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EXPLORING THE ROLE OF DELIBERATION TIME IN NON-SELFISH BEHAVIOUR: THE DOUBLE RESPONSE METHOD

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Exploring the role of deliberation time in non-selfish behaviour: the Double Response method

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Abstract

In this paper we introduce an innovative research method called Double Response under which subjects are incentivised to provide a quick, intuitive choice and additionally one based on longer deliberation. We apply the method to a series of simple decision tasks aimed at eliciting subjects' social preferences (as in Charness and Rabin, 2002). Our method appears to successfully induce very quick responses. We find that although only 9.9% of initial choices are changed after deliberation, 79.4% of subjects change at least one of their choices. Comparing contents of the decisions we observe that time pressure leads to more negative attitude towards another individual's earnings when they are higher than those of the decision maker. In other words, with deliberation decisions are typically updated towards lesser aversion to disadvantageous inequality ("envy").

Keywords:

response time, design of laboratory experiments, other-regarding preference, inequality aversion

JEL:

C9

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1. Introduction

Experimental economics has produced a large body of empirical results that violate the standard assumption of rationality and selfishness in simple interpersonal interactions. However, developing tractable models that could organize many findings has only been pursued with mixed success. If motives behind specific deviations from the benchmark of *homo oeconomicus* are to be understood, richer data sets need to be analyzed, beyond those reporting subjects' final decisions.

As aptly argued by Spiliopoulos and Ortmann (2014), *response times* (RT) may come handy in this respect. For example, if seemingly selfless cooperation is merely an error, such behavior should be found to be associated with insufficient deliberation time.

More generally, there are several reasons for which it is important to understand the role of time in decision making. From a theoretical viewpoint, such data can inform procedural models of decision making like the dual system theories (Kahneman, 2011), juxtaposing quick, intuitive, affective vs. slow, conscious and deliberate modes of thinking. An alternative view is that decisions are generated by a single, random comparison process ("sequential sampling models", SSM, Gold and Shadlen, 2007). It is assumed that evidence promoting one or the other option is continuously accumulated over time until the total net evidence exceeds a certain threshold (option A appears clearly better or worse than option B). Response time (RT) data is obviously indispensable to verify or calibrate such models. Specifically in the study of other-regarding preference, *the Social Heuristics Hypothesis* (Rand et al., 2014) has fuelled much of recent research (and spurred substantial controversy). It proposes that cooperative behaviour is often favoured in the field, due to the repeated nature of most human interactions. The arising social norm is then internalized, shaping automatic disposition towards cooperative behaviour. Again, testing the hypothesis requires RT data – it predicts that more cooperation will be seen under time pressure.

From a practical viewpoint, it is important that majority of human decisions appear to be taken by the intuitive system (Ortmann, 2008). In other words, we are wired to make quick decisions, thus explicitly investigating time pressure may strengthen external validity of experiments. From a policy viewpoint, possible inconsistency between hasty and more cautious decisions must be well understood and accounted for in legal regulations. To name one example, customers are often given the right to withdraw from ill-advised purchases.

Yet, until now, RT has only rarely been thoroughly analyzed by economists, partly because of methodological challenges that arise, which will be addressed shortly. In this paper we propose a novel way to analyze the role of RT in decision making that seeks to overcome these weaknesses: we incentivize subjects to report *both* their quick, intuitive choice and slower, deliberate decision.

We apply the method (which we call Double Response or DR for short) to the battery of simple two-person distributive tasks proposed by Charness and Rabin (2002, henceforth CR). We observe that under time pressure subjects tend to worsen the situation of other players who had higher earnings (unfavorable inequality aversion).

The remainder of the paper is organized as follows. In Section 2 we briefly review relevant literature focusing on methods used to identify a link between RT and decision content in experimental economics and resulting findings for other-regarding preference. In Section 3 we describe the DR method and our specific application in detail. The findings are reported in Section 4 and Section 5 contains concluding remarks.

2. Literature review

Experimental economists have addressed the relationship between RT and decision content in economic experiments has been using three major approaches. The first involves simple correlations, i.e. it seeks to establish whether one type of decision (e.g. altruistic) is typically made faster than another (e.g. selfish) where no explicit time pressure is imposed. For example, Branas-Garza et al. (2007) found minimum acceptable offers in the Ultimatum Game to be positively correlated with response time. Also Mussel et al. (2013) observed rejections to be slower in their large, heterogeneous sample.

While the correlational approach is simple and can be implemented at miniscule marginal cost in any computerized experiment, coming up with any specific interpretation of a relationship between decision content and RT is problematic. Focusing on findings such as those mentioned above, what can we conclude from observing a single Ultimatum Game decision in each subject and finding that, for any (low) level of offers, acceptances are, on average, faster than rejections? At least four interpretations can be given

a) fast-thinking subjects were also, on balance, those more willing to accept even a low offer,
b) those subjects who preferred acceptance, typically preferred it strongly (and so could decide quickly), while those who preferred rejection where closer to indifference (so it took them more time to decide),
c) rejection reflected true preference for most subjects, so acceptance could typically occur only after overly short deliberation (when the few arguments favouring it randomly happened to appear first in the decision maker's mind), whereas (more powerful and numerous) arguments for rejection almost always prevailed when RT was longer,
d) some subjects felt compelled to make a quicker decision and *because* of that entered a decision mode that made them more prone to accept a low offer.

Note that these explanations lead to very different theoretical inferences and practical conclusions. Indeed, d) is in line with (some) dual-self models, b) and c) – with sequential sampling/drift-diffusion models, while a) with none of them. b) and d) suggest that environments with exogenous time pressure will make people accept low offers (but for different reasons), a) suggests that they might only lead to self-selection of acceptors, while according to c) more or less rejections taking may result, depending which option is more attractive in a specific UG-like game.

Admittedly, some (but not all) of these interpretational difficulties may be avoided by observing sufficiently many choices in similar games for each individual. For example, Piovesan and Wengström (2009) showed that subjects with relatively egoistic preferences made their decisions faster than those with more altruistic preferences.

The problem of interpreting results based mostly on correlations is exemplified by the discussion of the findings by Rand and colleagues on RT in public good games. In particular, as Rand et al. (2012) observed (and Lotito et al., 2013 replicated), quicker decisions involved more cooperation than slower ones (in line with the Social Heuristic Hypothesis). However, when Recalde et al. (2014) modified the game such that the equilibrium was located above the midpoint of the strategy space, the correlation between giving an RT was reversed, in line with the explanation that time pressure merely results in a larger number of errors, be they pro- or antisocial, see also Krajbich et al (2014).

It seems thus more promising to apply the second major approach: random assignment of subjects to conditions of time limit vs. no time limit (or, a cleaner comparison, strict time limit vs generous time limit). A treatment effect observed in such a framework (if any) will now be subject to less confound than raw correlation between RT and decision content in the approach discussed before. For example, if subjects are more willing to accept low offers in the Ultimatum Game in the time pressure treatment, interpretation a) sketched before is clearly excluded. Still, such a design is not without problems either. Most importantly, like with the previous approach, we do not establish within-subject comparisons, so distinguishing between dual-self models and systematic difference in utility within drift-diffusion framework may still be difficult. As mentioned before, quick decisions may differ from slow decisions in that they are simply more erratic, not driven by the affective "System 1" showing different "preference".

In contrast to previously cited work using correlational approach, Cappelletti et al. (2011) reported that time pressure in ultimatum game led to more rejected offers. Analogous results were observed by Sutter et al. (2003), except that this significant difference between conditions was observed only in the first period, presumably because in subsequent rounds participants made deliberate decisions – with predetermined choices in relations to specific offers. These findings appear to be in line with the claim that rejections in UG are driven by (negative) emotions (Sanfey et al., 2003), which are relatively influential when there is no time for deliberation.

One practical difficulty with implementing the time pressure treatment is that we do not know exactly how strict it should be for any particular type of decision task. The one which is about right for median participant may force the slow ones to basically make a random decision and put no pressure whatsoever on the fast ones.

Some studies therefore, conversely, contrasted the control treatment with one in which a decision *delay* was forced upon subjects. Such a manipulation (which presumably reduced the role of the affective system) was however not found to reduce (self-reported) negative emotions in (Bosman, Sonnemans & Zeelenberg, 2001). On the other hand, Grimm and Mengel (2011) found that more low offers were accepted with a 10-minute delay. Similar results were reported by Neo, Yu, Weber & Gonzalez (2013).

Clearly, such a manipulation will have little impact on individuals who were willing to spend sufficient time on deliberation in the control treatment anyway. It is also likely that many subjects make a decision immediately (and simply hold it in their memory) also in the delay treatment. Finally, subjects may also be annoyed by unnecessary delays and e.g. starting behaving more erratically.

