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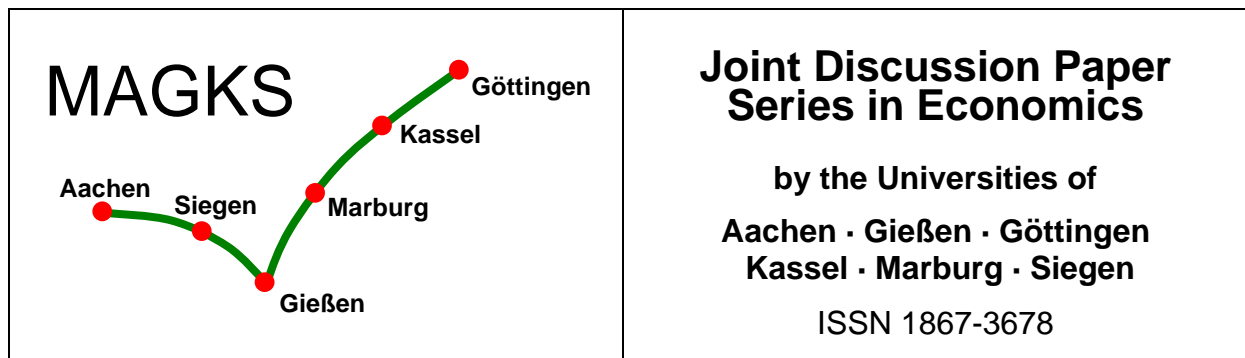
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**No. 02-2010**

**Björn Frank**

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# **The effects of enforced reflection in three simple experiments**

by Björn Frank

## **Abstract**

Rubinstein (2007) has recently found that the frequency of (types of) decisions made in Internet experiments are related to the time taken for these decisions. Other authors have investigated this relationship by exerting some time pressure. In this paper, I report on an attempt to do the opposite, i.e., to enforce a longer reflection time. To ensure that subjects do not just wait but actually think for five minutes, they had to perform a five minutes focused free writing task. Free writing is a standard method adopted from creative writing courses; subjects are asked to write up everything that currently runs through their minds, without pausing.

Enforced reflection significantly decreases the number chosen in beauty contest experiments, thus increasing the winning probability, and it increases the amount given in the solidarity game. For women, this increase is economically and statistically significant. The average amount offered in the ultimatum game is not higher for those who had performed the free writing task. However, after free writing, the share of 50:50 offers is significantly higher, which is in conflict with Rubinstein's conjecture that 50:50 offers take less time because they are instinctive (as opposed to cognitive).

*JEL classification: C90, D03*

*Keywords: free writing, decision time, beauty contest, solidarity game, ultimatum game*

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## 1. Introduction

Spontaneous decisions differ from those that are well-considered. Think of time trouble in chess, leading strong players to make blunders they otherwise would be sure to avoid (e.g., Kotov, 1978, pp. 176 et seq.). However, isn't this well known and unsurprising? Answering this question with a spontaneous yes might have led even behavioural economists to ignore, until recently, that a closer look at decision times can produce exciting new insights.

So far, there are two basic research strategies concerning decision time. One is to exert time pressure on subjects. Decisions with and without time pressure are known to be made by different parts of the brain. Hence the role of these different parts of the brain in experiments such as the ultimatum game can be studied by suppressing or activating these brain parts through time pressure (Cappelletti, Güth and Ploner, 2008; see also Ibanez, Czermak and Sutter, 2008; Sutter, Kocher and Strauß, 2003).

A second approach is to simply record subjects' decision times. According to an insightful study by Rubinstein (2007), the frequency of (types of) decisions made in Internet experiments are related to the time taken for these decisions (see also Piovesan and Wengström, 2008). This also leads to interesting insights, though below we will argue that the interpretation is not straightforward.

A third method would be to enforce not a particularly short decision time, but a longer one. While this nicely complements the other two approaches sketched above, the practical problems seem to be hard to overcome. How can subjects be *forced* to think longer? Not permitting them to make their decisions before 10 minutes have passed after reading the instructions? Many subjects will be bored, and in any case what occupies their minds is completely beyond the experimenter's control. In this paper, I discuss an attempt to solve this problem with a method called "free writing"; it is a well known tool in creative writing workshops, but used for the first time in three standard experiments reported on below: The ultimatum game, the beauty contest and the solidarity game. The general set-up is described in section 2, while details for each experiment and their results are given in section 3, where I will show that in none of the experiments does the subjects' behaviour appear to be entirely unaffected by this intervention. Section 4 concludes.

