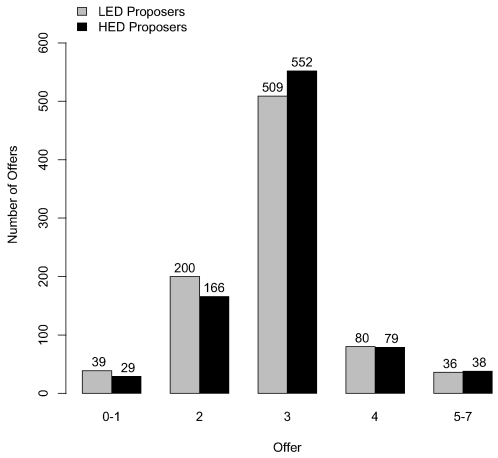

Figure 1: Histogram of proposer offers in the ultimatum game.

behavior of proposers is influenced by learning in the repeated UG and this in turn may blur the effects of ego depletion on offers. We thus start by considering proposers' first decision immediately after the depletion task. In the first period, depleted proposers made *larger* offers (average 3.444) than non-depleted ones (average 3.069). The treatment difference is significant using a two-sample WRS test (72 LED and 72 HED proposers, $z = -2.258$, and $p = 0.024$). The proportion of unfair offers (3 or less) is also different between LED (20.83%) and HED (9.72%) in the first period (two-sample test of proportions, $z = 1.853$, $p = 0.064$).

OLS regressions on first-period offers in Table 1 confirm this result. Model 1 accounts for the main treatment variables, i.e. ego depletion and incentive conditions, whereas Model 2 controls additionally for gender and participants' motivation for participation and performance.[15] In both regression models, ego-

[15]Those were measured as a response on a 7-point Likert scale to the questions "How much has the possibility of earning money motivated you to participate / perform as well as possible in this experiment?"

	Model 1	Model 2
Ego depletion (HED=1)	0.375**	0.335**
	(0.167)	(0.161)
Payment type (P=1)	−0.014	−0.018
	(0.167)	(0.163)
Male		−0.483***
		(0.168)
Performance motive		−0.143**
		(0.071)
Participation motive		0.056
		(0.081)
Constant	3.077***	3.888***
	(0.142)	(0.579)
Observations (subjects)	144	144
R^2	0.035	0.097

Notes: OLS regressions with robust standard errors in parentheses. Dependent variable in all models is proposer offer. *** significant at the 1% level, ** significant at the 5% level, * significant at the 10% level.

Table 1: Proposer offers in the first period.

depleted proposers made significantly larger offers than non-depleted ones, with the ego-depletion coefficient being positive and significant ($p = 0.026$ in Model 1, $p = 0.039$ in Model 2). The effect of incentive conditions (F/P) is close to zero and not significant. Model 2 reveals in addition that both males ($p = 0.005$) and subjects with strong motives to perform well ($p = 0.046$) made significantly lower offers. In summary, behavior in the initial period is a clear indication against the hypothesis that purely monetary concerns are more pronounced in depleted proposers. We defer our detailed interpretation of what drives depleted proposers to make higher offers to Section 6.

Repeated decisions. Repeated observations reveal that the difference between average offers of depleted and non-depleted proposers decreases over time. Depleted proposers continued to offer on average slightly more than non-depleted ones in the first quarter of the experiment (periods 1–3; LED 2.954, HED 3.199). The null hypothesis that the HED offers are smaller than LED offers in the first quarter is weakly rejected (one-sided binomial test, $N = 12$, $p = 0.073$).[16] Taking average offers over all 12 periods, HED proposers offer with 2.955 somewhat more than the 2.870 of LED proposers but this difference is not significant (one-sided binomial test, $p = 0.613$).

In accordance with the literature, there is a decrease in offers over time in both treatments. As remarked above, the proportion of unfair offers was significantly larger for LED proposers compared to HED ones. This difference also diminished over time. In the last period, the proportion is 30.56% for LED and 20.83% for HED participants. Figure 2 illustrates the decreasing trend in average offers over time. There are significant within-treatment differences in average offers between the first and second half of the experiment for HED proposers (two-sided binomial test, $p = 0.039$) but not for LED proposers ($p = 0.774$), evidence that HED proposers learn to lower their offers over time.

