Rituals of Reason: Experimental Evidence on the Social Acceptability of Lotteries in Allocation Problems

Pre-Analysis Plan Report

Elias Bouacida Renaud Foucart

October 7, 2024

1 Introduction

The experiment was run on August 14, 2023, using Prolific on a representative sample of 600 USA residents. The experiment was pre-registered, the pre-registration is available at https://aspredicted.org/3yy5p.pdf.

We first load the data that we have cleaned in `Experiment2CleaningData.ipynb`. We have removed from the original output of the data the Prolific IDs, that are used for payments. We ensure therefore that the data is anonymous. We also remove some columns we do not use in the analysis and rename some others. Finally, as we have said in the pre-registration, we remove participants who have not finished the experiment.

2 Analysis

2.1 Size of the Treatments

In total 577 participants finished the experiment. The target was 300 in each treatment, but due to the unavoidable drop we are below but close to the target.

Table 1: Number of subjects in each treatment.

Treatment	Participants
Rock, Paper, Scissors	291
Time	286

Table 2: Proportion of the non-random procedure being chosen in each treatment.

Treatment	Non-Random Chosen	P-value[1]
Rock, Paper, Scissors	78%	<0.001
Time	55.9%	0.044

[1] P-value of the one sample two-sided t-test of equality with 50%.

Table 3: Number of subjects and strength of the preference.

		Preference		
Treatment	Procedure Chosen	Indifferent	Strict	P-value[1]
Rock, Paper, Scissors	DC-5 Lottery	4	60	0.517
Rock, Paper, Scissors	Rock, Paper, Scissors	10	217	0.517
Time	DC-5 Lottery	3	123	0.324
Time	Time	1	159	0.324

Note:
A preference is considered strict if the WTA is non-null.
[1] P-value of the Fisher exact test of equal proportion.

2.2 Non-Random Procedures vs Lottery

We run the first analysis with all subjects (including those who state indifference).

Table 2 shows that in both cases, participants chose the *Lottery* less often than the non-random procedures. The Rock, Paper, Scissors result is in the direction we expected, whereas we did not expect the Time result to be significantly different from 50%. Given the difference in the proportion between the RPS and Time rituals, we can nevertheless test if the proportions are equal or not.

Using a Fisher exact test, we find that the P-value of the odd ratio being equal to 1 is <0.001. The proportion are significantly different: as expected, our participants chose RPS more often than Time.

2.3 Removing Indifferent subjects

We say that a subject is indifferent if they state that the minimal amount we should pay them to change their choice is $0.

Table 3 shows that a very large majority of subjects have strict preferences. These preferences are quite strong, as implied by the distribution of the minimal values asked for in Figure 1. The

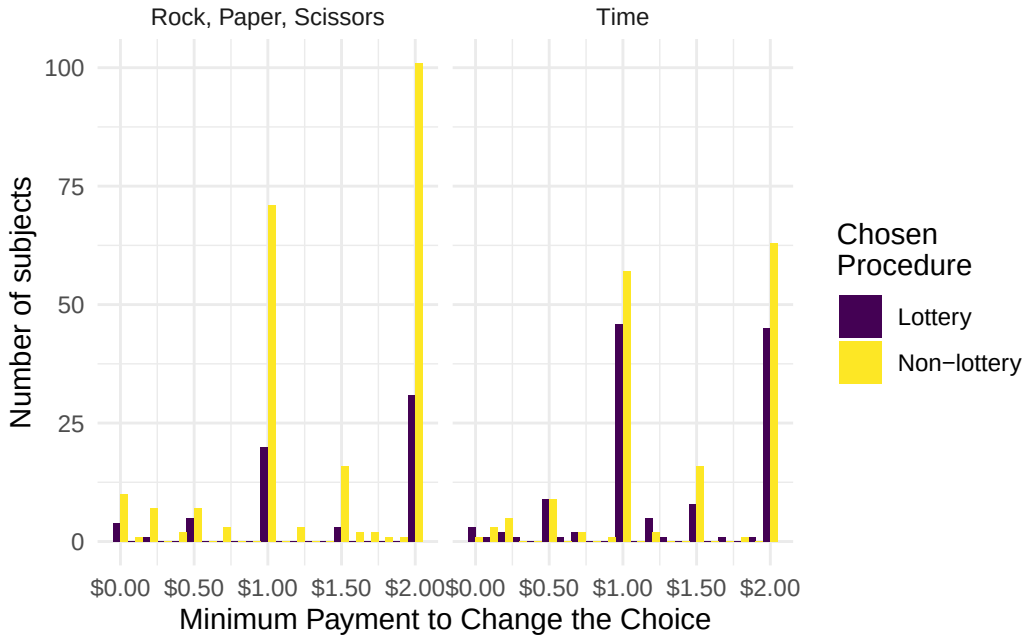

Figure 1: Minimum amount we would need to pay subjects for them to change their choice. Remember that the reward given by the mechanism is $2.