## 2. Basic design

Free writing is a standard method (e.g., Elbow, 1998, ch.1; Marsella and Hilgers, 1991) adopted from creative writing courses. In free writing tasks, participants are asked to write up everything that currently runs through their minds, without pausing. Sometimes they are

asked to start their text with a certain topic; this is called focused free writing. In any case, participants are asked not to pay attention to grammar and spelling. The aim is to "think onto the paper" (Elbow, 1991, p.200), avoiding the author's immediate critical review of his or her own style, i.e. avoiding writer's block. The resulting texts are usually not read aloud, but used as working material for further exercises (such as a short essay or a haiku).

In the experiments I report on below, focused free writing is used to enforce a certain period of thinking, or at least associating, on the decision task ahead. Subjects were invited into a large classroom or lecture hall. The experiment started with a short introduction to free writing, and a practice period, namely a three-minute free writing text on how they imagine their upcoming weekend will be. As is usual in free writing task, they were asked not to pause when writing, and to write anything that runs through their heads, even if this means just reporting having no ideas, etc. They were told that their texts would not be read aloud and that they are not obliged to hand them over to the experimenter or someone else.

Thereafter instructions for the experiment were distributed. Subjects were first asked to participate in a simple pen-and-paper experiment: Experiment A (to be specified in section 3) for about half of them and experiment B for the others. I thereby obtained the control group decisions. After completion of the first experiment, subjects were asked to just read the instructions of a different (second and final) one, but not to make a final decision. This second experiment was experiment A for those who had previously participated in experiment B and vice versa. After possible clarifying questions concerning the rules were answered by the experimenter, participants were asked to perform a five-minute focused free writing text on the decision ahead. Again, they were told that text would be neither read aloud nor collected.

When five minutes were over, subjects were told to make their decision, and the sheets on which they reported their decision (along with an alias allowing them to receive payoffs while remaining anonymous) were collected.

Payments were made immediately after the experiment; few participants used the option to collect their payoff later in the office of a person who was not present during the experiment. It was announced that, as had been promised, I would not collect the free writing text, but that I offer €2 per text. Most, but not all, participants sold their texts.<sup>1</sup>

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<sup>1</sup> I presume that most participants who did not sell their texts did this because the one on the next weekend and the one on the experiment were on the same sheet, and the text concerning the next weekend were sometime pretty intimate.

Was the free writing method successful in inducing thinking about the task ahead? At least it did have an effect, although the interpretation might be subject to debate. The next section reports details on the three experiments.

### **3. The effects of enforced reflection**

#### **3.1. Ultimatum Game**

This experiment was performed with 138 first-year students. Seven participants were randomly assigned to the role of responders in the ultimatum game. The 131 other participants took the role of the proposers, who had to propose the division of €50. Seven of the proposals were randomly drawn after the experiment, each of them being matched with one responder. 67 participants in the role of the proposer constituted the control group: They made an offer without previous free writing. The experimental group consists of 64 subjects who made their offer after free writing (the experiment they took part in before their free writing task is the beauty contest described in section 3.3).

While the proposers filled out their forms, the seven responders were asked to indicate the minimum acceptable offer. After matching seven randomly drawn offers with the seven proposer decisions, payments were made (5 offers were accepted). Furthermore, the experimenter offered to buy the free writing texts for €2 per person. That resulted in 43 complete and 1 incomplete free writing text on the ultimatum game.

Considering the mean offers only, there is hardly any difference between control group and experimental group (see Table 1). In the control group, the mean offer is €20.72 or 41.44 percent of the stakesize. In the experimental group, the offer is only 3 cents higher.

Cappelletti, Güth and Ploner (2008) had found higher offers in the ultimatum game under time pressure (15 seconds decision time) compared to a control group with only a moderate time restriction (180 seconds). One might hypothesize that if an artificially short decision time increases offers, then artificially increasing decision time might have the opposite effect, but our results do not confirm this hypothesis.

However, comparing our results to those by Rubinstein (2007) reveals an interesting pattern. As shown in table 1, the 50% offer was the one that took Rubinstein's subjects the least time to make. Rubinstein's (2007) explanation of this finding is that a 50:50 split is the "instinctive" choice by the proposer, as opposed to "cognitive" ones.

An alternative explanation that is supported by Rubinstein's data as well does not rely on the instinctive versus cognitive distinction. Rather, it is reasonable to presume that many people start reflecting their offers at 50:50. If they conclude that this is satisfactory, they stop and

make their offer. If they are not satisfied, they check other options like 51:49 in their favour, or 60:40. One might call such a mode "stepwise cognitive". For all subjects whose decision making is thereby reasonably well described, 50:50 offers necessarily take less decision time. Now what is the likely effect of more reflection? If my reading of Rubinstein (2007) is correct, his model predicts less 50:50 offers as instinctive decision making is prevented by enforcing a 5-minute decision period. On the other hand, my "stepwise cognitive" explanation of Rubinstein's findings does not lead to such a prediction. As shown in table 1, free writing is increasing, rather than decreasing, the share of 50:50 offers. The difference is even weakly significant<sup>2</sup>, though this would not need to be the case in order to reject the hypothesis that enforced reflection decreases the share of 50:50 offers.