Repeated decisions (regression analysis). Our experimental data form a strongly balanced panel, with 12 observations per subject. Table 2 reports the results of a set of linear panel (GLS) regressions on proposer offers with robust standard errors clustered by sessions (as the independent units of observation) and with random effects on the subject level. Our specification includes possible dependencies on previous acceptances, which automatically excludes first-period offers from the analysis. Model 1 controls for the acceptance rate, whether or not the previous offer was accepted, the incentive condition (F/P) in the depletion task, the effect of ego depletion, and its interaction over time. Model 2 and 3 incorporate further variables related to the experimental manipulation, such

[16] All reported binomial tests take session-level differences as the independent units of observation.

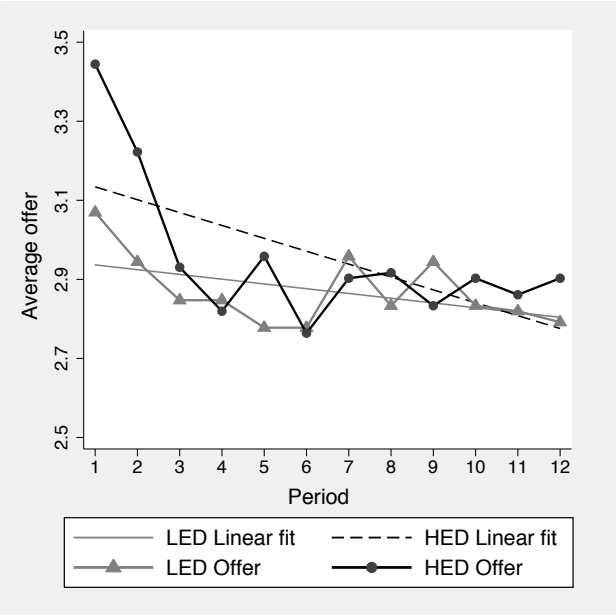

Figure 2: Proposer offers per period.

as the number of blocks worked by participants during the depletion task, the number of blocks correctly solved, and their respective interactions with the treatment dummy (HED).

First, a consistent impact on offers, over time, is captured by the acceptance rate of previous offers, confirming the robustness of the learning effect first pointed out by Roth et al. (1991) and Slonim & Roth (1998). Whether the previous round's offer was accepted or not (Accept at $t-1$) has also a consistent and strongly significant negative impact on this period's offer. The ego-depletion coefficient has a positive sign and is significant ($p = 0.044$ in Model 2, and $p = 0.070$ in Model 3) in regressions which control for the number of blocks worked in the depletion task and its interaction with the HED dummy. The number of blocks worked in the depletion task has a weakly significant effect on behavior in Model 3 ($p = 0.069$). The negative interaction of blocks worked with the HED treatment ($p = 0.095$ in Model 2, $p = 0.073$ in Model 3) suggests that working hard in the depletion task has a negative effect on offers of HED

	Model 1	Model 2	Model 3
Accept rate until $t-1$	-0.291^{*}	-0.294^{*}	-0.311^{*}
	(0.166)	(0.171)	(0.176)
Accept at $t-1$ (Yes=1)	-0.106^{***}	-0.106^{***}	-0.105^{***}
	(0.039)	(0.040)	(0.040)
Ego depletion (HED=1)	0.149	0.807^{**}	0.737^{*}
	(0.164)	(0.401)	(0.406)
Period	−0.006	−0.006	−0.006
	(0.010)	(0.010)	(0.010)
HED × Period	−0.012	−0.012	−0.012
	(0.012)	(0.011)	(0.011)
Payment type (P=1)	−0.024	−0.001	0.015
	(0.091)	(0.089)	(0.092)
Blocks worked		0.205	0.223^{*}
		(0.133)	(0.122)
HED × Blocks worked		-0.297^{*}	-0.306^{*}
		(0.178)	(0.170)
Correct blocks			−0.135
			(0.096)
HED × Correct blocks			0.294
			(0.181)
Constant	3.231^{***}	2.699^{***}	2.749^{***}
	(0.209)	(0.353)	(0.382)
Observations	1584	1584	1584
Number of groups (subjects)	144	144	144
Wald χ^2	20.99	32.44	379.93
Prob $> \chi^2$	0.002	0.000	0.000

Notes: Random-effects linear (GLS) regressions. Dependent variable in all models is proposer offer. Robust standard errors (clustered by sessions) in parentheses. *** significant at the 1% level, ** significant at the 5% level, * significant at the 10% level.

