**Title:** Statistical information about reward timing is insufficient for promoting optimal persistence decisions. Partial replication of Experiment 3: Descriptive information about probabilistic timing

*1. Have any data been collected for this study already?*

No.

*2.  What’s the main question being asked or hypothesis being tested in this study?*

**Note:** This data set will be collected as part of a revision in response to reviews. The new study is a partial replication of the original Experiment 3 with a larger sample size. The originally submitted manuscript can be found here (<https://psyarxiv.com/3yezf/>, version 1 added on April 2, 2022).

**Research Question:** We examine the extent to which providing individuals with explicit information about reward timing statistics influences their decisions about how long to persist for delayed rewards. We expect that explicit description would accelerate learning. This study focuses on a “limited-persistence” environment, in which reward timing statistics dictate that it is advantageous to wait only a limited amount of time before giving up. Data will be collected online using Amazon Mechanical Turk.

**Hypothesis:** We will test the hypothesis that explicit description leads to accelerated adaptation to the structure of the environment*.* Our hypothesis would be confirmed if participants who receive descriptive information are willing to wait less time for rewards on average than participants who do not receive such information.

*3.  Describe the key dependent variable(s) specifying how they will be measured.*

**WTW task.** Voluntary persistence, our primary behavioral measure, will be assessed using the willingness-to-wait (WTW) task (introduced by McGuire & Kable, 2012, *Cognition*, and with modifications introduced by McGuire & Kable, 2015, *Nature Neuroscience*). Participants will perform a 15-minute block in a “limited-persistence” reward-timing condition. In the version used here, a progress bar is displayed to show how long the current token has been on the screen (same as in McGuire & Kable, 2015, *Nature Neuroscience*). Participants will be randomly assigned to either a standard condition (resembling the original version of the task) or an instructed condition in which marks on the progress bar indicate the equiprobable times at which the token could mature.

Key dependent variable:

* *Area under the curve:* The main participant-level descriptive statistic will be the “area under the curve” (AUC) derived from a Kaplan-Meier survival curve analysis of waiting times. Separately for each participant, excluding trials that ended within the last 30 seconds of the block, we will construct a survival curve in which “survival” corresponds to continued persistence toward the reward, quit events are analogous to “deaths”, and reward delivery events are treated as censored observations. Persistence will be quantified by the area under the survival curve.

*4.  How many and which conditions will participants be assigned to?*

We will randomly assign participants to one of two between-participant conditions: the standard and instructed versions of the WTW task (n=80 each).

*5.  Specify exactly which analyses you will conduct to examine the main question/hypothesis.*

**Main analysis:** We will test the difference in AUC values between the instructed and the standard condition using an independent samples t-test, reporting two-tailed p-values and Bayes factors.

Handling missing data:

Participants who do not have usable data for the WTW task (see task-specific exclusion criteria below) will be excluded from analyses.

*6.  Any secondary analyses?*

We will additionally assess the trend in an individual’s willingness to wait (*WTW-trend*) over time and test the hypothesis that individuals learn faster in the instructed than the standard condition. We measure the change in persistence over time by approximating a local estimate of WTW at every 1 s interval throughout the 15 min block, using the method developed in McGuire & Kable (2012). We will model WTW as a linear function of elapsed time and use the resulting coefficient as a proxy for the learning rate, with a more negative WTW trend corresponding to a faster learning curve (since WTW should decrease over time in LP environments). Our hypothesis would be confirmed if we find evidence for larger, negative coefficients in the instructed than the standard condition.

*7.  How many observations will be collected or what will determine the sample size? No need to justify decision, but be precise about exactly how the number will be determined.*

We plan to collect data from 160 participants (80 per condition). Any participants who do not have a full usable data set for the WTW task (see exclusion criteria below) will be replaced and not counted toward the target sample size.

*8.  Anything else you would like to pre-register? (e.g., data exclusions, variables collected for exploratory purposes, unusual analyses planned?)*

**Exclusion criteria**

**WTW task.** A participant’s WTW task data will be excluded (and the participant will be replaced) if they meet any of the following three criteria.

* Participants will be excluded if they fail to complete the entire WTW task.
* Participants will be excluded if they were too slow to sell tokens that had matured and delivered rewards. We will calculate the per-session median response time (RT) to sell rewarded tokens (combining both task blocks in the session). The participant’s WTW task data will be excluded if the median RT exceeds a threshold of 1.25 s
* Participants will be excluded on the basis of a cumulative measure of “off-task time” per block. Off-task time will include time in excess of 1 s on a given trial between the delivery of a reward (a matured token) and the participant’s “sell” response to collect the reward. For example, selling a rewarded token with an RT of 2 s would add 1 s to the block’s off-task time, and selling a rewarded token with an RT of 500 ms would have no effect on the block’s off-task time. A participant’s WTW task data will be excluded if they accumulate 180 s or more of off-task time during the 15-minute block (more than 20% off-task time).