**Preregistration Form (http://aspredicted.org/)**

**Authors:**

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

Behavior in a bandit task with a minimum aspiration level (i.e. a goal of a minimum value of points that must be reached) is state dependent, i.e. a strategy that takes outcome variance and the relative state to the goal in a trial (for example risk sensitivity theory) will outperform a strategy that takes only the outcome magnitude into account (e.g. expected value maximization). Or formulated as a question: Is behavior in a bandit task with a minimum aspiration level state dependent and if yes, is this the case when this would be the optimal behavior?

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

1. High variance option chosen in a trial or the proportion of high variance option chosen for aggregated level analyses.
2. Proportion of goals reached in the 10 games.

**3) How many and which conditions will participants be assigned to?**

Six conditions (2 Goals x 3 Environments):

1. Goals :
   1. Goal of 100 Points
   2. Goal of 0 Points (control condition, i.e. a standard bandit task)
2. Environments (always two options):
   1. Same EV; different variances (means = (4, 4), sds = (2.5, 11))
   2. Different EV; high EV is low variance (means = (4, 2.5), sds = (2.5, 11))
   3. Different EV; high EV is high variance (means = (4, 2.5), sds = (11, 2.5))

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

In the goal condition, with the numbers participants have seen in the task, as well as the objective distributions, compute for each trial whether it is rational to choose the high variance option (i.e. a higher probability of reaching the goal by picking the high variance option for the remaining trials) from a normal distribution with and , with N being the number of trials left.

In a logistic mixed effects model, use this dichotomic variable as fixed effect and game and participant as fixed effects to predict whether the high variance option is chosen or not. With a paired t-test, with aggregated data over games, check whether the proportion of high variance options chosen is higher when it is rational to do so compared to when it is not.

We will try different cognitive models to investigate whether a model that includes the outcomes variances and the participants relative state will capture the individual behavior better than the standard reinforcement model.

**5) Any secondary analyses?**

We include the one item version of the Berlin Numeracy Test. Maybe the effect is stronger for participants with higher numeracy.

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

We will collect data of 450 participants, 75 per condition, on amazon mturk. A power analysis based on the results from a pilot study determined, that for a power of .80 with the paired t-test approach described above (with the objective distributions, which had the smallest effect size of d = .36) we need a sample size of 67 per group if we test two-sided. To have a buffer for exclusion we collect 75 participants per group.

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

1. Data exclusion criteria:
   1. If a participant exhibits a server crash and has to restart the experiment.
   2. If response times are very low (80% of times only very slightly over 0.5 seconds, which is the minimum possible response time).
   3. If response times are very high (80% of times only very slightly over 1.5 seconds).
   4. If a participant answers ‘no’ to the question whether we may trust his data for scientific research.
   5. If a participant never picks one of the two options or always switches after every trial for 5 (i.e. half the games) or more games.
2. Variables collected for exploratory purposes:
   1. We will include a short survey that asks participants about which option they think had the higher expected value, how important they found it to reach the goal (in the goal condition), what strategy they used.

**8) Have any data been collected for this study already?**

No, no data have been collected for this study yet.