Table 2: Proposer offers over time.

proposers in comparison to LED proposers. Lastly, the regressions also show that neither the incentive condition (F/P) nor the performance in the depletion task influences the level of offers in the UG in any significant way.

In summary, results clearly show that HED proposers offer more in earlier periods, but this difference decreases with repetition in the game. Panel regressions corroborate the differences observed in the one-shot game (cf. Figure 2) as long as one controls for participants' effort (an indicator of participant's involvement) in the depletion task. Overall, it is remarkable that the effect of depletion on offers persists over time, even though the first period (which reported the largest treatment differences) is excluded in the panel regression model by definition.

5.3. Responder Behavior

First-period and average acceptances. We did not expect sharp results for responder behavior, since, as argued by Cooper & Dutcher (2011), who pooled responder data from six different experiments, effects on responder behavior are more subtle than those on proposer behavior. Indeed, the rates of acceptance in the first period are almost identical for responders across treatments (0.89 for LED and 0.90 for HED). Similar results are obtained when considering treatment differences over all 12 periods. There, LED and HED responders accept both on average 81.9% of the offers received.

Repeated decisions (regression analysis). Turning to a more detailed analysis, explicitly taking repeated game effects into account, Figure 3 plots per-period acceptance rates for depleted and non-depleted responders (72 in each treatment). Acceptance rates decrease sharply in early periods but are again increasing thereafter. This pattern is a first indication for learning effects of responders after the initial (acceptance) decision. Table 3 presents a set of panel probit regressions with random effects on responder acceptance decisions and standard errors clustered by sessions.[17] Model 1 controls for learning effects by incorporating the number of unfair offers received as a regressor, to accommodate the observation that responders learn to accept low offers as they observe

[17] GLS regression models yield comparable effects of ego depletion on responder acceptance decisions as the probit specifications in Table 3 and are hence not reported.

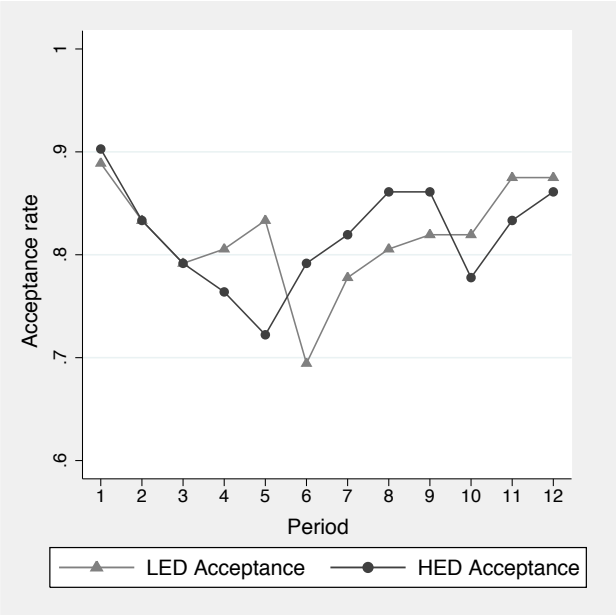

Figure 3: Responder acceptance rates per period.

more of them. Models 2 and 3 add further controls, i.e. effort and performance of participants in the depletion task.

Regression results show, as in Cooper & Dutcher (2011), that a large offer decreases the likelihood of rejection. The number of unfair offers observed has no significant effect on behavior. The baseline model (Model 1) found no significant effect of ego depletion on the acceptance decision as such. However, when including the number of blocks worked, we find a significant, *positive* effect of ego depletion ($p = 0.039$ in Model 2, $p = 0.030$ in Model 3). The result that depleted responders exhibit lower rejection rates is evidence against the hypothesis that monetary concerns are less automatic than the desire to punish unfair behavior. Results also show that controlling for exerted effort in the manipulation task is necessary for ego depletion to have a significant effect on acceptance decisions in the regressions for repeated behavior.

