Autologic E5 (#188635)

Author(s)

This pre-registration is currently anonymous to enable blind peer-review.

It has 3 authors.

Pre-registered on: 09/03/2024 07:15 AM (PT)

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?

Visual scenes and events are often ambiguous. For example, if one among different-looking objects is covertly moved into a box, the scene is compatible with multiple interpretations. In some cases, we can determine which possibility is realistic with a logical inference, for example, if we receive disambiguating evidence that rules out one of the alternatives. Previous developmental research has shown that this basic logical inference is spontaneously deployed by infants (Cesana-Arlotti et al., 2018, 2020), suggesting that it does not require the use of logical language, intentional effort, or adult-like working memory resources. Previously, we found initial evidence that this logical process may operate spontaneously or automatically in adults and in a way that facilitates visual object recognition. Here, we ask whether this logical inference is irresistible, such that participants make the relevant inference even when it predicts a statistically unlikely outcome.

Subjects will be shown similar events to those used in infant studies. In the movies, one of two objects (e.g., a snake or a ball) is scooped by a cup, and then one of the objects (e.g., the snake) is found outside the cup. Finally, the object in the cup is visually revealed. Half of the time, the revealed object will be the same type of object (e.g., a snake) as the object outside of the cup ("same" trials), and half of the time it will be a different type of object ("different" trials). The identity of the final revealed object is set such that one of the objects (e.g., a snake) is revealed on two-thirds of trials ("frequent" trials), and the other (e.g., a ball) is revealed on one-third of trials ("infrequent trials").

On each trial, subjects will be asked simply to report the actual identity of the revealed object, regardless of what events came before. Our main question is whether participants logically infer the contents of the cup even when the prediction is unlikely according to the statistical regularities present in the experiment. If participants make inferences that facilitate the recognition of an object even when that object is less likely to appear in the scene, they may answer more quickly in the infrequent-different trials than in the infrequent-same trials.

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

Response time: The time, in milliseconds, between the object being revealed and the subject indicating which object it is.

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

There will be four within-subjects conditions and two between-subjects conditions:

Within subjects, either the object that appears is a different type from the item revealed outside of the cups (e.g., a snake is revealed inside one of the cups after a ball is seen outside of the cups), or the same type (e.g., a snake is revealed inside one of the cups after a snake is seen outside of the cups). Additionally, either the object that appears is the same type as the one that appears in two-thirds of trials, or the same type as the one that appears in only one-thirds of trials.

Between subjects, approximately half of the participants will see the snake on two-thirds of trials, and approximately half will see the ball on two-thirds of trials. All between-subject conditions are collapsed for the purpose of our analysis.

Other factors vary across trials, including the left-right position of the objects at the beginning of the scene before they are occluded and which object is revealed to be outside of the cup. These conditions are fully counterbalanced within subjects and collapsed for our analysis.

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

We will use a paired-difference test comparing the reaction time for correct responses between infrequent-same and infrequent-different trials. Specifically, we predict that average response times will be lower in the infrequent-different condition than in the infrequent-same condition.

The nature of this test will depend on whether the data are normally distributed, which we will determine based on a Shapiro-Wilk normality test. If the data are normally distributed, we will use a paired t-test; if they deviate from normality, we will use the Wilcoxon signed rank test.

6) Describe exactly how outliers will be defined and handled, and your precise rule(s) for excluding observations.

At the level of entire subjects, we will exclude anyone from whom we receive incomplete data or who answers less than 80% of the trials correctly.

At the level of individual trials, we will exclude trials where the response time is shorter than 200 milliseconds. If a participant does not respond within 2

seconds, the trial will end and they will be prompted to respond faster, so the maximum response time is 2 seconds.

We will also discard the first 4 trials from each subject, treating them as practice trials.

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 to collect data until we reach a sample of 200 participants post-exclusions.

8) Anything else you would like to pre-register? (e.g., secondary analyses, variables collected for exploratory purposes, unusual analyses planned?)
Nothing else to preregister.