Social Preferences and Self-Control*

Anja Achtziger[◇] Carlos Alós-Ferrer[▲] Alexander K. Wagner[◎]

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Abstract

We provide new evidence on the impact of diminished self-control on social preferences in the ultimatum game. Following the design of Achtziger et al. (2016), but using a different subject pool, we find a different pattern of behavior: depleted proposers made lower offers, and depleted responders rejected unfair offers as often as non-depleted ones. Subtle depletion manipulations seem to alter social preferences, but the direction of the effect appears not to be systematic across studies with different subject pools. Results suggest a large individual heterogeneity with respect to whether prosocial or selfish motives are the default mode of behavior.

Keywords: Ultimatum game, self-control, ego depletion, social preferences
JEL-Classification: C72, C91

1 Introduction

Self-control problems permeate decision making in professional (and private) life. In recent years, a small but growing literature has examined the effects of exhausted self-control on social preferences. Psychological manipulations which induce a state of ego depletion in decision makers have produced a number of important insights on this question (e.g. Xu

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◇Department of Social Sciences, Zeppelin University. Am Seemooser Horn 20, D-88045 Friedrichshafen (Germany). Email: anja.achtziger@zu.de

▲Department of Economics, University of Cologne. Albertus-Magnus Platz, D-50923 Cologne (Germany). Email: carlos.alos-ferrer@uni-koeln.de

◎Vienna Center for Experimental Economics and Department of Economics, University of Vienna, Oskar-Morgenstern-Platz 1, 1090 Vienna (Austria). Email: alexander.k.wagner@univie.ac.at

et al., 2012; Halali et al., 2013, 2014; Achtziger et al., 2015, 2016). In non-strategic settings such as in the dictator game, depleted participants give less than non-depleted ones (Achtziger et al., 2015). In strategic settings, however, results are much less clear.[1] As a consequence, we still lack a clear understanding of how mechanisms of self-control impact social preferences and strategic behavior.

In this work, we present additional evidence on the effects of diminished self-control on social preferences, by using an almost identical design, but a different subject pool, as in the ultimatum game (UG) study of Achtziger et al. (2016) and the dictator game study of Achtziger et al. (2015). In the experiment, participants complete first a non-interactive ego depletion task (where controls complete a non-demanding version of the task) and then interact in an ultimatum game (Güth et al., 1982), either as a proposer or as a responder. The latter interaction is repeated, as in Achtziger et al. (2015, 2016). The ego depletion manipulation affects the balance of different underlying motives of the decision maker because, according to the logic of the "strength model" of self-control (Muraven et al., 1998; Baumeister, 2002), reduced self-control resources increase reliance on automatic processes of decision making. This allows to uncover the (implicit vs. explicit) motives underlying behavior of proposers and responders in the UG. By taxing self-control resources, we aim to identify the "default mode of behavior" and hence contribute to research on the question of whether humans are inherently more selfish or more prosocial.

Results show that proposers with exhausted self-control resources made lower offers, with the effect not wearing off with repetitions of the game. This is evidence for monetary/egoistic concerns being more implicit and being implemented more automatically than (strategic) fairness concerns. In contrast, depleted responders did not exhibit higher rejection rates than non-depleted ones. These results are opposed to those in the closely related study of Achtziger et al. (2016), where proposers offered more and responders rejected less under ego depletion.

Taken together, evidence in Achtziger et al. (2015, 2016) and the study reported here show that subtle self-control manipulations do have an impact on behavior in games commonly used to study social preferences. However, the direction of the effect is not systematic across studies with different subject pools. Given the significant effects of ego depletion on behavior (in all studies), we conclude that ego depletion is a real phenomenon, even in strategic interactions, but point out that many questions regarding its effects in the domain of social preferences are

[1] Similar discussions have recently surfaced in this literature on the effects of related manipulations such as cognitive load (Benjamin et al., 2006; Cornelissen et al., 2011; Schulz et al., 2014; Kessler & Meier, 2014) or time pressure (Sutter et al., 2003; Cappelletti et al., 2011).

still unanswered. Differences in behavior across studies highlight the possible heterogeneity across participants with respect to the underlying dominant response (decision process). An additional factor, which we regard as less likely given the significant results in each study but which cannot be ruled out, is that seemingly arbitrary design details led to conflicting results across studies.

More generally, this work contributes to the current discussion on the effects of ego depletion on decision making (for an overview, Carter & McCullough, 2013, 2014; Hagger & Chatzisarantis, 2014; Alós-Ferrer et al., 2015) and, in particular, to its impact on social preferences in strategic interactions.