The third approach that seeks to avoid the latter problems was followed by Kocher and Sutter (2006) and Rieskamp and Hoffrage (2008) among others. It involves introducing an additional time-dependent payment, i.e. explicit opportunity cost of time. Under this scheme, it is hoped that slower individuals will simply take a bit more time (rather than pick randomly). Again, it is not easy to design the specific scheme: if penalty for additional thinking time is too low, the method makes no difference, if it is too high, we will again only get random (but very fast) decisions from slow (yet rational and self-aware) and not-so-slow but perhaps underconfident and risk-averse subjects. Interestingly, Kocher and Sutter found that time-based penalties led to faster decisions yet not inferior decisions. In any case, again, we only have between-subject comparisons.

It is therefore tempting to apply what Spiliopoulos and Ortmann (2014) call "multiple RT" – elicitation of the decision at different points in time, allowing subjects to reveal how they change their mind, thereby providing rich information on their cognitive processes. This approach was pursued by Agranov et al. (2012), but (like in the case of time-dependent payment methods described previously) as of now we are not aware of an application to the study of other-regarding preference.

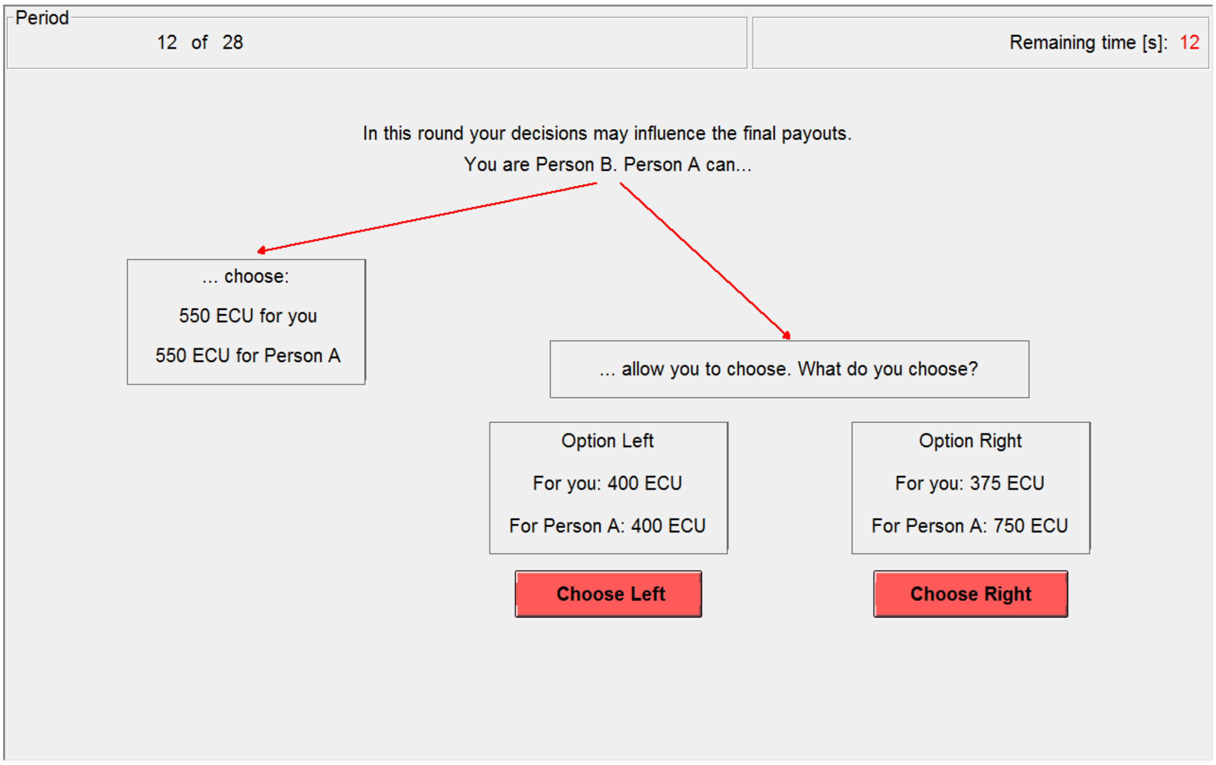
3. Design and procedures

3.1. Decision tasks

The design was based on CR and involved 28 rounds of simple two-person games. In each of them participants were randomly matched in pairs of Person A and Person B.[1] Each subject's role could change across rounds; they played each game in one role only. There were two types of games: dictator games and games with conditional decisions. In dictator games only Person B would make a decision that could have an impact on the outcomes (while at the same time Person A was asked to make a hypothetical choice, having the same options as Person B). In games with conditional decisions, both players' actions would matter: A could choose one of the options determining the final payoffs for her and for Person B (we call it Option Out; in this situation B's decision was irrelevant for payoffs) or she could let B choose. He then had two options for final allocations for both to choose from. When B decided in this game he did not know what A actually chose. Therefore B made a conditional decision ("strategy method") that was relevant only if A actually let him decide in particular round. In other words, Person B should have assumed that A would actually do so – otherwise his decision was irrelevant.

In every case, subjects would see all the available options and resulting payoffs – their own and the other subject's. Therefore, Person B could take into consideration payoffs that Person A could provide for both participants by choosing Option Out.

Fig. 1. Decision screen: a game with conditional decisions



[1] Henceforth we will refer to Person A as "she" and to Person B as "he".

Figure 1 shows a typical decision screen (see Appendix A for a screenshot of a typical dictator game). Person B choosing one of the options should have assumed that his decision was relevant, i.e. that A had forgone the option of 550 Experimental Currency Units (ECU) for each, perhaps hoping for 750 for herself (but leaving less to B). This could be perceived as an unkind act, so that Person B may be disinclined to help A by choosing Option Right, even though he can do so at a low cost to himself.

Table 1. Results from dictator games and games with conditional decision

Dictator games		**Hypothetical (As)**		**Real (Bs)**	
		Initially Left	Finally Left	Initially Left	Finally Left
1	B chooses between (750,400) and (400,400)	66%	69%	74%	75%
[2]	B chooses between (400,400) and (750,375)	69%	60%	79%	69%
[3]	B chooses between (800,800) and (1500,750)	68%	60%	75%	69%
4	B chooses between (800,200) and (0,0)	96%	96%	99%	97%
5	B chooses between (300,600) and (700,500)	72%	78%	72%	71%
6	B chooses between (200,700) and (600,600)	51%	56%	59%	57%
7	B chooses between (0,800) and (400,400)	75%	71%	84%	84%

Games with conditional decision: **Payoffs for B identical**		**A initially Out**	**A finally Out**	**B initially Left**	**B finally Left**
8	A chooses (750,0) or lets B choose between (750,400) and (400,400)	50%	43%	60%	66%
9	A chooses (550,550) or lets B choose between (750,400) and (400,400)	63%	57%	72%	71%
10	A chooses (100,1000) or lets B choose between (125,125) and (75,125)	56%	50%	88%	84%
11	A chooses (450,900) or lets B choose between (400,400) and (200,400)	90%	90%	91%	88%

Games with conditional decision: **sacrifice of B helps A**		**A initially Out**	**A finally Out**	**B initially Left**	**B finally Left**
12	A chooses (725,0) or lets B choose between (400,400) and (750,375)	68%	74%	71%	68%
13	A chooses (800,0) or lets B choose between (400,400) and (750,375)	68%	71%	79%	74%
14	A chooses (750,0) or lets B choose between (400,400) and (750,375)	65%	68%	72%	62%
15	A chooses (750,100) or lets B choose between (300,600) and (700,500)	82%	79%	65%	59%
[16]	A chooses (450,0) or lets B choose between (350,450) and (450,350)	54%	53%	78%	81%
[17]	A chooses (900,0) or lets B choose between (700,900) and (900,700)	72%	63%	90%	85%
18	A chooses (700,200) or lets B choose between (200,700) and (600,600)	82%	84%	41%	47%
19	A chooses (800,0) or lets B choose between (0,800) and (400,400)	79%	78%	65%	72%
20	A chooses (550,550) or lets B choose between (400,400) and (750,375)	87%	90%	78%	74%
[21]	A chooses (0,800) or lets B choose between (0,800) and (400,400)	0%	3%	68%	78%
[22]	A chooses (0,400) or lets B choose between (0,400) and (200,200)	0%	0%	81%	82%

Games with conditional decision: **sacrifice of B hurts A**		**A initially Out**	**A finally Out**	**B initially Left**	**B finally Left**
23	A chooses (375,1000) or lets B choose between (400,400) and (350,350)	35%	37%	94%	91%
24	A chooses (375,1000) or lets B choose between (400,400) and (250,350)	49%	53%	96%	96%
25	A chooses (500,500) or lets B choose between (800,200) and (0,0)	72%	57%	88%	90%
26	A chooses (750,750) or lets B choose between (800,200) and (0,0)	75%	69%	90%	85%
[27]	A chooses (400,1200) or lets B choose between (400,200) and (0,0)	85%	85%	88%	87%
[28]	A chooses (200,600) or lets B choose between (200,100) and (0,0)	84%	87%	91%	90%

The first number in parentheses always represents the payoff for A, the second – for B. "Out" means that A chooses unilaterally, rather than let B choose, this option was always marked as "left" for As. Columns with "initial" choice (A out initially and B initially left) present the percentage of participants that decided to choose Option Left at first. Final choice (A out finally and B finally left) means the percentage of players who initially chose Right and later switched to Left or initially chose Left and stuck to it. Pair of games identical up to a multiplication (e.g. 27 and 28) are marked with brackets.

