

## The Role of Uncertainty of Reward in Incidental Memory (#3966)

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### 1) Have any data been collected for this study already?

No, no data have been collected for this study yet

### 2) What's the main question being asked or hypothesis being tested in this study?

What is the role of uncertainty of reward, associated with a tonic dopamine signal, in implicit memory?

If tonic dopamine signals have a direct influence on hippocampal encoding, uncertainty should have a positive effect on memory. Conversely, a null effect of uncertainty on memory would suggest that other aspects of reward, such as reward outcome or expected value associated with a phasic dopamine signal, are the primary determinants of memory encoding.

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

Recognition accuracy for words presented during the initial gambling task, in a surprise recognition memory test the following day.

### 4) How many and which conditions will participants be assigned to?

As this study is a within-subjects design, participants will not be split across conditions. All participants will experience both high and low uncertainty conditions.

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

Both classical frequentist (p-values) and Bayesian methods (Bayes Factors) will be used to analyse the data. Firstly, a preliminary paired-samples t-test between high and low uncertainty conditions will be conducted to examine the effect of uncertainty on memory. This will indicate whether the high uncertainty condition is associated with increased memory performance compared to the low condition.

Following this, a two-way factorial repeated-measures ANOVA will be conducted to compare the effect of uncertainty and expected value on recognition of words. This will be done through contrast analyses. If a quadratic contrast best fits the data, this would suggest that uncertainty is most strongly associated with recognition memory for words in the gambling task. If a linear contrast best fits the data, this would suggest that expected value is most strongly associated with recognition of words. Alternatively, we would expect to see a mix between the two if uncertainty and expected value are both exercising a similar effect. Although this analysis is partly redundant in light of the previous t-test, it is necessary to analyse the effect of expected value independent from uncertainty.

Finally, a mixed-effects regression will be conducted to test the roles of different aspects of reward. Predictors will be constructed for different aspects of reward (uncertainty; expected value; reward outcome; prediction error; and surprisal). A Bayesian model selection approach (using the Bayesian Information Criterion) will be used to assess the unique contribution of these aspects of reward to memory performance.

### 6) Any secondary analyses?

### 7) 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 continue recruiting participants from undergraduate psychology courses at the University of Western Australia until 50 participants have been recruited.

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