2 Experimental Hypotheses and Design

2.1 Hypotheses

We hypothesize that proposer behavior is determined by the interaction between a basic, implicit motive oriented towards monetary rewards and possibly several explicit motives leading to more prosocial behavior (e.g., because of concerns for fairness or socially desirable outcomes; see Fehr & Schmidt, 1999; Bolton & Ockenfels, 2000; Charness & Rabin, 2002). Following Achtziger et al. (2015, 2016) we assume that selfishness is an implicit motive implemented through more automatic processes on which participants rely more under ego depletion (e.g., Muraven et al., 1998; Baumeister, 2002). Hence, prosocial motives are implemented in a controlled way, and ego-depleted proposers should make on average lower offers than non-depleted proposers. Proposer behavior, however, also entails a strategic element, as the responder can reject (low) offers. If this strategic element corresponds to a more deliberative process, the argument remains unchanged, simply giving several explicit motives for apparently prosocial behavior, all of them opposed to the more automatically-supported selfishness motive (see, however, the discussion section below).

The decision of responders is free from strategic elements, and is thought to result from the interaction between monetary concerns and affective processes, the latter leading to the rejection of “unfair” offers. Our hypothesis for responders was that emotional responses to unfairness are implemented more automatically than monetary motives, and hence ego-depleted responders have a higher rate of rejection of (unfair) offers than non-depleted responders.

In addition, we also hypothesized that the effects of the ego depletion manipulation do not disappear as decisions are repeated. In line with results in Achtziger et al. (2016), we also expected that monetary incentives in the manipulation task itself would not counteract its effects on self-control, which is of independent interest as the vast majority of studies using depletion manipulations uses non-incentivized tasks.

2.2 Design and Procedures

We ran 13 sessions in Germany at the experimental economics laboratory of the University of Konstanz. Each session consisted of 24 subjects (12 proposers and 12 responders) for a total of 312 participants. A session lasted about 50 minutes and participants earned on average 11.02 Euros. Subjects were university students recruited from the laboratory's subject pool, managed by an online recruitment system (ORSEE; Greiner, 2015). Students majoring in either economics or psychology were not eligible for participation. The experiment was run in German and programmed in z-Tree (Fischbacher, 2007).

The experimental setup (including design, procedures, structure, and instructions) was almost identical to the one in Achtziger et al. (2016) and consisted of two parts. In part 1, we used a non-interactive ego depletion task following Baumeister et al. (1998), which lasted 5 minutes. In the low ego depletion (LED) treatment, participants had to cross out all instances of the letter "e" in a series of paragraphs (blocks) from a physics textbook. In the high ego depletion (HED) treatment, participants had to cross out "e"s following a cognitively more demanding rule which made use of frequent inhibition and hence depleted self-control resources. Specifically, "e"s had to be crossed unless either another vowel followed the letter (e.g., cross the "e" in "diet", but not in "read") or if there was another vowel at a distance of exactly two letters, in either direction, next to the letter "e" (e.g., do not cross the "e" in "vowel") in the HED treatment. In any case, participants had to type on-screen the number of crossed-out "e"s per block, and we recorded and checked the number of blocks that each participant actually worked out.

In part 2, participants interacted in an ultimatum game (UG), which was played 12 times under perfect-stranger matching. In the one-shot UG, the proposer offers a split of a fixed monetary amount, and the responder then decides whether to accept it (in which case it is implemented as proposed) or reject it (in which case both players receive nothing). In our case, the fixed amount was 7 and the proposer offered an integer from 0 to 7 to the responder. Half of the participants were randomly selected into the role of a proposer or a responder.[2]

[2]For completeness, we note here that in 5 sessions we used, as in Achtziger et al. (2016), perfect-stranger "mixed matchings" where half of the proposers and half of the responders were randomly allocated to either the HED or LED treatment. The remaining 8 sessions employed perfect-stranger "pure matchings" between