We find that the coefficient for the effect of the number of blocks worked on the acceptance likelihood is significantly positive ($p = 0.000$ in Models 2 and

	Model 1	Model 2	Model 3
Offer at t	1.875***	1.878***	1.882***
	(0.312)	(0.313)	(0.302)
Unfair offer accumulated	0.088	0.091	0.090
	(0.080)	(0.095)	(0.095)
Ego depletion (HED=1)	−0.111	2.038**	2.184**
	(0.214)	(0.987)	(1.005)
Payment type (P=1)	−0.088	−0.105	−0.039
	(0.244)	(0.263)	(0.269)
Blocks worked		0.793***	0.992***
		(0.207)	(0.204)
HED × Blocks worked		−0.877*	−1.053**
		(0.448)	(0.459)
Correct blocks			−0.410***
			(0.155)
HED × Correct blocks			0.702
			(0.486)
Period	−0.003	−0.003	−0.003
	(0.022)	(0.025)	(0.026)
Constant	−3.543***	−5.584***	−5.840***
	(0.662)	(1.078)	(1.071)
Observations	1728	1728	1728
Number of groups (subjects)	144	144	144
Wald χ^2	268.88	269.96	270.81
Prob $> \chi^2$	0.000	0.000	0.000

Notes: Random-effects probit regressions. Dependent variable in all models is responder acceptance decision. Robust standard errors (clustered by sessions) in parentheses. *** significant at the 1% level, ** significant at the 5% level, * significant at the 10% level.

Table 3: Responder acceptance decisions over time.

3), but negative for the interaction between blocks worked and HED responders ($p = 0.050$ in Model 2, $p = 0.022$ in Model 3). This suggests that working hard in the depletion task has a negative effect on the acceptance likelihood for HED responders compared to LED responders. In Model 3, the effect of the perfor-

mance measure in the depletion task, the number of correctly solved blocks, is negative ($p = 0.008$). However, its interaction with the depletion treatment ($p = 0.148$) is not significant. Since subjects learn about their performance in the task only at the end of the session, the number of correctly solved blocks is a clean measure of cognitive ability, but not necessarily of effort invested in the task. Moreover, the incentive condition in the depletion task had no significant impact on the likelihood of acceptance, again evidence that monetary payments do not decisively mitigate the effects of depletion (as in Achtziger et al., 2015b).

Overall, the depletion effects on responder behavior are, as expected, quite subtle but reveal significant positive effects of ego depletion on the acceptance likelihood when controlling for effort in the depletion task in the panel regressions. The observed higher likelihood of acceptance in the HED treatment is evidence for (self-centered) monetary valuation being more automatic than other concerns.

6. Discussion

In this section, we discuss our experimental results in light of the underlying modes of dominant response of participants (summarized in our main hypotheses in Section 3) and relate our findings to the recent literature.

6.1. Interpretation of the results

We start with the behavior of proposers. The initial behavior is of particular interest because first-period offers capture the direct effect of ego depletion. Proposers with exhausted self-control resources offered significantly more than the control group. We also found that the direction of the depletion effect persists, although less pronounced, in repeated interactions. The difference between offers in the LED and HED treatment over time is significant when controlling for additional variables related to the ego-depletion manipulation (such as effort provided and performance). These findings also corroborate previous results showing that repeated decisions do not crowd out ego depletion in subsequent tasks (Vohs et al., 2008; Baumeister et al., 2007, for an overview).

Higher offers of depleted proposers seem to fit, at first glance, the interpretation of prosocial concerns being implemented more automatically than monetary/egoistic concerns. Additional experimental evidence on the effects of ego depletion on revealed social preferences, however, lets us firmly discard this conjecture. Achtziger et al. (2015b) showed in a dictator game (DG) study, which otherwise used a setup identical to the one of the present study, that depleted dictators made significantly lower offers. Recall that the key difference between proposer behavior in the UG and the DG is that behavior in the former contains a strategic element in addition to the social preference motive (which can also be affected by the depletion manipulation) whereas strategic concerns are absent in the latter. The results on dictator giving in Achtziger et al. (2015b) are hence direct evidence for preferences for selfishness being implemented more automatically and being more pronounced under weakened resources of self-control in non-strategic settings. Moreover, these results are also in agreement with dictator giving in Xu et al. (2012), Halali et al. (2013), as well as Martinsson et al. (2012) who find a positive correlation between the capacity for self-control (measured through self-reports on "trait self-control") and dictator giving. Even though the experimental hypotheses (in Section 3) classified strategic concerns of proposers as explicit, the combined results of existing DG and UG studies strongly suggest that the strategic element can have an explicit as well as an implicit component: putting yourself in the shoes of the other (explicit) vs. an affect-based *fear of rejection* (implicit).