**Table 1: Ultimatum Game: Free writing experiment and Rubinstein's Internet experiment**

Offer (stakesize normalized to 100)	Free writing experiment		Rubinstein (2007)	
	share in experimental group	share in control group	Average decision time taken (in seconds)	share
0-1	0%	0%	54.0	15%
2-25	20%	19%	52.2	9%
26-49	28%	36%	47.9	13%
50	39%	27%	39.6	46%
51-60	11%	16%	49.5	10%
61-100	2%	1%	42.3	8%
Average offer to responder (stakesize 50 €)	20.75 €	20.72 €	?	
n	64	67	4628	

### 3.2. Solidarity Game

One of the reasons why this game was chosen was that I wanted to recruit participants from an introductory course in game theory, but to confront them with an experiment that was entirely new to them, unlike the ultimatum game. Belanoff observes one problem some

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<sup>2</sup> p=0.0967, Fisher's exact probability test, one-tailed.

students had with free writing: "Poor writers used free writing to record what happened or to record the result of previous thinking; they did not often use it to tap into the ongoingness of the unresolved. They seemed unaware of the frayed edges lying under and around their ideas." (Belanoff, 1991, p.19) This problem is probably intensified when the experiment at hand is already known to the students, who might then fall into a kind of exam mode.

This experiment was performed with 80 students, 18 of which were recruited from a creative writing course for first-year trainee teachers, 62 from economics courses.<sup>3</sup>

The rules of the solidarity game are simple (Selten and Ockenfels, 1998): Each participant is randomly assigned to a three-person-group, not knowing the identity of the others. Each subject has to throw a dice once. If one of the numbers 1, 2, 3, or 4 appears, s/he wins €5 (approximately equal to 10 German marks used in the original experiment by Selten and Ockenfels, 1998). If one of the numbers 5 or 6 appears, s/he loses and all s/he receives is an amount that winners in the group donate to the loser(s). Before the dice is thrown, everyone makes two decisions: First, how much (if any) to donate to the loser if there is one loser in the group, and second, how much (if any) to donate each loser in the group if there are two.

**Table 2: Solidarity Game: Free writing experiment and the Selten/Ockenfels (1998) results**

	Amount transferred... (all subjects)		Amount transferred... (women only)	
	... to 1 loser	...to 2 losers	... to 1 loser	...to 2 losers
Control group (n=40)	2.1275	1.345 each	1.450	0.878 each
Experimental group (n=40)	2.585	1.647 each	2.525	1.538 each
p-value	0.2591	0.1013	0.0932	0.0535
Selten/Ockenfels (1998)	2.46	1.56	3.23	1.94

All p-values derived with a Mann-Whitney-U-test, two-sided

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<sup>3</sup> 9 of the former belong to the control group; the experiment they participated in after focused free writing is the beauty contest. 12 control group participants from the economics courses wrote their free writing text on a subject that had nothing to do with any experiment, the others had taken part in the beauty contest after free writing on that experiment. Due to 4 no-shows, two participants were not members of a proper three-person-group, which they did not know when they made their decision. As both neither rolled a 5 nor a 6, they simply received €5 each.



As shown in table 2, enforced reflection increases the amount given to losers, i.e., it leads to greater solidarity. For the whole sample, a conventional level of significance is narrowly missed for the case of two losers ( $p=0.1013$ ). Considering women only, however, the difference becomes larger and statistically significant. This finding is well in line with the observation by Croson and Gneezy (2009) that women's behaviour in experiments is more situation specific than men's. As a side result, it might be noted that Selten and Ockenfels (1998) found a gender effect with respect to the amount given that I completely failed to replicate. Women gave significantly more in their study, while they gave significantly less in mine.

A final interesting result concerns the structure of the donations. In Selten and Ockenfels (1998), who have 118 observations, and in my control group (40 observations), nobody gives more to each of two losers than to one single loser. While this seems natural, Selten and Ockenfels (1998, p.520) assert that a "possible approach to the problem could have been that one wants to secure a minimum payoff, say, (...) 2.00 to a loser. In order to achieve this, two winners would have to give (...) 1.00 each to a single loser and a single winner would have to give (...) 2.00 to each of the losers." In my experimental group, two (out of 40) subjects reveal a similar way of reasoning in their texts and finally come to the decision to donate more to each of two losers than to a single one.<sup>4</sup> This clearly had not been their first idea, it rather developed during the 5-minute period of free writing.