Table 4: Proportion and P-value of the proportion of the ritual being chosen in each treatment, when excluding indifferent subjects.

Treatment	Ritual Chosen	P-value[1]
Rock, Paper, Scissors	78.3%	<0.001
Time	56.4%	0.032

[1] P-value of the one sample two-sided t-test of equality with 50%.

proportion are not significantly different from each other, as the p-values given in in Table 3 indicate.

Another way to think about the strength of preferences is to look at whether subjects give higher WTAs for the non-random or random procedures. We look at that in Table 5 and the difference between the non-random procedure and the lottery are not significant.

Table 5: Average WTA by procedure.

Treatment	Chosen Procedure	Average WTA	P-value^{1}
Rock, Paper, Scissors	Lottery	\$1.39	0.891
Rock, Paper, Scissors	RPS	\$1.41	0.891
Time	Lottery	\$1.32	0.456
Time	Time	\$1.37	0.456

[1] P-value of the t-test of equality of the WTA between the lottery and non-random procedures.

Very few subjects report non-null WTA and their choices are not significantly different. For slightly more power and be consistent with earlier experiment we keep subjects with a WTA of \$0.

2.4 Beliefs

Table 6 shows some overall overconfidence, as more than 50% of subjects believe they will win in either the criteria or the lottery. To see if beliefs influence choices, we can look at the subjects who believe they will win in the criteria but not in the lottery and the reverse. If beliefs are the only driver of choices, then the first group should always choose the criteria, and the second group should always choose the lottery. Table 7 shows that it is not the case. P-value of the Fisher test shows that beliefs have only a minor influence as well.

Table 6: Percentage of subjects who believe they win in the lottery or the criteria.

Treatment	Winning in Criteria	Winning in Lottery
Rock, Paper, Scissors	72.5%	56.0%
Time	62.9%	53.5%

2.5 Time spent in the experiment

We look at the time spent looking at each procedure. We have the time in the pages order by page. The first page is the welcome page. The second page is the first procedure, while the

Table 7: Percentage of subjects who choose the criteria conditional on their beliefs of winning in criteria but not the lottery and the reverse. P-value of the proportions being the same.

	Subjects expect to win only in		
Procedure	Non-random	Random	P-value[1]
Rock, Paper, Scissors	84.9%	63.2%	0.010
Time	63.8%	45.2%	0.117

Note:
The first column represents subjects expecting to win in the non-random procedure but not in the lottery, the second column the reverse.
[1] P-value of the Fisher test of the proportions of subjects who believe they will win in one procedure but not the other who choose the non-random procedure being equal.

third is the second procedure. The third page is the vote between the procedures. The fourth the WTA question. The fifth and sixth the beliefs over winning or losing the procedures, in the same order as the choice between procedures.

The median participant spent 5min and 11s in the experiment.

Figure 2 shows that the time spent on the page for the criteria do not differ much from each other. The median time for RPS is 50s, whereas it is 54s for Time. The distribution of time spent are not significantly different from each other, as the P-value of an the Kolmogorov-Smirnov test of the values being drawn from the same distribution is 0.165. The median time spent on the DC-5 Lottery screens is 30s. The shorter time spent on the lottery is expected, as they only have to read the description of the mechanism and do not have to think about what to do in the mechanism.

2.6 Regression Analysis

Finally, we perform a regression analysis in Table 8. The results show the share of subjects who chose a criteria. The baseline is given with Rock, Paper, Scissors. We can see that Time decrease the share of criteria chosen compared to lottery. Believing that you will win the lottery but not in the criteria decrease the share of criteria chosen, whereas the opposite is true if you believe you will win in the criteria but not in the lottery.

Table 8: Regression analysis of the choice of a criteria, depending on the alternative.

	Non-Lottery Chosen	
	Simple	Demographic controls
(Intercept)	0.774***	0.868***
	(0.032)	(0.076)
Time	-0.216***	-0.218***
	(0.038)	(0.038)
Win in Criteria[a]	0.077+	0.076+
	(0.045)	(0.046)
Win in Lottery[a]	-0.126*	-0.131*
	(0.060)	(0.060)
Male		-0.045
		(0.038)
Employed full-time		0.002
		(0.045)
White		-0.067
		(0.046)
Age		0.000
		(0.001)
Num.Obs.	577	577
R2	0.070	0.076
R2 Adj.	0.065	0.065

+ p \num{< 0.1}, * p \num{< 0.05}, ** p \num{< 0.01}, *** p \num{< 0.001}

[a] Win in XX is a dummy for when a subjects believe they win the XX mechanism and NOT in the alternative one.