The parameters of all games are presented in Table 1 (the results shown in the four rightmost columns will be discussed later). In our experiment we used two-person games of CR. Additionally, games 3, 17, 22 and 28 were introduced by multiplying all payoffs of games 2, 16, 21 and 27 (the first two by 2 and the other two by ½) to evaluate consistency of the choices. Each subject participated in every game only once, taking the role of Person A in some of them and Person B in others. During the experiment each specific pair of payoffs, e.g. (750,400) in Game 1, appeared for half of the participants on the left side of the screen and for the other half on the right (to control for the sheer effect of location on the screen, which was expected to show up especially in the very fast decisions). However, to simplify presentation of the results, we assigned fixed names of each pair of options (e.g. the payoff (750,400) in Game 1 is always called "left" in this paper). Specifically, in each game label "left" is assigned to B's option that he would choose assuming that he wanted to maximize his payoff and in the case that both of his option gave him the same – that he wanted to maximize A's payoff (lexicographic preferences). In four sessions participants first made their decisions in seven dictator games and later in 21 games with conditional decision, in three remaining sessions this order was reversed. Within each of these types of games there were six random orders of rounds within each block.

To provide an easier overview of the decisions faced by the subjects, the first part of Table 1 shows dictator games, followed by games with conditional decisions divided according to the effect that B's decision had on A: in some games B could choose between options that would give him the same payoff (but, of course, one of them was better for A than the other), in the next group of games B could increase the payoff of A by sacrificing his own outcome, and in the last group, on the contrary – he could reduce A's payoff in this way.

3.2. The Double Response method

The fundamental modification comparing to CR was the introduction of time pressure and specifically the use of the Double Response (DR) method. Each round lasted 60 seconds, no matter what and when decisions were made. After this time the next round automatically began. Participants were asked to make their initial choice in each round as soon as possible (by clicking on the Option Left or Option Right button) and then they were able to change their decision at most once at any moment until the end of the round. This method allowed us to observe both choices made under severe time pressure and very mild time pressure (within-subject design) for each participant.

The actual payoffs were determined by a randomly selected round and randomly selected second of this round. For example, let us consider a participant who was a Person B in round 3. In the 10th second of this round he chose Option Left. After reading the description of the two options once again, he decided that Option Right was more profitable than he originally thought. Therefore he finally changed his choices in the 33rd second of the round. If at the end of the experiment computer randomly chooses round 3 to determine the payoffs and one of the first nine seconds (when no decision was made yet) – the computer will randomly choose Option Left or Option Right. If a number from the [10,32] interval is selected, then Person A and Person B will obtain the payoffs prescribed in Option Left. If a number from the [33,60] interval is picked – Option Right will determine their payoffs. More examples can be found in Appendix A.

Therefore participants were motivated to make their decisions in accordance with their real preferences in each round, picking initial decision as quickly as they reasonably could and revising it when they realized it was sub-optimal. Because subjects were free to choose the timing of their decisions, the problem of heterogeneity of response speeds pertinent in standard between-subject designs was largely removed.

3.3. Sample and procedures

In total, 136 individuals took part in our experiment: 71 women and 65 men. 56 of them were students of economics, 54 studied other disciplines and 26 people were not students. The sessions of experiment were conducted at Laboratory of Experimental Economics on Faculty of Economics at University of Warsaw. Participants were recruited using ORSEE (Greiner, 2004). The experiment was computerized using z-Tree software (Fischbacher, 2007). All of the instructions (see Appendix A) were displayed on the screen after the experiment was started. The experiment proper was preceded by two examples, four control questions and four trial rounds. At the end of the sessions, subjects completed Frederick's (2005) Cognitive Reflection Test (CRT) aimed at identifying individuals who tend to mindlessly accept intuitive (but wrong) answers (see Appendix A). They also filled in a short post-experiment questionnaire. Sessions lasted about 60 minutes.

Each participant received show-up fee of 5 PLN (ca 1.20 euro) in cash and four randomly selected individuals (two pairs) in each session won the payoffs in the form of vouchers, the value of which was determined by their decisions as specified before using the exchange rate of 1 ECU=0.40 PLN. Average voucher payment of those selected to receive one was 217 PLN, resulting in an average total payoff for all participants of ca. 50 PLN.

4. Results

4.1 Response times: initial and revised choices

The research design was based on the assumption that subjects will actually make an initial decision under time pressure and that they will have enough time to change it. The effectiveness of this manipulation can be observed by looking at the RT data. Table 2 presents the average time in seconds of initial and revised decisions broken by game type and Figure 2 shows their distributions (see also Table B2 in Appendix B for median times of each game). It should be noted that the manipulation was effective. Vast majority of participants made initial choices very quickly. In dictator games half of participants (A and B) made their choices in the first three seconds of a round and 90% of them in the first seven seconds. Similarly in games with conditional decisions half of subjects needed up to 4 seconds to make a decision and 90% of participants up to 11 seconds. On the 3 808 decisions only in one case a participant did not choose any of the options.

Table 2. Response time: initial decisions and revised decisions

		Dictator games		Games with conditional decisions	
	Statistics	Initial decision (s)	Revised decision (s) [2]	Initial decision (s)	Revised decision (s)
A	Mean	3.7	16.9	5.6	18.4
	Standard deviation	3.4	14.1	5.2	15.4
	Median	3.0	11.0	4.0	14.0
	Number of decisions	476	36	1428	178
B	Mean	3.4	21.9	5.5	20.9
	Standard deviation	3.2	18.5	5.3	14.9
	Median	2.0	15.0	4.0	18.5
	Number of decisions	476	37	1427	124

Overall, 9.9% of initial decisions have been changed. As can be easily seen in Table B2, harder decisions were more often changed: there were less changes in games in which subjects were more unanimous (see table notes for a definition of unanimity). Table 3 presents the distribution of total number of changes made by a participant. It shows that over all of the rounds most of the subjects changed their decision once or a few times. One of the participants changed her choice 23 times. It is interesting to note that subjects who made quicker decisions also tended to change their decisions less often (r_S=-0.08, p<0.001).

Table 3. Distribution of the number of decision changes.