The design differences between this study and the one in Achtziger et al. (2016) were as follows. First, in part 1 we used the original rule in Baumeister et al. (1998), while in Achtziger et al. (2016) the rule was adjusted to account for language differences and specifically diphthong frequencies in Spanish. Second, we used only a subset of the incentives treatments in Achtziger et al. (2016) (called LED-F and HED-P there). Participants in the LED treatment received payment for the depletion manipulation according to a flat-fee (F), whereas participants in the HED treatment were paid according their performance (P). Payment was such that 8 ECU (exchange rate 1 ECU = 0.25 Euros) for working on the task were paid in each of the two treatments, and HED-P participants received additional earnings as in Achtziger et al. (2016), i.e., they received 4 ECU for each correctly, and 2 ECU for an almost correctly solved block ($+/-1$ crossed-out "e"s). Feedback on the number of correctly solved blocks was given at the end of the part. This change should be inconsequential for behavior in the UG because Achtziger et al. (2016) showed that there were no differences in part 2 accruing to the payment method employed in part 1. Here, we decided to employ performance-based payment for the HED treatment because we were concerned that otherwise participants would just give up, failing to deplete their self-control resources. Third, as previous studies, Achtziger et al. (2016) included an habituation phase where all participants had to simply cross out all the "e"s in a number of paragraphs. However, the original study of Baumeister et al. (1998) reported no habituation task, and recent implementations and variants of the "e" task do not include it (e.g., Sripada et al., 2014; Alós-Ferrer et al., 2015). Hence we dropped this phase to avoid unnecessarily extending the experiment.[3] Everything else, except for the subject pool, was identical to the design and the instructions in Achtziger et al. (2016).

3 Results

We start by providing the summary statistics of the depletion manipulation and then present the effects of ego depletion on behavior in the UG, separately for proposers and responders.

proposers and responders, i.e. (HED/HED), (HED/LED), (LED/HED), and (LED/LED). Since the only information that participants received from the matched player were either the offers or the acceptances (respectively rejections), we did not observe, as expected, any matching effects, and do not report these sessions separately in the analysis.

[3]The logic behind ego depletion manipulations does not prescribe a habituation task. The reason is that any self-control task should deplete self-control, and adding a set of complex exceptions to something as simple as crossing out "e"s creates the need to inhibit an impulse.

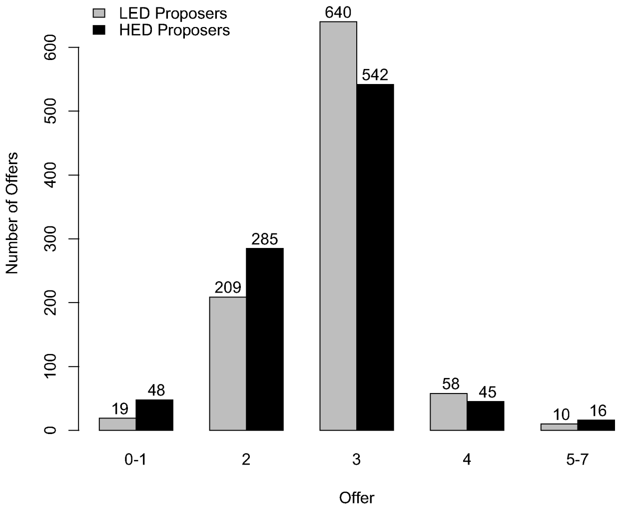


Figure 1: Histogram of proposers' offers in the ultimatum game.

3.1 Depletion Manipulation

Reflecting the differences in rule complexity, in part 1 subjects in the HED treatment worked on significantly less blocks than those in the LED treatment (HED, mean 1.564; LED, 2.673; Wilcoxon rank-sum (WRS) test, $z = 11.662$, $p = 0.000$). This difference is also confirmed by comparing the distributions of correctly solved blocks between treatments (1 point for a correct answer and 0.5 for an almost correct answer). Subjects in the HED treatment also solved significantly less blocks correctly than those in the LED treatment (HED, mean 0.183; LED, 0.403; WRS test, $z = 3.705$, $p = 0.000$). In the LED (HED) treatment, 60% (79%) of the participants solved zero blocks, 16% (11%) solved half a block, 14% (6%) solved one block, and the remaining top 10% (4%) solved 1.5 or more blocks correctly. We conclude that, as in Achtziger et al. (2016), the HED task was cognitively more demanding than the LED task.

3.2 Proposer Behavior

Depleted proposers offered *less* than non-depleted proposers at the population level (see Figure 1 for the histogram of offers). Defining offers of 3 or less as "low," 36% of the offers made by HED proposers were low, compared to only 24% of offers made by LED proposers. We present first the effect of ego depletion on offers in the one-shot interaction and then in

	Model 1	Model 2
Ego depletion (HED=1)	-0.269^{**}	-0.275^{**}
	(0.131)	(0.134)
Male		0.030
		(0.134)
Constant	3.218^{***}	3.210^{***}
	(0.085)	(0.097)
Observations (subjects)	156	156
R^2	0.027	0.027

Notes: OLS regressions with robust standard errors in parentheses. Dependent variable in all models is proposer offer. *** $p < 0.01$, ** $p < 0.05$.