### 3.3. Beauty Contest

In this beauty-contest experiment (Nagel, 1995; Bühren, Frank and Nagel, 2009), the winner is the player whose number is closer than anyone else's to  $2/3$  of the average number. 95 belonged to the experimental group, making their decision after five minutes of focused free writing concerning their decision in this experiment. The control group consisted of 99 participants. The winners<sup>5</sup> were awarded €100.

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<sup>4</sup> This difference between those with the focused free writing phase before their decision and the other participants is not significant according to Fisher's Exact Probability Test unless my control group is merged with that of Selten and Ockenfels (1998).

<sup>5</sup> Table 3 reports data pooled from three runs of the experiment, and there was a winner determined and paid for every run separately.

One might hypothesize that enforced reflection decreases the number chosen in the beauty contest, as participants are led to think maybe one step further ahead.<sup>6</sup> A number that is often chosen is 33:  $2/3$  of the average if everyone else chooses his or her number randomly. Thinking one step further, one might presume that everyone else has seen this point, hence one should submit  $2/3 \cdot 33 = 22$ . Our results are mixed: While the average number chosen in the experimental group is by 8.1 lower than in the control group, this is mainly due to the lower share of guesses between 51 and 100 (table 3); disregarding these observations would reduce the absolute difference between the two treatments to 2.2. Furthermore, those numbers that take a long time to be chosen by Rubinstein's (2007) participants (table 3) were not chosen markedly more often after enforced reflection via free writing.

**Table 3: Beauty Contest: Free writing experiment and Rubinstein's Internet experiment**

Number chosen	Free writing experiment		Rubinstein 2007	
	experimental group	control group	time (seconds)	share
0-1	2%	1%	91	11%
2-13	9%	5%	89	9%
14-15	1%	2%	84	2%
16-21	13%	8%	82	6%
22	5%	4%	157	4%
23-32	20%	16%	84	10%
33-34	7%	4%	113	11%
35-49	21%	22%	94	11%
50	2%	4%	70	16%
51-100	19%	33%	70	20%
Mean number chosen	35.0	43.1	36.2	
n	95	99	2423	

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<sup>6</sup> There are interesting, though contradictory, results from experiments where the decision whether to write a text or not is left to the participants. Those who did so in a Spanish newspaper beauty contest did not choose a lower number, while those who took part a popular science magazine's beauty-contest experiment and decided to submit a written comment guessed 14.4 on average, compared to 26.8 for the others, see Bosch-Domènech et al. (2002) and the references given therein.

The beauty contest is a constant sum game in which social preferences play no role (Nagel, 1999, p.107). This is important in that it facilitates the interpretation of the other two experiments, as the beauty-contest results show that free writing does have an impact on cognitive decision making (otherwise one might speculate that free writing merely arouses emotions, though this is not what the participants' texts suggest.)

#### **4. Conclusion**

In all these experiments, enforced reflection had a significant impact on the decisions.<sup>7</sup> This is well in line with the results of other experiments that focus on decision time. Compared to these approaches, free writing has limitations and strengths. One regrettable limitation is the lack of complementary neurological research on free writing. As yet, it is simply unknown which brain areas are activated during free writing. The interpretation of experiments with time pressure as a treatment variable, such as Cappelletti, Güth and Ploner (2008), is facilitated by existing evidence on time pressure from cognitive brain research, which is missing for free writing.

Another limitation is the artificiality of random assignment to control group and experimental group in the context of decision time. In Rubinstein's (2007) study, it is left to participants to choose the time they take for deciding. This corresponds to many instances of real world decision making. However, sometimes circumstances or institutions enforce a certain minimum duration of the decision time, be it that the law requires a cooling off period after which an agreement has to be reconfirmed, be it that the physical conditions of communication between negotiators involves breaks and delays, as in email communication between different time zones. Hence it is of interest to see that the results of standard experiments do depend, to some extent at least, on the time frame.

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<sup>7</sup> Free writing was tried out to solve the problem of increasing subjects' decision time without boring them. However, a side-effect is that the experimenter is provided with insights into subjects' decision-making processes. Hence free writing is also an alternative to thinking aloud (Gneezy, Rustichini and Vostroknutov, 2007), videotaping group decisions (Bosman, Hennig-Schmidt and van Winden, 2006) or chat rooms (Burtraw et al. 2008). However, the analysis of the text that subjects have written is beyond the scope of the present paper, (but see the last paragraph of section 3.2) and left to future research.

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