

# Pre-analysis plan for “Time Pressure and Performance Effects”

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The study has three aims:

- a) Study the average performance impact of time pressure on performance in a cognitive task
- b) Study individual heterogeneity in the impact of time pressure
- c) Study individual preferences for working under time pressure using incentivized choices

## **Sample Restrictions**

For our main analysis, we will exclude participants based on the following criteria:

- 1) Dropping out of the survey partway through.
- 2) Taking a longer break (>30 minutes) at some point during the survey.
- 3) People who solved fewer than 80% of the games without a time limit in rounds 1-4.

We will present robustness checks that include the participants mentioned in criterion (3) in the Appendix.

In addition, we will exclude participants based on the following criteria for tests that involve the following variables:

- 4) Questionnaire variables: participants who selected the same option (e.g., the minimum value) on all questions on a particular questionnaire page.
- 5) Decisions in round 5: participants who switched multiple times (after the program sent them a reminder).

Here too, we will repeat the analysis relaxing these restrictions in the Appendix.

## **a) Analysis of average impact:**

We will use data from the first four rounds (40 games) to estimate the average impact of time pressure on performance. We will use data at the game level and regress a dummy for whether the game was solved on time-limit dummies controlling for subject dummies and game number dummies, clustering the standard errors at the subject level. We will do the same with time spent per game.

We will then look at productivity (games solved per minute spent working) by collapsing the data at the subject x time limit level and then regressing the number of correctly solved games at each time-limit (out of ten) divided by the number of seconds spent working at each time limit on time limit dummies controlling for subject dummies and clustering the standard errors at the individual level.

We will also look at gender differences in the impact of time pressure.

## **b) Study individual heterogeneity in the impact of time pressure:**

The experiment will be preceded by a questionnaire that elicits measures of personality traits on a Likert scale (big 5, competitiveness, risk seeking). In between these standard items, we will add two items eliciting self-judged enjoyment and productivity when working under time pressure.

We will regress the number of games solved under a 15 second limit and a 25 second limit (out of 10), as well as the sum of the two (number of games solved out of 20) on the questionnaire measures (and the sum of the two questionnaire measures) at the subject level. We will also run regressions at the game level (as specified before under point a) where we interact the time limit dummies with the questionnaire measures.

## **c) Study individual preferences for working under time pressure:**

We are both interested in determining whether participants are averse to time pressure in the aggregate as well as studying individual heterogeneity in time pressure aversion.

We will construct the following choice measures:

First choice 15 seconds versus no time limit (binary)  
First choice 25 seconds versus no time limit (binary)  
The sum of these two choices

Switching point 15 seconds versus no time limit  
Switching point 25 seconds versus no time limit

The three binary competition choices

To look at individual heterogeneity in preferences, we will regress these choices on both our objective performance measures (number of games solved under 15 seconds and 25 seconds) and the questionnaire measures (productivity, enjoyment and the sum of the two), using OLS regressions at the subject level (tobit regressions for the switching points). Finally, we will also run regressions where we add the other elicited personality traits and correlate these traits with our new time pressure measures to check whether preferences for working under time pressure are captured by commonly studied traits and preferences.

We will also study gender differences both in choices and in self-rated preferences.

To study aggregate levels of time pressure aversion, we will compare actual choices to profit-maximizing choices (judged by performance in the first 40 games). In particular, we will compare the first choice for 15, 25 and 60 seconds versus no time limit to the profit maximizing choice and determine the proportion of participants who are averse, neutral or attracted towards time pressure. We will do the same comparing actual to profit-maximizing switching points. Finally, we will compare these choices to choices under risk in the post-experimental lottery choice task to determine the role of risk aversion in determining aversion to time pressure.

### **Power Calculations and Minimum Detectable Effect Size**

For part (a) we are interested in the effect of time pressure on performance. We can compute power using a paired means t-test for two levels of time pressure. This is equivalent to the regression analysis proposed under part (a), apart from not controlling for game number dummies. In a pilot experiment, we observed that going from no time pressure to 25 seconds decreased performance from 96% to 68% (the standard deviation of the difference is approximately 18 percentage points). With our intended sample size of 200 participants, our power to detect a similar effect size would be equal to 1. Similarly, even for the difference we observed between no time pressure (96% solved) and 60 seconds (93% solved), we would have a power of 1 with our intended sample size (standard deviation of the difference of approximately 9 percentage points). In other words, we have very high power to detect time pressure effects on performance.

For parts (b) and (c) we are essentially looking at correlations between different outcome variables. With our intended sample size (200), we can expect to have a power of greater than 0.80 to detect correlations of 0.20 or above.