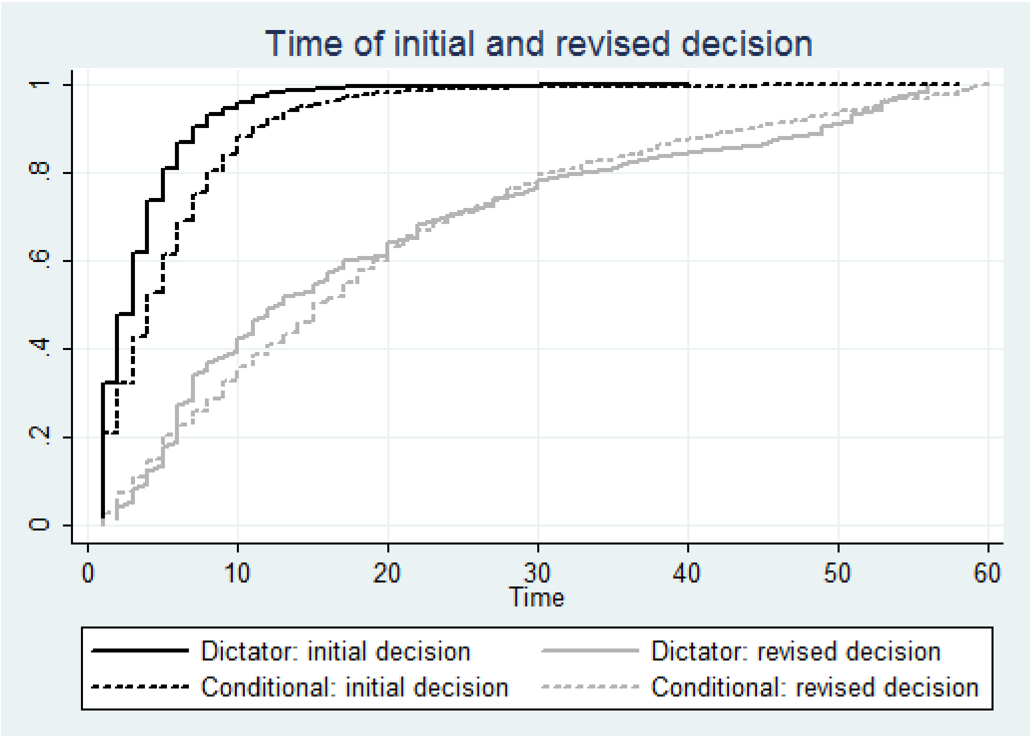
Number of changes	Number of subjects	Percent of subjects
0	28	20.6
1	34	25.0
2	19	14.0
3	18	13.2
4	12	8.8
5	9	6.6
6	3	2.2
7	2	1.5
8	2	1.5
9	3	2.2
10	2	1.5
12	1	0.7
13	2	1.5
23	1	0.7

The revised decisions required considerably more deliberation: as shown in Table 2, half of players B opting to change their choice in dictator games needed 15 seconds or more since the onset of the round

[2] Time of revised decision is in the range [1, 60], e.g. time to change decision equal to eight seconds means that a subject has changed her decision in the 8th second during the round (and not eight seconds after initial decision).

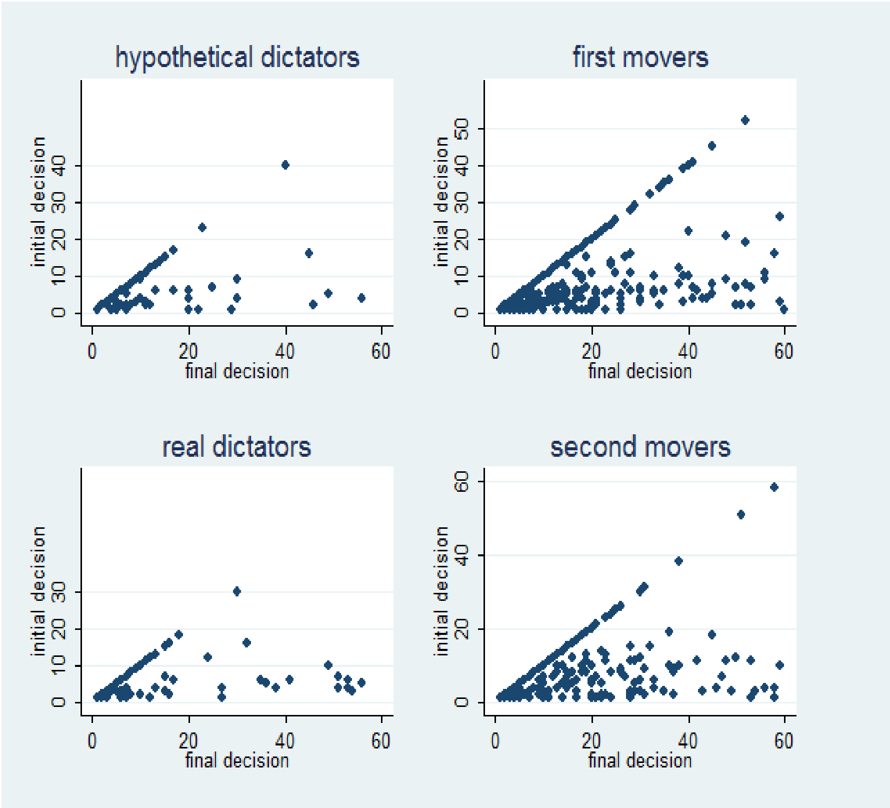
(players A: 11 seconds, *ns*), and in games with conditional decision – 18.5 seconds (players A: 14 seconds, *ns*). The entire distribution is depicted in Fig. 2, showing that decision changes would happen throughout the whole round, albeit with diminishing frequency (the cumulative distribution functions depicted in blue are concave). The fact that participants rarely changed their initial choices at the end of the round may suggest that they had sufficient amount of time to decide. More importantly, 98% of subjects said in the post-experimental survey that 60 seconds was enough to make a deliberate decision.

Fig. 2. Time of initial and revised decisions



The relationship between times of initial and final choices is shown in Figure 3. The points located on the diagonal correspond to cases in which a participant has stuck to her initial decision. We observe that participants who made their initial choices very quickly were also often quick to change it (r=0.31; *p*=0.001).

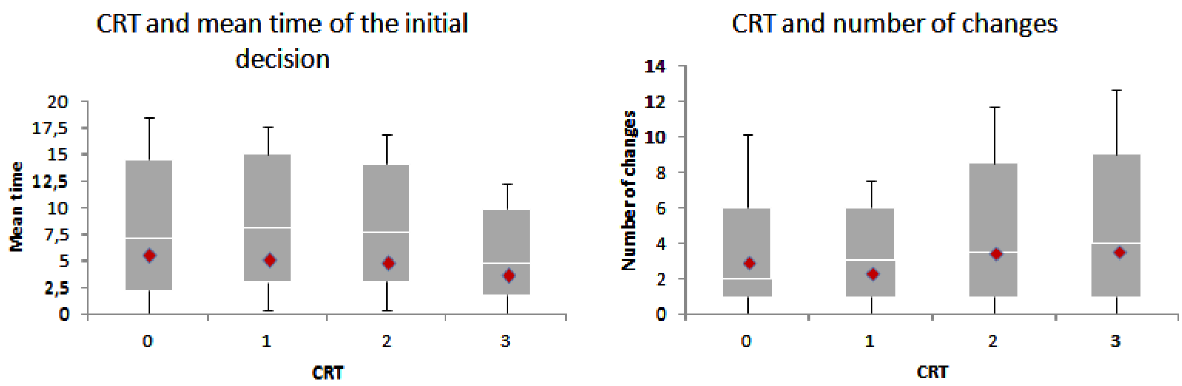
Fig. 3. Relationship between time of initial and final decision divided into types of game and players



As mentioned before, at the end of the experiment participants solved the Cognitive Reflection Test. Our aim was to verify if subjects willing to embrace the intuitive (yet wrong) answers in the CRT were also more likely to stick to their initial, quick decisions.

We have calculated correlation of CRT results (from 0 – all answers were wrong, to 3 – all were correct) with mean time of the initial decision and the number of changes each subject made (Fig. 4). It turns out that subjects with higher CRT score took less time to make initial decision, which may be associated with higher cognitive abilities (r_S=-0.17, p<0.001 in rho-Spearman correlation). At the same time, they were more willing to change it (r_S=0.12, p<0.001), seemingly because they recognized that they had made an inferior decision. What is more, results obtained from CRT are positively correlated with the number of decision changes, which may suggest that intuitive choices are relatively often incorrect. We have also observed a negative correlation between mean time of initial decision and the number of changes (r_S=-0.08, p<0.001).

Fig. 4. Mean time of initial decision and number of changes depending on CRT score



Gray boxes stand for 25th and 75th percentile, white line – median, red diamond – mean, whiskers – standard deviation.

4.2 Decisions

Before proceeding with analysis of preference, it may be worthwhile to look at the consistency of choices in the pairs of games with identical payoff ratios, i.e. games 2-3, 16-17, 21-22 and 27-28. Inconsistency would show up if e.g. Person B chose (400,400) in game 2 and (1500,750) in Game 3 or (750,375) in Game 2 and (800,800) in Game 3. Such choices would be difficult to reconcile with any reasonable preferences. As can be seen in Table 4, majority behaved consistently, although the actual numbers strongly depended on the question. Interestingly, final choices were not necessarily more consistent than initial ones.

Table 4. Choices determining the consistency of decisions

	A		B	
	initial	final	initial	final
2 – 3	60%	49%	69%	59%
16 – 17	61%	59%	80%	74%
21 – 22	100%	97%	63%	78%
27 – 28	78%	78%	82%	70%

4.2.1. Initial and final choices

Figures displayed in Table 1 show that the differences in the distribution of initial and final choices were generally very small. This is hardly surprising of course, given that only a small fraction of all choices was changed at all, as mentioned before. In dictator games a significant difference was only observed in Game 2 both in A's and B's decisions: after deliberation some participants decided that they could let the other person earn more than they do. As a matter of fact, of the 13 subjects who switched in Game 2, *all* switched from the 'selfish' option to 'charitable' option ($p<0.001$ in the test for equal frequency of the two possible changes). The same tendency was observed in game 14, while greed could motivate switching in games 19 and 21 (the remaining ones showing no significant difference between distributions of initial and final choices).