Table 1: Proposer offers in the first period.

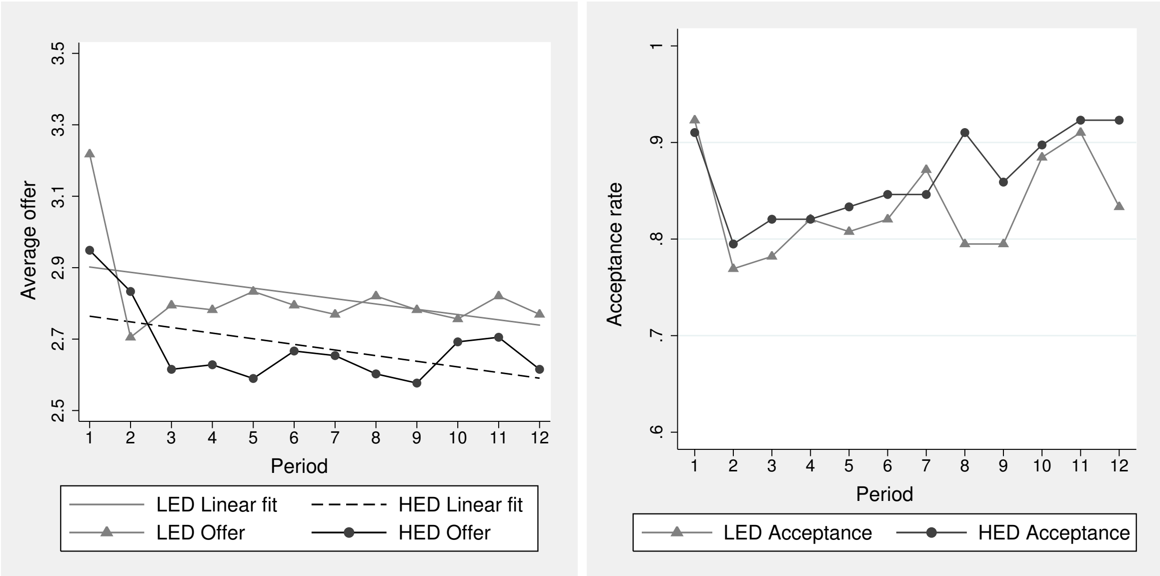
repeated interactions.

On average, depleted proposers offered 2.949 in the first period, compared to 3.218 offered by non-depleted proposers. OLS regressions on first-period offers in Table 1 confirm that HED proposers offered less, revealing a significantly negative ego-depletion coefficient in both models ($p = 0.042$ in Model 1, $p = 0.043$ in Model 2). For a comparison with Achtziger et al. (2016), where males offered significantly less than females in the first period, we included a gender dummy in Model 2 but found no evidence for gender differences on offers.

Regarding the effects of ego depletion on offers in repeated interactions, Figure 2(a) illustrates a weakly decreasing trend in average offers, with depleted proposers offering less than non-depleted proposers in 11 out of 12 periods (overall average 2.677 in HED, 2.821 in LED).

Table 2 reports panel regressions on proposer offers to explicitly account for learning effects of proposers within sessions. The estimation method is GLS with standard errors clustered by sessions and random effects at the subject level. Model 1 controls for the acceptance rate and whether the previous offer was accepted; Model 2 adds controls for period and gender. Both models confirm that HED proposers made, over time, significantly lower offers ($p = 0.021$ in Model 1 and $p = 0.034$ in Model 2). The effect of the acceptance rates of previous offers and whether the last round's offer was accepted are significantly negative in all models. That is, offers decrease as offers are accepted, confirming the learning effect first pointed out by Roth et al. (1991) and Slonim & Roth (1998).

Note that in Achtziger et al. (2016) ego depletion interacted significantly with the number of blocks worked and the number of correctly solved blocks. Here, neither these variables nor their interactions with ego depletion are significant, and their inclusion also does not improve the fit of the model. We thus do not report these robustness regressions here.



(a) Proposer offers

(b) Responder acceptance rates

Figure 2: Proposer and responder behavior over time.

