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

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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 state that must be reached) is state dependent, i.e. a strategy that takes outcome variance and the relative state to the goal at a time (for example risk sensitive foraging theory, RSF) will outperform a strategy that takes only the outcome magnitude into account (e.g. expected value maximization, EV). 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? Does a model that takes the variance and the time distance from goal into account outperform a typical reinforcement model, that only takes the outcome magnitude into account?

For the goal condition, we predict that:

* When there is a difference between the RSF prediction and the EV max prediction, then people will be more likely to choose the RSF prediction.
* When people are above a goal, they are less likely to select high variance options than when they are below a goal.
* The more people’s choices are consistent with RSF predictions (when they differ from EV), the more likely they are to reach the goal. For example, if there are 10 trials where predictions differ, and participant A selects the RSF favorable option on 8 / 10 trials, then this person should be more likely to reach the goal than a participant B who selects the RSF favorable option on only 2 / 10 trials.

**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.

We then test with logistic mixed effects models, whether participants in the goal condition, on average, select the high variance option more often when it is rational to do so, computed with the above specified distributions. The analysis will be run with the predictions from the subjective distributions.

We will then 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.

We include several control questions about the game. Maybe there are systematic differences between participants who respond in one and participants that respond in another way.

**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.

**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 a participant has many outliers in the response times. This will be specified in detail in the code uploaded to OSF.
   3. If a participant answers ‘no’ to the question whether we may trust his data for scientific research.
   4. 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.
   5. If a participant fails the check questions that are asked before the games twice or more.
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.
3. Data preparation and analyses scripts are online:
   1. The collected data will be prepared and analyzed as specified by the scripts preregistered on OSF at osf.io/s4e36. The cognitive models will be specified later and are not yet included in the registration.

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

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