4.2.2. Choices in view of models of social preference

Analysis of B's behavior indicates that in most games he chose the option that gave him higher payoff or the same but higher for A (indicated in Table 1 as "Left"). Overall, 78% of initial and 77% of final decisions followed this pattern. These numbers were relatively small when Person B could at a low cost help A, who would otherwise end up with a meager payoff (games 6, 15, 18). The average number of selfish choices in these three games, both in Person B's initial and final decisions, was 55%.

Table 5 presents the distribution of decisions in relation to models of social preference. The choice is said to be compatible with *self-interest* whenever own payoff is maximized. *Competitive* preference requires that the option that gives not less money to self and less money to the partner than the other option be preferred. In the *social welfare* model the option that gives not less money to self and *more* money to the partner than the other option must be preferred. In *difference aversion* models other's payoff is treated as in the competitive model if it is higher than own payoff and as in the social welfare model if it is lower. While compatibility of B's choices with the specific models can be determined directly, for A's choices in games with conditional decision we assume (as CR do) that she correctly predicts B's actual behavior and resulting expected payoffs enter her utility function just as would actual payoffs do. Consistency of choices in particular games with the four models is detailed in Table B1 in Appendix B.

Table 5. Percentage of choices compatible with models of social preference

	Dictator games				Games with conditional decision			
	Self-interest	Competitive	Difference aversion	Social-welfare	Self-interest	Competitive	Difference aversion	Social-welfare
A: initial choices	75.8%	67.0%	81.5%	94.5%	71.9%	73.6%	90.5%	96.2%
A: final choices	73.7%	64.5%	78.8%	95.0%	72.6%	74.0%	90.2%	96.1%
B: initial choices	81.1%	70.8%	83.0%	96.0%	82.6%	77.5%	82.0%	84.2%
B: final choices	78.2%	67.9%	80.5%	96.0%	81.9%	76.5%	80.4%	84.2%

It turns out that the social welfare model can rationalize the highest fraction of choices, both initial and final ones. By contrast, the competitive model performs poorly, especially for final choices. Overall, A's choices are less often consistent with any model, perhaps because they are more erratic when they have no consequence (dictator games) and because of the strong assumption of correct predictions of B's behavior (games with conditional decisions).

4.2.3. Estimating parameters of a general model of social preference

To assess the relative importance of various motives, we estimate a simple model of social preference in two-person games (CR). It is based on the assumption that the player can assign a non-zero weight to the payoff of the other player and this weight may wary depending on whether the payoff is higher or lower than the payoff he receives himself. Additionally, in dynamic games this weight may depend on whether the other player acted against him before. Letting π_A and π_B be Person A's and B's monetary payoffs, Person B's utility[3] is assumed to be given by:

$$U_B(\pi_A, \pi_B) = (\rho * r + \sigma * s + \theta * q) * \pi_A + (1 - \rho * r - \sigma * s - \theta * q) * \pi_B \quad [1]$$

Where
$r = 1$ if $\pi_B > \pi_A$, and $r = 0$ otherwise
$s = 1$ if $\pi_B < \pi_A$, and $s = 0$ otherwise
$q = -1$ if A has misbehaved, and $q = 0$ otherwise

[3] We only consider B's behavior here. Modeling of first movers' choices would require additional specific assumptions about their beliefs concerning other's behavior.

As in CR, A is said to have misbehaved if she missed the opportunity to implement the welfare-optimal option i.e. the one that maximized the sum of payoffs (presumably because she hoped to receive more for herself at the expense of Person B). Parameter ρ can then be readily interpreted as a measure of advantageous inequality aversion, (-σ) as a measure of disadvantageous inequality aversion and θ as a measure of (negative) reciprocity.

Competitive preferences can be described by the assumption that $\sigma \leq \rho \leq 0$, meaning that Person B would like to receive a relatively high payoff compared to the payoff of the other player. Therefore, he attempts to reduce her payoff, especially when it is higher than his own. Inequality aversion corresponds to $\sigma < 0 < \rho < 1$ - this means that Person B is willing to reduce A's payoff when it is higher than his own and increase it when it is lower. Assumption: $0 < \sigma \leq \rho \leq 1$ marks an altruistic or efficiency-seeking approach, in which other's payoff has a positive weight, especially when she is behind. Reciprocity obtains in this model when $\theta > 0$.

When a player has two options to choose from, which we can denote as Option Left (L) and Option Right (R), the differences in the utilities between these two options (which can be readily used to estimate a logistic regression) can be written in the following form:

$$U_B\ (\pi_A^L, \pi_B^L) - U_B\ (\pi_A^R, \pi_B^R) = \text{diff\_own\_payoff} \ + \ \rho * \text{diff\_other\_behind} + \sigma * \text{diff\_other\_ahead} + \ \theta * \text{diff\_reciprocity}, \qquad [2]$$

where

diff_own_payoff, equal to $\pi_B^L - \pi_B^R$, measures the difference in own payoffs

diff_other_behind, equal to $r_L(\pi_A^L - \pi_B^L) - r_R(\pi_A^R - \pi_B^R)$, corresponds to a relative improvement of A's situation in Option Left, if A has a lower payoff than B

diff_other_ahead, equal to $s_L(\pi_A^L - \pi_B^L) - s_R(\pi_A^R - \pi_B^R)$, corresponds to a relative improvement of A's situation in Option Left, if A has a higher payoff than B

diff_reciprocity, equal to $q(\pi_A^L - \pi_B^L - \pi_A^R + \pi_B^R)$, corresponds to a relative worsening of A's situation in Option Left after A has misbehaved (in terms of foregoing maximization of the sum of payoffs)

If we now want to detect differences between motives reflected in initial and final choices, the model can be generalized to

$$\begin{aligned} U_B\ (\pi_A^L, \pi_B^L) - U_B\ (\pi_A^R, \pi_B^R) & \qquad [3] \\ = \text{diff\_own\_payoff} \ + \ \rho * \text{diff\_other\_behind} \ + * \text{diff\_other\_behind} \\ + \ \theta * \text{diff\_reciprocity} \ + \rho_{ini} * \text{diff\_other\_behind\_ini} \\ + \sigma_{ini} * \text{diff\_other\_ahead\_ini} + \theta_{ini} * \text{diff\_reciprocity\_ini}, \end{aligned}$$

where variables with the "ini" suffix are defined analogously to their counterparts without the suffix, except that they are multiplied by the dummy indicating that the observed choice was the initial choice. Thus the three additional parameters measure additional effects in initial decisions rather than final decisions. For instance, positive ρ_{ini} means that quick and intuitive decisions to a greater extent include A's payoff (if she has lower payoff than B) than decisions after deliberation.

Based on these specifications of utility, logistic regressions models can be estimated. We have allowed for standard errors clustered for individuals, because different decisions of the same subject cannot be considered independent. Moreover, the estimator corresponding to the impact of own payoff has been constrained to be equal to one, in line with the utility model. Estimation results are reported in Table 6.

Table 6. Logistic regression with CR definition of reciprocity

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
diff_own_payoff	1***	1***	1***	1***	1***	1***	1***
diff_other_behind	0.302***	0.301***	0.314***	0.311***	-	0.102**	0.409***
diff_other_ahead	-0.027	-	-0.021	-	0.022	0.102**	0.022
diff_reciprocity	-0.121	-0.103	-	-	-	-	-0.055
diff_other_behind_ini	0.027*	0.025	0.028*	0.026*	-	-0.004	0.028*
diff_other_ahead_ini	-0.038**	-	-0.030*	-	-0.046*	-0.004	-0.037**
diff_reciprocity_ini	-0.146	-0.130	-	-	-	-	-0.143
diff_other_behind_female							-0.104*
diff_other_ahead_female							-0.115**
diff_reciprocity_female							-0.140
diff_other_behind_econ							-0.156**
diff_other_ahead_econ							0.025
diff_reciprocity_econ							0.043
R^2	0.207	0.203	0.204	0.200	0.134	0.145	0.227
Number of observations	3808	3808	3808	3808	3808	3808	3808

All results in the table above were scaled so that the coefficient of *diff_own_payoff* was equal to 1, according to [1]. * *p*<0.05; ** *p*<0.01; *** *p*<0.001

In addition to the baseline model, we estimated different combinations of constraints imposed on the parameters: „reciprocal charity": $\sigma = 0$ (2), "no reciprocity": $\theta = 0$ (3), "single parameter – charity": $\sigma = \theta = 0$ (4) , "single parameter – behindness aversion": $\rho = \theta = 0$ (5), "single parameter – altruism": $\rho = \sigma, \theta = 0$ (6). We have also run the baseline model with interactions for gender and field of study (7).