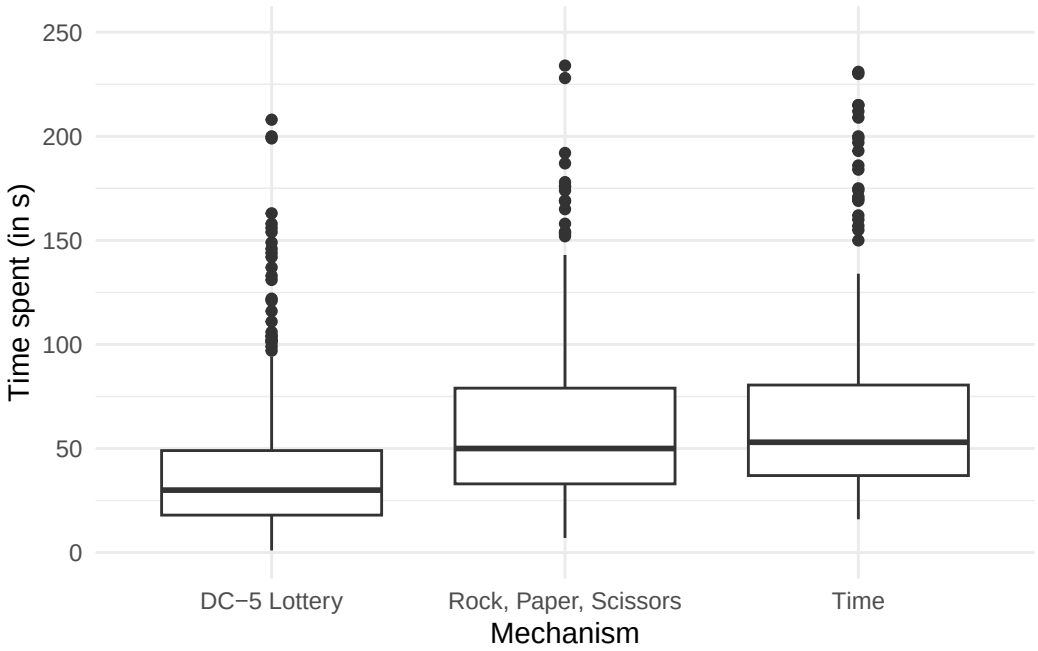

Figure 2: Boxplots of the time spent on the page for the different mechanisms. Some outliers do not appear on the plots to make the figure readable.

3 Demographics

52.5% of participants in the sample are female. Figure 3 represents the repartition of the different age using Prolific stratification strategy. Table 9 shows a the repartition of ethnicity using Prolific stratification strategy.

Table 9: Declared ethnicity in the sample.

Declared Race	Count
Asian	36
Black	76
Mixed	12
Other	6
White	447

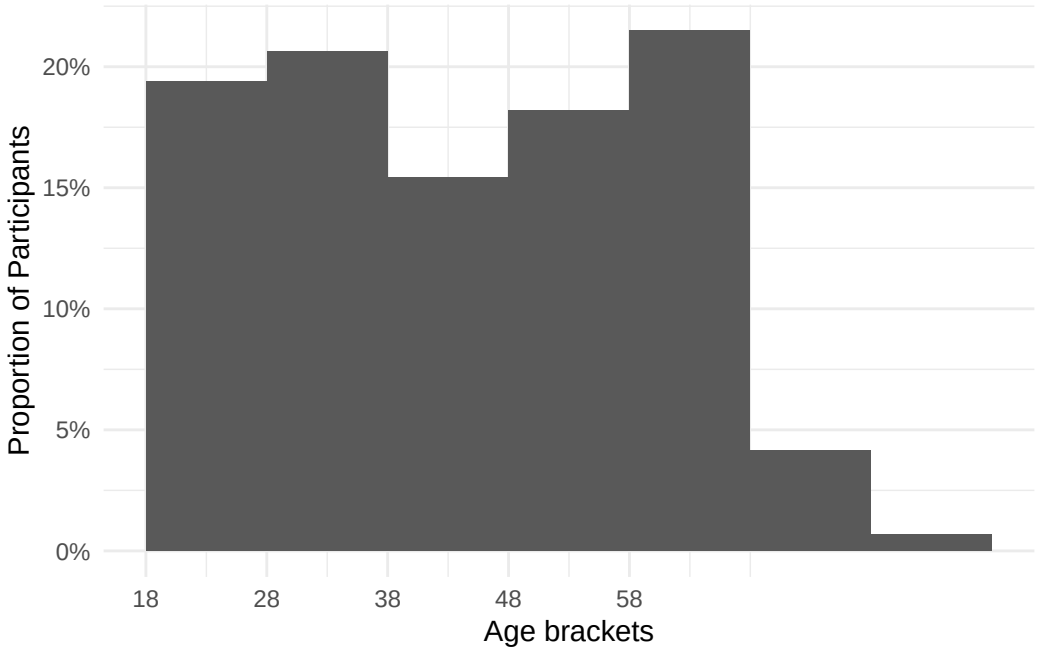

Figure 3: Histogram of the age groups in the sample.