In summary, proposer results confirm our hypothesis that depleted participants would be less able to control the impulse to act purely on selfish (monetary) concerns. Importantly, the effect of ego depletion on offers even persists over time. The direction of the effect is, however, the *opposite* to the one found in Achtziger et al. (2016). A case in point is also the difference in extreme forms of behavior found in this study. Labelling a proposer as "very selfish" if she made 8 or more (out of 12) offers of 3 or less, we found that 10% of the LED proposers acted very selfishly, compared to 22% of the HED proposers (against 14% LED and 1.4% HED proposers in Achtziger et al., 2016).

3.3 Responder Behavior

It is well-known in the UG literature that responder behavior generates much subtler effects than proposer behavior. Unsurprisingly, average acceptance rates are almost identical between treatments in the first period, with 0.923 for LED and 0.910 for HED responders ($\chi^2 = 0.084$, $p = 0.772$). This lack of significance is unlikely to have arisen due to a lack of statistical power. From an a priori perspective, a simple power analysis based on the χ^2-test of acceptance rates between treatments shows that, assuming a relatively small effect size of $w = 0.3$, an error probability $\alpha = 0.05$, and a power of 0.9, the responder sample size required to detect significant treatment differences is $N = 117$, whereas our sample contains $N = 156$

	Model 1	Model 2
Accept rate until $t-1$	-0.314^{**}	-0.322^{**}
	(0.153)	(0.157)
Accept at $t-1$ (Yes=1)	-0.077^{**}	-0.074^{**}
	(0.035)	(0.037)
Ego depletion (HED=1)	-0.134^{**}	-0.131^{**}
	(0.058)	(0.062)
Male		-0.019
		(0.062)
Period		-0.002
		(0.007)
Constant	3.116^{***}	3.142^{***}
	(0.127)	(0.164)
Observations	1716	1716
Number of groups (subjects)	156	156
Wald χ^2	22.95	22.83
Prob > χ^2	0.000	0.000

Notes: Random-effects linear (GLS) regressions. Standard errors (clustered by sessions) in parentheses. Dependent variable in all models is proposer offer. *** $p < 0.01$, ** $p < 0.05$.

Table 2: Proposer offers over time.

responders. A posteriori, the empirical effect size of the ego-depletion manipulation for our data (based on the same assumptions as above) is only $w = 0.049$. Given this small effect size, we would have needed a sample size of $N = 4419$ to expect significant treatment differences.

In both treatments, the per-period acceptance rate (see Figure 2(b)) increases slowly over time after an initial drop. The average acceptance rate over all periods was 0.834 for LED and 0.865 for HED responders. For the analysis of effects of ego depletion over time, Table 3 presents probit panel regressions with random effects at the subject level and standard errors clustered by sessions. Model 1 only controls for learning effects, Model 2 adds further controls. We find that large offers increase the likelihood of acceptance in all models, as expected. Acceptance becomes significantly more likely as more unfair offers are observed. However, the ego depletion coefficient misses significance ($p = 0.749$ in Models 1 and 2). As already pointed out, the effects of depletion are weaker and more subtle for responders than proposers, and we do not find a significant effect of ego depletion on acceptance decisions even after adding further controls. In contrast to Achtziger et al. (2016), adding the number of blocks worked and the number of correctly solved blocks by responders as independent variables did not change the results. The coefficient of ego depletion remains insignificant for all other specifications.

	Model 1	Model 2
Offer at t	2.293***	2.322***
	(0.244)	(0.262)
Unfair offer accumulated	0.223***	0.272***
	(0.040)	(0.082)
Ego depletion (HED=1)	0.113	0.114
	(0.355)	(0.356)
Male		0.056
		(0.294)
Period		−0.022
		(0.031)
Constant	−4.581***	−4.627***
	(0.741)	(0.804)
Observations	1872	1872
Number of groups (subjects)	156	156
Wald χ^2	139.22	139.63
Prob > χ^2	0.000	0.000

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

Table 3: Responder acceptance decisions over time.

4 Discussion

4.1 A comparison with Achtziger et al. (2015, 2016)

For proposers, initial (first-period) behavior is of particular interest because they are unaffected by, e.g., learning effects. In the present study, we found that depleted proposers made lower offers in the first period than non-depleted ones. Achtziger et al. (2016) found the exact opposite pattern of first-period behavior for depleted proposers in the UG. Regarding repeated decisions, the direction (sign) of the effect remained stable in both experiments. However, while in the present study depleted proposers offered consistently less than non-depleted proposers over time, in Achtziger et al. (2016) treatment differences disappeared within the first (four) repetitions of the game.