Our findings largely replicate the results reported by CR. Own payoff is critical to decision making. The weight attached to other's payoff when she is behind (diff_other_behind) ranges around 1/3 of that for self, depending on the model. On the other hand, when the other person is in a better situation, her payoff is not important for B.

However, time pressure has an impact on these weights. There is a tendency to attach a smaller weight to A's payoff when it is higher than B's payoff (the estimates for diff_other_ahead_ini is negative and significant in all the models, except for (6) where it is constrained). There is also some tendency to increase concern for the other being behind, although it is weaker and less robust.

In models with interaction between gender and field of study ("economics" vs "other") women put some additional negative weight on the other participants' payoffs, when they were lower than their own payoffs. In other words, men behaved slightly more altruistically than women in this case. Also economics students appeared to have less positive concern for others' payoff.

Surprisingly, reciprocity seems to play no role. To check if this could be due to specific way in which it was defined, we additionally check an alternative construction. In fact, CR's approach could have been considered unsatisfactory in the first place, as it does not allow for the possibility that individuals *react positively to other's kind actions*. Therefore we consider the alternative specification:

$$U_B(\pi_A, \pi_B) = (\rho * r + \sigma * s + \varphi * t + \omega * u) * \pi_A + (1 - \rho * r - \sigma * s - \varphi * t - \omega * u) * \pi_B \quad [4]$$

where
$u = -1$ if A has misbehaved, and $u = 0$ otherwise
$t = 1$ if A has behaved kindly, and $t = 0$ otherwise.

This time we define misbehavior as foregoing option Out that would give B the highest possible payoff. Analogously, acting kindly corresponds to foregoing option Out that would give *A* her highest positive payoff. Thus positive values of φ and ω would correspond to positive and negative reciprocity respectively. This results in the following utility difference:

$$U_B\ (\pi_A^L, \pi_B^L) - U_B\ (\pi_A^P, \pi_B^P) = \text{diff\_own\_payoff} + \rho * \text{diff\_other\_behind} + \sigma * \text{diff\_other\_ahead} + \varphi * \text{diff\_pos\_reciprocity} + \omega * \text{diff\_neg\_reciprocity}, \quad [5]$$

where the hitherto undefined terms are

diff_neg_reciprocity, equal to $u(\pi_A^L - \pi_B^L - \pi_A^R + \pi_B^R)$, corresponding to a relative worsening of A's situation in Option Left after A has misbehaved (in terms of maximizing B's payoff),

diff_pos_reciprocity, equal to $t(\pi_A^L - \pi_B^L - \pi_A^R + \pi_B^R)$, corresponding to a relative improvement of A's situation in Option Left after A has behaved kindly.

Table 7 compares models with reciprocity defined as CR did it to those following our alternative definition. We also control for gender and, as a robustness check, for round number (to detect any effects of boredom etc.). The results are stable and our two measures of reciprocity are positive and negative reciprocity in baseline models are not significant, although some weak interaction with gender may be possible (women being less negatively reciprocal).

Table 7. Logistic regressions: alternative definitions of reciprocity

Variable	(1)	(8)	(9)	(10)	(11)	(12)
diff_own_payoff	1***	1***	1***	1***	1***	1***
diff_other_behind	0.302***	0.281***	0.350***	0.348***	0.306***	0.285***
diff_other_ahead	-0.027	-0.043	0.033	0.029	-0.069	-0.079
diff_reciprocity	-0.121		-0.039		-0.299	
diff_other_behind_ini	0.027*	0.014	0.028*	0.014	0.027*	0.014
diff_other_ahead_ini	-0.038**	-0.042**	-0.038**	-0.042**	-0.038**	-0.042**
diff_reciprocity_ini	-0.146		-0.143		-0.146	
diff_pos_recip		0.038		0.027		0.041
diff_neg_recip		-0.054		0.016		-0.069
diff_pos_recip_ini		0.003		0.003		0.003
diff_neg_recip_ini		-0.042		-0.042		-0.042
diff_other_b_female			-0.096*	-0.129*		
diff_other_a_female			-0.115*	-0.136**		
diff_recip_female			-0.135			
diff_pos_recip_female				0.004		
diff_neg_recip_female				-0.135**		
other_be_round					0.000	0.000
diff_other_ah_round					0.003	0.003
diff_recip_round					0.011	
diff_pos_recip_round						0.000
diff_neg_recip_round						0.001
R^2	0.207	0.208	0.218	0.222	0.209	0.209
Number of observations	3808	3808	3808	3808	3808	3808

* *p*<0.05; ** *p*<0.01; *** *p*<0.001

5. Discussion and conclusions

The contribution of this paper is two-fold. First, we have developed and tested a novel method of incentivized, within-subject elicitation of intuitive and deliberate choices. It proved to be easy to understand for the subjects and indeed induce rapid early choices. We believe that allowing only one change was a fortunate design choice: the number of changes appears reasonable (while it was, in our view, not reasonable in the study of Agranov et al, 2012, who placed no limits on switching between options) and the resulting data structure facilitates analysis. Also the finding that easier decisions (those which vast majority of subjects agreed on) were much less often changed speaks about the reliability of results.

In terms of decision content, it was largely in line with pre-existing evidence based on standard elicitation methods. The only substantial difference with respect to the results reported by CR is that we observed no significant effect of reciprocity. The reason for this is not clear – it could potentially result from insufficient exposition of the conditional nature of B's decision (i.e. that it is relevant only if A does not choose Out). One possibility to be considered in future research would then be to show Option Out first (perhaps for as long as the subjects wishes to analyze it) and only then show the rest of the decision tree with explicit request "Now, assume that Person A has NOT chosen her option Left, instead letting you decide. What do you choose?" or similar.[4] Another possible explanation of no reciprocity is that Bs considered As' decisions as largely random (which they could in fact be, if the decision was made in extreme rush or an early second of the round, in which no decision was made yet, was selected.) In such a case, it would not deserve a reward or punishment. In fact, assuming that A's decision was random could even led to the reverse of reciprocity, if participants tended to equalize the expected value of payoffs (Krawczyk, 2011) – a relatively high payoff of B under (A's) Option Out meant that his expected payoff was high, so he could be more generous in his choice. It is also possible that CR subjects, playing both roles (and knowing they would), tended to put themselves more into the shoes of the other person, considering their options and motivations. Finally, lesser role of reciprocity could simply be a characteristic of our subject pool.

The DR mechanism can, in principle, be applied to vast majority of decision tasks in economic experiments. One restriction is that their parameters are given, rather than endogenously determined by subject's earlier choices (as is typically the case in non-parametric elicitation methods inspired by prospect theory, Abdellaoui, 2000). Indeed, in such a case it would be problematic which choice (initial or final) should be fed into subsequent decision tasks. It is also a possibility that should be verified in future research that tasks with more than two options would be cognitively overly demanding when coupled with the DR method, possibly resulting in chaotic behavior. Subject to these constraints, we believe that the use of DR can enrich our understanding of a wide variety of behaviors – choices under risk, intertemporal choices and choices in games being three broad areas of study that immediately come to mind.

The second contribution of present study lies in the novel findings in the specific area of other-regarding behavior. As far as we know, the observation that disadvantageous inequality aversion (as opposed to other motives to lower other's payoffs) is strengthened under time pressure is novel. Generally speaking it contradicts the Social Heuristics Hypothesis of Rand and colleagues. One plausible explanation for this phenomenon is that own payoff initially appears to be low when compared to the high payoff the other subject is enjoying under the same option. With more deliberation time, subjects tend to find that in fact there is no reason not to let the other person earn a bit more money. This effect provides an alternative explanation to the findings of higher rejection rates in Ultimatum Game played under time pressure, often understood in terms of emotion-driven revenge. Additionally, intuitive disadvantageous inequality aversion allows explaining "hot-headed" behavior in situations in which no evil intentions can be attributed to the other party. For example, many drivers seem to change lanes much too often in heavy traffic. By doing so, they generally diminish average driving speed and cause a risk of collisions without substantial own benefit in terms of time saved. This is particularly puzzling in view of laboratory findings such as reluctance to exchange lottery tickets (Bar-Hillel et al., 1996), suggesting a strong status-quo bias. It could be that such drivers' behavior may be explained in view of its timing – typically one has to decide very quickly whether or not to change to another lane that temporarily seems to allow a quicker ride. If this time pressure puts drivers in a mode in which they find it hard to accept that somebody else is making more of a progress, it is likely to result in excessive lane switching.