Taken together, we interpret our results of higher offers of depleted proposers as clear evidence for an affect-driven fear of rejection, an implicitly implemented strategic motive, but not as evidence for increased social preferences under depletion. The difference between Achtziger et al. (2015b) and the present UG study points out that 'fear of rejection', conceptualized as a further decision process weighing in for the proposer's decision in the UG, is even *more automatic* than monetary concerns for participants. This led, in turn, to a higher reliance on fear of rejection (compared to prosocial motives and monetary concerns) and hence higher offers in the UG. Our interpretation of proposer offers

is also in line with the results of a recent study on ego depleted proposers in the UG by Halali et al. (2013) and with the effects of time pressure on proposer offers in Cappelletti et al. (2011).

For the case of depleted responders, results are more subtle than those of proposers. Responder effects depend on the effort and performance in the manipulation task which measured participants' involvement/motivation and cognitive ability (e.g., concentration). Responders with exhausted self-control resources exhibit lower rejection rates as evidenced by a set of panel regressions. These results are consistent with monetary (egoistic) valuation being more automatic than negative inequity aversion (not wanting to have *less* than others). These findings are in contrast with recent experimental evidence by Halali et al. (2014) but are perfectly in line with Sanfey et al. (2003), who found that receiving an unfair offer leads to activation of the anterior insula, a brain region associated with (automatic) emotional reactions, *and* activation of the dorsolateral prefrontal cortex (DLPFC), associated with self-control. We follow their interpretation of the data in that two different processes are at work, the "emotional"/impulsive reaction to reject, and the "rational"/controlled tendency to accept any positive amount of money (in our case, the latter being stronger than the former). Similarly, Knoch et al. (2006) disrupted the right-DLPFC of responders playing the UG using transcranial magnetic stimulation (TMS) and found that the tendency to accept unfair offers increased. Since the DLPFC is also active in response inhibition (Miller & Cohen, 2001), a possible interpretation, consistent with our findings, is that the "rational" reaction to accept any positive amount might be more automatic (first reaction which needs to be inhibited), and the impulse to reject unfair offers requires more self-control.

Comparing our experimental hypotheses with our results and those of the related literature points at the possibility that the underlying dominant or active response may differ across individuals (and possibly even within an individual).[18] Given the still mixed evidence on the effect of self-control depletion

[18] Achtziger et al. (2015c), for instance, ran a similar study as the one presented in this

in strategic environments in the literature, it seems promising to account for the possibility that being prosocial, egoistic, or worried about rejection is not unequivocally "basic" for all humans in future work. For some individuals, the dominant response might be selfishness, while for others it might be prosociality. In this regard, it is important to note that, although we speak of "automatic" and "controlled" processes, the classification of processes is merely qualitative (e.g. Strack & Deutsch, 2004; Alós-Ferrer & Strack, 2014). What is actually meant is that, in experimental paradigms where two decision processes can be clearly identified (in our case those of proposers in the UG), it is useful to identify which one of them is *more automatic* than the other.[19] Although ego depletion is known to strengthen basic tendencies, a theory which identifies the active underlying automatic process (dominant response) of individuals would be helpful for a more general understanding of the effects of self-control depletion in strategic situations.

An alternative interpretation of our data would emphasize the mode of thinking rather than the individual processes at work. Suppose that the ego-depletion manipulation leads to an emphasis on the most intuitive interpretation of a social situation. In a dictator game as in Achtziger et al. (2015b), this interpretation might be one of entitlement, i.e. dictators would be led to sharing less of "their" money. In contrast, in an ultimatum game, the proposer's payoff depends on the receiver's decision, and hence an intuitive interpretation of the situation might emphasize reciprocity, hence leading proposers to increase their offers. This in-

paper which produced a different pattern of behavioral results. Proposers made lower offers and depleted responders rejected unfair offers more frequently. The two studies are however not directly comparable because they differ in design and procedures in the depletion task (regarding habituation task, feedback, and incentives). Achtziger et al. (2015c) also discusses the differences in behavior and the relation to the underlying dominant mode of response.

[19] It is well known (see, e.g., Bargh, 1989) that decision processes can and do become more automatic, and also depend on the environment. When a teenager learns to drive, for instance, the involved processes are initially quite controlled, as driving a car is not part of our genetic heritage. A few years later, however, the very same processes have become so *automatized* that for the most part they even escape the conscious part of the mind.

terpretation would be roughly in line with Halali et al. (2014), who found that ego depletion led to increased reciprocity in a trust game. However, it is not in line with the theoretical basis of ego depletion, that is, the fact that this manipulation explicitly targets self-control resources. Also, it should be noted that the interpretation does not match our results for responder behavior, since increased reciprocity should have lead to increased rejections of unfair offers.