Results of the present experiment for proposer behavior are clearly in line with the hypothesis that monetary/egoistic concerns (take a large share for myself) are more implicit and implemented more automatically than "cold" or strategic fairness concerns, which require cognitive resources. This is also in line with Achtziger et al. (2015), in which depleted proposers made lower offers in a Dictator Game (DG). Taken together, results of the present study and of Achtziger et al. (2015) indicate that preferences for selfishness are implemented more automatically and are hence more pronounced under weakened resources of self-control. The discrepancy with Achtziger et al. (2016) is of course notable. However, the dictator game sessions in Achtziger et al. (2015) were run in Spain, on the same week and in the same laboratory as the UG sessions in Achtziger et al. (2016). Participant samples were disjoint but drawn from the same population. Results in the non-strategic setting of the DG study in Achtziger et al. (2015) imply, for the interpretation of the results in Achtziger et al. (2016), that 'fear of rejection', conceptualized as a further decision process weighing in for the proposer's decision, is even more automatic than monetary concerns for participants in Achtziger et al. (2016). Obviously, this additional effect did not play a crucial role in the study reported here.

The significant but contradictory evidence regarding the effects' direction is also evidenced by the observation that depletion triggers more extreme forms of behavior. On the population level, for instance, there were 10% more unfair offers made by LED than HED proposers in Achtziger et al. (2016), but the reversed pattern was observed in the present study, where HED proposers made 19% more unfair offers than LED ones. This phenomenon can also be illustrated by comparing the proportion of very selfish proposers (those who made 8 or more unfair offers out of 12). Whereas this proportion is comparable across LED treatments (10% in the Spanish study and 14% in the German study), in the HED treatment, there are virtually no extremely selfish proposers (1%) in Spain but a whopping 22% of such types in Germany.

Consider responder behavior. In Achtziger et al. (2016), depleted responders exhibited lower rejection rates than non-depleted ones, suggesting that monetary concerns ("take the money") were at the forefront, and not affectively-based negative reactions to perceived inequality. This effect is absent in the present study. Although there is also no significant evidence for the opposite (i.e., that rejections of unfair offers are affectively-motivated and automatically implemented), this still points at a subject-pool difference. The results of Achtziger et al. (2016) are consistent with monetary (egoistic) valuation being more automatic than negative inequity aversion or responders, but this "ordering" of processes is not found in the present study.

4.2 A natural explanation: individual heterogeneity

In summary, the results suggest that participants in the present UG study did process pure monetary concerns in a more automatic way than prosocial motives or strategic motives related to 'fear of rejection'. In Achtziger et al. (2016), depletion led to a higher reliance on 'fear of rejection' as compared to prosocial motives and monetary concerns. The simplest explanation is a difference in subject pools between Germany and Spain.

We suggest that the difference between experiments for HED participants but not for LED participants arises because it reveals differences in the dominant responses in the two populations. That is, the underlying dominant response of behavior might be driven by country effects, e.g., triggered by differences in economic conditions of students in the two respective countries. After the recent economic crisis, prospects for the current generations of Spanish students are, in contrast to those of German students, rather bleak.[4] For years, economic problems have been absolutely focal in Spanish life, while the general sentiment in Germany is one of recovery and, if anything, of the crisis being linked to "the southern countries". Considering the different (student) populations of the two samples, one might speculate that the valuation and demand for money, and possibly the underlying dominant response in economic games, have become rather different in the two countries, especially for university students. In a country where students face much gloomier economic prospects, the results in Spain (Achtziger et al., 2016) may, in retrospect, not be very surprising: depleted proposers hold an exaggerated fear of not getting the money if rejected (driving offers up) and responders just want to get away with any positive amount of money in the game (yielding lower rejection rates).