[4] We are grateful to Peter Katuscak for this interesting suggestion.

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Appendix A: Stimuli

Instructions

In today's experiment you will be making many different decisions. In each round you will be randomly paired with another participant. Persons in each pair will be called A and B. Both you and the other person will make decisions not knowing what the other person has chosen. In some rounds your choices will be hypothetical (will not affect your payoffs). If it happens, it will be clearly indicated. However, in most of the rounds your decision might affect your payoff and that of the other person. The payoffs are expressed in Experimental Currency Units (ECU). At the end of experiment one of the rounds and two pairs of participants (four people) will be randomly chosen. These persons will receive their payoffs in the form of shopping vouchers (which can be redeemed in cinemas, discos, theaters, clubs, etc.). The amount of the payoff will be determined according to the formula: 1 ECU=0.40 PLN. For instance, payoff equal to 200 ECU will give you PLN 80 worth of vouchers, and 800 ECU is equivalent to PLN 320. Other participants, who were not chosen, will get PLN 5 in cash each.

NOTE: unlike most experiments in our Laboratory, TIME will play a very important role in today's experiment. Each round will last 60 seconds and after that time you will be automatically transferred to the next round. It is in your best interest that at any time during the round your choice indicated on the computer screen corresponds to what you think is best for you. Please try JUDGE THE AVAILABLE OPTIONS AS FAST AS POSSIBLE VALUE and MAKE YOUR INITIAL CHOICE by clicking the appropriate button. Then go back to the description of the options and think again. IF YOU CHANGE YOUR MIND, CHANGE YOUR CHOICE ON THE SCREEN. Note: you can change your choice ONLY ONCE during the round! You can also leave your initial choice unchanged

To encourage you to make your decisions as fast as possible, but also consider them carefully thereafter, we will use the following method to determine your payoffs. At the end of the experiment the computer will not only will randomly choose one round to determine your payoffs, but also a SPECIFIC SECOND of this round. The choice that was indicated by you at this specific second in this round will be implemented. If the computer chooses a second, in which you had not managed to choose any option yet, one of the options will be chosen randomly. Typically, it will be less profitable for you, than have your own, conscious choices implemented. It means that it is best to make your initial decision very quickly (but not too quickly, it would effectively be random again in such a case).

<u>Example 1</u>

Consider a participant who played the role of Person B in Round 3. She had to make a decision, which could have an impact on her payoff and that of Person A. She had two Options: Left and Right. She read the description of these two options as fast as possible. At a first glance Option Right seemed to be more attractive. She clicked on the "I choose Right" button. It was the 10th second of the round. However, she knew that her first decision may not be optimal and that her payoff can be determined by a decision indicated in some subsequent second. She read the description of these two options once again and she realized that Option Left is more attractive than she had originally thought. Finally, she changed her decision (in the 33rd second of the round) to Option Left by clicking on the "I change to Left" and waited for the next round.

Let's assume that at the end of experiment computer randomly chooses the Round 3 (and the participant in question is one of individuals, who will get their payoff in the form of vouchers). Additionally, computer randomly chooses one second of this round. If one of the first nine seconds is chosen (the time when Person B had not made any decision yet – the computer will also randomly choose Option Left or Option Right. If the chosen second is in the interval of [10,32], Option Right will determine her payoff and that of Person A, and when it is within 33 and 50 Option Left will determine these payoffs.

Example 2

Consider a participant who played the role of Person A in Round 17. She could choose Option Left: (400 ECU for her, 400 ECU for Person B) or Option Right, which involves letting Person B choose between (200 ECU for her, 200 ECU for Person B) and (500 ECU for her, 500 ECU for Person B). She quickly glanced at the two options and Option Left seemed to her more attractive. She clicked on the "I choose left" button. It was the fifth second of the round. However, she knew that the first decision may be suboptimal and her payoff can be determined by any subsequent second of the round. She read the description of each option once again and decided that the right option is more profitable than it initially seemed. She finally changed (in the 41st second) of the round.

At the same time Person B was making his decision. He knew that Person A could choose the option (400 for him, 400 for Person A) or she could let him to choose. However, he did not know what decision Person A was going to make. Person B quickly read the description of each option (Option Left: 200 for him, 200 for Person A; Option Right: 500 for him, 500 for Person A) and at first glance the right option seemed to him more attractive. He clicked on the "I choose right" button. It was the seventh second of the round. He read the description of two options once again and decided that his initial choice was indeed optimal. He waited until the end of the round.

Suppose that at the end of experiment computer randomly chose the 17th round (and participants mentioned before are the persons, who will get their payoffs in the form of vouchers). Additionally, computer randomly chose one second of this round. If one of first 4 seconds is chosen, when Person A and Person B had not made any decision – the computer will also randomly choose option for Persons A and B. If the chosen second is within the range of [5,40], the Option Left chosen by Person A will determine the payoffs, therefore the decision of Person B will not matter – both participants will receive 400 ECU. If computer choose 41th or later second of the round, Option Right chosen by Person A will be implemented. Therefore, Person B's choice will be relevant. Since in those seconds he preferred Option Right, the final payoffs will be (500 ECU for Person A, 500 ECU for Person B).

Screenshot: a dictator game

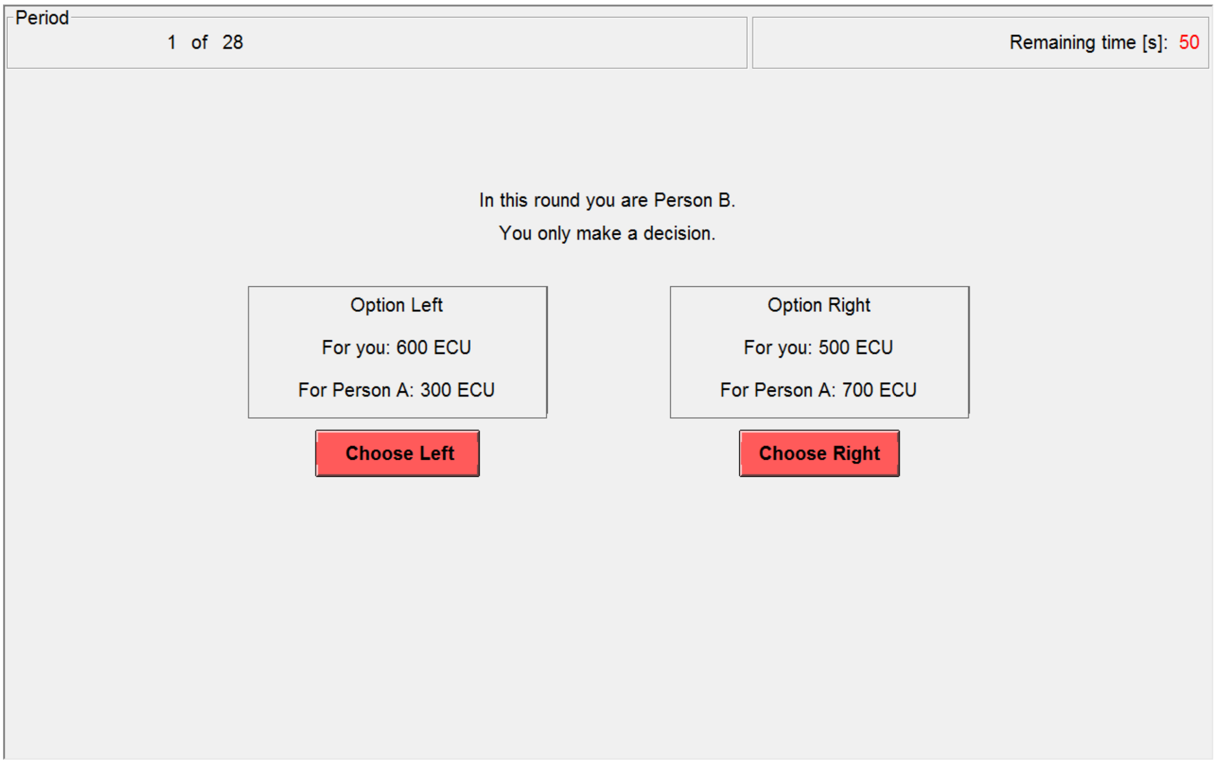

Figure A1: B’s decision screen in one of the dictator games.