6.2. Earnings in the depletion task

Since the depletion task was remunerated and partially incentivized, one might ask whether differences in realized earnings (in the depletion task) across individuals influence later behavior in the UG. However, the maximum amount of money earned in the main depletion task was quite small (4 ECU = 1 Euro), is almost negligible in comparison to the total amount earned in the experiment (average of 12.91 Euros). Further, note that subjects did not receive feedback about their performance (or earnings) in the depletion task until after the UG. Therefore, our design rules out that information about own performance or earnings in the depletion task influenced behavior in the UG. Still, we re-ran all regressions reported above adding earnings from the depletion task as an additional regressor. There were no significant effects.

Of course, performance (number of blocks correctly solved) maps directly into earnings in the depletion task in the performance-based incentive condition (P) but not in the flat-fee incentive condition (F). While in the latter earnings were 4 ECU, in the former they were, on average, 3.276 ECU for LED subjects and only 0.332 ECU for HED ones. In Section 5.1, however, we report tests showing that there were no differences in UG behavior across incentive conditions for a given depletion treatment. This also speaks against an influence of individual earnings in the depletion task on later behavior.

One could still speculate on whether an *expectation* of low performance or earnings in the depletion task may impact behavior in the UG (possibly through mood effects). We would, however, expect that low expected earnings (or frustration due to the difficult task) would lead to smaller offers (respectively higher

rejections) for depleted participants whereas we observe higher offers (respectively lower rejection rates).

6.3. Depletion and repetition

It has been pointed out that repeated decisions can be depleting in themselves (Vohs et al., 2008; Baumeister et al., 2007), which means that in designs as ours one should not expect the effects of the depletion manipulation to vanish during the experiment. However, the additional depletion arising from repeated decisions might have an effect on the time trend of proposals in our data. Our design does not allow to disentangle this possible, additional effect, because participants in both treatments should become more depleted from repeated decision making. This, in turn, does not allow us to distinguish whether behavioral effects stem from the initial depletion task, from an increase of depletion over time, or from other learning effects (e.g. which offer is perceived as fair) within a session.

Our results suggest that a combination of depletion and learning effects in the repeated game is most likely to explain the persisting differences in offers between treatments over time. Recall that both depleted and non-depleted participants interacted within a session, so they are subject to the same social norm of what constitutes a fair offer (formed in a session). Given the same social norm, results show that depleted proposers significantly decreased their offers over time, but remain slightly above average offers of non-depleted proposers. This observation is consistent with the explanation that depleted proposers exhibit a larger fear or rejection than non-depleted ones.

7. Conclusion

Psychological models postulate that self-control is a limited resource which can be depleted. In this study, we depleted subjects before their participation in the UG. Even though the self-control manipulation we employ is extremely subtle, we found a significant effect on proposers and responders. The objective

of our manipulation was to test whether manipulating levels of self-control (i.e., low vs. high ego depletion) can help explain the commonly observed behavior of proposers and responders in the UG. Our approach enabled us to explore whether participants' motives (e.g., selfishness vs. fairness or strategic concerns) in the UG are more or less implicit (basic) and whether they rely on more automatic or more controlled processes as defined in the literature on dual-process theories.

Experimental data shows that proposers with exhausted self-control resources made, in the first period, higher offers than non-exhausted proposers. Even though results seem consistent with more pronounced prosocial behavior, we can discard this interpretation based on findings in a related paper which uses a dictator game (Achtziger et al., 2015b), thereby eliminating strategic concerns. We conclude that the higher offers of depleted proposers in the UG are driven by the (implicit) strategic element of "fear of rejection" of low offers, and is not due to strengthened social preferences. Responders with exhausted self-control resources exhibit lower rejection rates. This finding is consistent with automatic money valuations ('take the money and run') being more automatic and pronounced than the emotional reactions or "rational" inequity aversion (not wanting to have *less* than others).

In conclusion, our results provide evidence that weakened self-control has a significant effect on behavior in strategic interactions. Findings point also at a possible heterogeneity across individuals with respect to which decision processes have become more automatized. The interaction of the underlying motives and processes, however, crucially shapes behavior. In order to isolate the effects of self-control manipulations on social preferences in strategic settings, a theory identifying (or experimental procedure manipulating) the underlying dominant response of individuals would be a valuable next step.

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