The purpose of psychological manipulations as ego depletion, cognitive load, or time pressure in games as the UG or the DG is to uncover the "default" mode of behavior, or, more specifically, to investigate whether prosociality or selfishness are implemented more automatically/impulsively. Following a dual-process logic (see, e.g., Alós-Ferrer & Strack, 2014), since automatic processes require less cognitive resources than deliberative ones, decision makers under cognitive load or time pressure should be less able to rely on deliberative processes and their behavior should shift towards responses favored by more automatic processes. However, evidence from cognitive load studies is rather mixed (Benjamin et al., 2006; Cornelissen et al., 2011; Schulz et al., 2014; Kessler & Meier, 2014). In the case of depletion, the targeted resources are specifically related to the capacity to inhibit automatic responses, but the ulti-

[4]For several years, unemployment rates for their population cohorts have been around a staggering 50%. German unemployment rates are much lower. According to Eurostat, the December-dated seasonally adjusted unemployment rates for Spain in the years of 2009 to 2013 were 19.5%, 20.2%, 22.9%, 26.1%, and 25.8%. In contrast, the corresponding figures in Germany were 7.5%, 6.6%, 5.5%, 5.3%, and 5.1%. Youth (under 25) unemployment for Spain in the period from 2009 to 2013 was 44.5%, 42.8%, 48.7%, 55.6%, and 54.3%, whereas in Germany, it was 10.1%, 8.6%, 7.8%, 8.0%, and 7.4%. Spain's rates were always among the highest in the Eurozone and Germany's almost always among the lowest.

mate dual-process logic is similar. A natural hypothesis is that results in this field are mixed because there is a large individual heterogeneity. That is, dominant/default responses might be more selfish for some decision makers, and more prosocial for others. This view is natural if one recalls that, as pointed out by Bargh (1989), automatic decision processes are often actually those which have become "automatized," i.e., for heavily context-dependent decisions what is more automatic depends on individual experience. The present study delivers clear evidence for this view. The economic differences between Spain and Germany in the recent years amount to a correlated shock, a "natural experiment" creating a difference between the population in our study and that in Achtziger et al. (2016). In principle, monetary concerns (selfishness) are implemented more automatically than prosocial ones, as evidenced by our results and those in Achtziger et al. (2015), where the decision carried no risk. But for a population permanently exposed to dire economic prospects, the need to secure the monetary payoff (by e.g. reducing the possibility of rejection) might have become more automatized.

Alternative explanations are of course possible. In general, differences in results (as well as the reasons for the observed heterogeneity in social preferences across studies) may, of course, arise from seemingly irrelevant changes in experimental methods, environment, subject pool or some other unobservable factors. Post hoc, we can of course not exclude that depletion effects are so subtle and unstable that minute differences in the manipulation task (e.g., the presence or absence of an habituation task) are the source behind the observed differences. In view of the ego-depletion literature, such explanation appears unlikely, since effects, although often small, do not appear to vary in sign across replications (Hagger et al., 2010). In our case, the two UG studies follow a very similar design and procedure, and the most salient and obvious difference between the two is the fact that they were run in different countries (German students in the present study and Spanish students in Achtziger et al., 2016).

4.3 The impact of depletion

Evidence across this study and the ones in Achtziger et al. (2015, 2016) indicates that ego depletion has a significant impact on behavior, adding to existing evidence that ego depletion is itself not a spurious phenomenon, even in strategic interactions. Results are however mixed across studies in the sense that they do not indicate a clear direction of the effect in the ultimatum game, neither for proposers nor for responders.

In spite of these inconsistent results, one should not lose sight of the fact that our ego manipulation is rather short and subtle. Just a few minutes of crossing out letters on a piece of paper seems to alter the balance between motives underlying the decisions summarized by social preferences. Beyond the explanation for the differences given above, the fact that such a mild intervention can affect decisions in strategic contexts indicates that the balance between selfish, prosocial, and other motives is a very fragile one, easily tilted by seemingly irrelevant factors. This highlights the importance of the issue of individual heterogeneity. There is clearly a large heterogeneity in subjects' responses to the manipulation, both in social preferences and strategic motive, for which current experimental studies have not accounted for. Hence, we regard individual differences as a very likely factor behind the mixed results found in the literature. Ego depletion is known to strengthen basic tendencies, but being prosocial, egoistic, or worried about rejection appears not to be unequivocally "basic" for all humans.

In line with our discussion, we expect that, as long as no theory to identify (or experimental procedure to manipulate) the underlying dominant response (motivation) of *individual* participants is developed, the effect of psychological manipulations on social preferences in strategic settings can go either way. In other words, further studies will likely remain ambiguous unless a systematic way to tackle individual differences regarding the dominant response under weakened self-control is developed.

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Appendix: Experimental Instructions

There were four sets of instructions, depending on the condition (HED, LED) and the player's role in the ultimatum game. The instructions below contain alternative paragraphs accordingly. We provide a translated version of the instruction used in the laboratory experiment. Instructions in the original language (German) are available upon request. Materials inside square brackets were not displayed in the original instructions.