Cognitive Reflection Test

Question 1: A bat and a ball cost 110 PLN in total. The bat costs 100 more than the ball. How much does the ball cost? (correct answer: 5, intuitive: 10).

Question 2: If it takes 5 machines 5 minutes to make 5 widgets, how long would it take 100 machines to make 100 widgets? (correct answer: 5, intuitive: 100).

Question 3: In a lake, there is a patch of lily pads. Every day, the patch doubles in size. If it takes 48 days for the patch to cover the entire lake, how long would it take for the patch to cover half of the lake? (correct answer: 47, intuitive: 24).

Appendix B. Additional tables

Table B1. Choices in view of models of social preferences

Choice	A left/out[a]		A right/in[a]		B left		B right	
	N	Pref	N	Pref	N	Pref	N	Pref
1:B(750,400)-(400,400)	45 (47)	Q,$	23 (21)	C,D,$	50 (51)	Q,$	18 (17)	C,D,$
2:B(400,400)-(750,375)	47 (41)	C,D,Q,$	21 (27)	Q	54 (47)	C,D,Q,$	14 (21)	Q
3:B(800,800)-(1500,750)	46 (41)	C,D,Q,$	22 (27)	Q	51 (47)	C,D,Q,$	17 (21)	Q
4:B(800,200)-(0,0)	65 (65)	C,D,Q,$	3 (3)	C,D	67 (66)	C,D,Q,$	1 (2)	C,D
5:B(300,600)-(700,500)	49 (53)	C,D,Q,$	19 (15)	D,Q	49 (48)	C,D,Q,$	19 (20)	D,Q
6:B(200,700)-(600,600)	35 (35)	C,D,Q,$	33 (33)	D,Q	40 (39)	C,D,Q,$	28 (29)	D,Q
7:B(0,800)-(400,400)	51 (48)	C,D,Q,$	17 (20)	D,Q	57 (57)	C,D,Q,$	11 (11)	D,Q
8:A(750,0); B(750,400)-(400,400)	34 (29)	C,D,Q,$	34 (39)	D,Q	41 (45)	Q,$	27 (23)	C,D,$
9:A(550,550); B(750,400)-(400,400)	43 (39)	D,Q	25 (29)	C,D,Q,$	49 (48)	Q,$	19 (20)	C,D,$
10:A(100,1000); B(125,125)-(75,125)	38 (34)	Q	30 (34)	C,D,Q,$	60 (57)	C,D,$	8 (11)	Q,$
11:A(450,900); B(400,400)-(200,400)	61 (61)	C,D,Q,$	7 (7)	C,D	62 (60)	C,$	6 (8)	D,Q,$
12:A(725,0); B(400,400)-(750,375)	46 (50)	C,D,Q,$	22 (18)	D,Q	48 (46)	C,D,Q,$	20 (22)	Q
13:A(800,0); B(400,400)-(750,375)	46 (48)	C,D,Q,$	22 (50)	D,Q	54 (50)	C,D,Q,$	14 (18)	Q
14:A(750,0); B(400,400)-(750,375)	44 (46)	C,D,Q,$	24 (22)	D,Q	49 (42)	C,D,Q,$	19 (26)	Q
15:A(750,100); B(300,600)-(700,500)	56 (54)	C,D,Q,$	12 (14)	D,Q	44 (40)	C,D,Q,$	24 (28)	D,Q
16:A(450,0); B(350,450)-(450,350)	37 (36)	C,D,Q,$	31 (32)	D,Q	53 (55)	C,D,Q,$	15 (13)	
17:A(900,0); B(700,900)-(900,700)	49 (43)	C,D,Q,$	19 (25)	D,Q,$	61 (58)	C,D,Q,$	7 (10)	
18:A(700,200); B(200,700)-(600,600)	56 (57)	C,D,Q,$	12 (11)	D,Q	28 (32)	C,D,Q,$	40 (36)	D,Q
19:A(800,0); B(0,800)-(400,400)	54 (53)	C,D,Q,$	14 (15)	Q	44 (49)	C,D,Q,$	24 (19)	D,Q
20:A(550,550); B(400,400)-(750,375)	59 (61)	C,D,Q,$	9 (7)	C	53 (50)	C,D,Q,$	15 (18)	Q
21:A(0,800); B(0,800)-(400,400)	0 (2)		68 (66)	C,D,Q,$	46 (53)	C,D,Q,$	22 (15)	D,Q
22:A(0,400); B(0,400)-(200,200)	0 (0)		68 (68)	C,D,Q,$	55 (56)	C,D,Q,$	13 (12)	D,Q
23:A(375,1000); B(400,400)-(350,350)	24 (25)	Q	44 (43)	C,D,Q,$	64 (62)	C,D,Q,$	4 (6)	
24:A(375,1000); B(400,400)-(250,350)	33 (36)	Q	35 (32)	C,D,Q,$	65 (65)	C,D,Q,$	3 (3)	C
25:A(500,500); B(800,200)-(0,0)	49 (39)	D,Q	19 (29)	C,D,Q,$	60 (61)	C,D,Q,$	8 (7)	C,D
26:A(750,750); B(800,200)-(0,0)	51 (47)	C,D,Q,$	17 (21)	C	61 (58)	C,D,Q,$	7 (10)	C,D
27:A(400,1200); B(400,200)-(0,0)	58 (58)	C,D,Q,$	10 (10)	C,D	60 (59)	C,D,Q,$	8 (9)	C,D
28:A(200,600); B(200,100)-(0,0)	57 (59)	C,D,Q,$	11 (9)	C,D,$	62 (61)	C,D,Q,$	6 (7)	C,D

[a] In dictator games A makes hypothetical decision and she chooses between Option Left and Right (the same options as B has).

Numbers of final choices are provided in parentheses. To simplify models of social preferences have been indicated as: C – competitive, D – difference aversion, Q – social-welfare, $ - self interest.

All decisions' A: 1904; initial decision: C=1370; D=1681; Q=1824; $=1388
final decision: C=1364; D=1663; Q=1824; $=1388

All decisions' B: 1904; initial decision: C=1444; D=1566; Q=1659; $=1565
final decision: C=1416; D=1531; Q=1660; $=1541

Table B2. Decision times, changes and unanimity by game

	As' decisions				Bs' decisions			
Game number	Initial: median time [s]	Revised: median time [s]	Percentage of changes	Unanimity	Initial: median time [s]	Revised: median time [s]	Percentage of changes	Unanimity
1	3	9	0.06	67.5%	3	6	0.07	74.5%
2	3	10	0.09	64.5%	3	49	0.10	74.0%
3	3.5	11	0.10	64.0%	3	14.5	0.09	72.0%
4	2	16.5	0.06	96.0%	2	24	0.01	98.0%
5	3	13.5	0.06	75.0%	4	27	0.10	71.5%
6	3	7.5	0.09	53.5%	2	6	0.04	58.0%
7	2	25	0.07	73.0%	2	16.5	0.12	84.0%
8	3	12	0.19	53.5%	4	14	0.09	63.0%
9	5	13.5	0.21	60.0%	4.5	17	0.13	71.5%
10	6	18	0.18	53.0%	5	12	0.04	86.0%
11	4	-	0	90.0%	3	6	0.06	89.5%
12	4	13.5	0.18	71.0%	5	22.5	0.12	69.5%
13	3.5	7.5	0.12	69.5%	5	4.5	0.09	76.5%
14	4	8	0.12	66.5%	4.5	28	0.10	67.0%
15	5	24	0.06	80.5%	5	14.5	0.12	62.0%
16	5	15	0.19	53.5%	4	16	0.06	79.5%
17	4	9	0.18	67.5%	3	17	0.07	87.5%
18	4	45	0.04	83.0%	5	26.5	0.12	56.0%
19	3	38	0.01	78.5%	5	18	0.16	68.5%
20	4.5	15	0.15	88.5%	4	17	0.04	76.0%
21	4	2.5	0.03	98.5%	6	28	0.13	73.0%
22	5	-	0	100.0%	4	28	0.04	81.5%
23	5	8	0.22	64.0%	3	22.5	0.06	92.5%
24	5	21	0.13	51.0%	4	23.5	0.03	96.0%
25	5	10	0.24	64.5%	3	11	0.10	89.0%
26	3	17.5	0.18	72.0%	3	15	0.10	87.5%
27	4	14	0.06	85.0%	3	20	0.13	87.5%
28	5	14.5	0.15	85.5%	4	37	0.01	90.5%

Unanimity refers to the percentage of individuals who chose the more popular option, taken as the mean of initial and final choices. E.g. if 30% chose Left initially and 40% chose Left finally, then Unanimity is equal to 65%

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