Instructions

Welcome to this experiment. Please read the following instructions carefully. If you have questions, now or during the experiment, please raise your hand; an experimenter will come to you and answer your question privately. From now on, please refrain from communicating with any of the other participants in the experiment.

The experiment consists of two parts. The decision-making part of the experiment consists of 12 rounds. In each round, you will interact with a different participant, that is you will never interact with someone with whom you have already interacted in a previous round.

There are two different types of players, A and B. Player types are randomly determined and remain fixed for the experiment.

[Proposer:] You have been selected to be a type "A". You will be a type "A" player in all rounds and you will only interact with type "B" players. In each round, you will interact with a (different) player of type "B". In each round there are seven (7) experimental currency units (ECU) available. You are going to decide, together with a player of type "B", on how to split these 7 ECU. As a player of type "A", you have to make an offer to the type "B" player with whom you interact in the round on how to split the 7 ECU. To put it another way, your task is to propose how many ECU (an integer between 0 and 7) you want to keep for yourself and how many ECU (the remainder) you offer to the type "B" player. After you have submitted your offer, the type "B" player with whom you have been matched in the round will decide whether to accept or reject your proposed offer. If player B accepts your proposed split, the proposed split will be allocated as it was proposed by you. If player B rejects your proposed split, then both you and the other player receive a payoff of 0 ECU (zero) in the round.

[Responder:] You have been selected to be a type "B". You will be a type "B" player in all rounds and you will only interact with type "A" players. In each round, you will interact

with a (different) player of type “A”. In each round there are seven (7) experimental currency units (ECU) available. You are going to decide, together with a player of type “A”, on how split these 7 ECU. The player of type “A” with whom you interact in the round will propose a split of the 7 ECU. That is, he will propose how many ECU (an integer between 0 and 7) he wants to keep for himself and how much he will offer to you (the remainder). After the type “A” player has proposed a split of the 7 ECU, you have to decide whether to accept or reject the proposed offer. If you accept the offer, then the proposed split is implemented exactly as proposed. If you reject the offer, then both you and the other player receive a payoff of 0 ECU (zero) in the round.

[All:] After all decisions have been taken in all parts of the experiment, the ECU payoffs you accumulated during the experiment will be summed up. For the final payment in EURO, you will receive exactly 25 EURO Cents for each ECU earned. You will be paid in cash and in private, and no other participant will know how much money you earned in the experiment.

[LED condition:] Before you start with the decision-making part of the experiment, you will be asked to perform the following task: you have to cross out each letter “e” in each text block in the corresponding sheet on your desk. You have 5 minutes to work on the task (time will be given by the experimenter). Please write the total number of “e”s you found in a block into the blank field provided below the block. It does not matter whether you manage to work on all or only some of the text blocks. The experimenter will tell you to stop working on the task after 5 minutes. You will then be asked to enter the number of “e”s found for each block into the computer. After that, we will collect the sheet and check that you indeed crossed out the “e”s in all text blocks for which you entered a number into the computer. You will receive a payoff of 8 ECU for working on the task, which will be added to your total earnings in the experiment.

[HED condition:] Before you start with the decision-making part of the experiment, you will be asked to perform the following task: in each text block in the corresponding sheet on your desk, you have to cross out each letter “e” but only if no other vowel followed the letter in the same word (e.g. do not cross out the letter “e” in the word “read”) and only if there was no other vowel at a distance of exactly two letters next to the letter “e” (e.g. do not cross out the letter “e” in the word “vowel” but cross it out in the word “diet”). You have 5 minutes to work on the task (time will be given by the experimenter). Please write the total number of “e”s you found in a block into the blank field provided below the block. The experimenter will tell you to stop working on the task after 5 minutes. You will then be

asked to enter the number of "e"s found for each block into the computer. After that, we will collect the sheet and check that you indeed crossed out the "e"s in all text blocks for which you entered a number into the computer. You will receive a payoff of 8 ECU for working on the task, which will be added to your total earnings in the experiment. In addition, you will earn a payoff of 4 ECU, for the correct number of crossed out "e"s in each block, and a payoff of 2 ECU for an almost-correct number of crossed out "e"s in each block (this is if the entered number is only one higher or lower than the correct number).

[All:] After this task is finished, the decision-making part of the experiment will begin. If you have a question, please raise your hand and an experimenter will come to you to answer your question.