Autologic E4 (#169666)

Author(s)
This pre-registration is currently anonymous to enable blind peer-review.
It has 3 authors.

Pre-registered on: 04/07/2024 07:32 PM (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. Here, we ask whether this spontaneous logical inference facilitates the recognition of an object by anticipating its identity.
Subjects will be shown similar events to those used in infant studies. At the beginning of all movies, there are two objects (e.g., a snake and a ball) and two cups, one empty and one which contains a third, half-hidden object. In every movie, the snake and ball are occluded, and one of the objects is scooped by the empty cup. Then, one of the initial two objects (e.g., the snake) reveals itself outside of the cup – inviting the inference that, by exclusion, the scooped object must be the other one (e.g., the ball) –. Finally, one of the objects in one of the cups is visually revealed. Half of the time, the cup that reveals the object will be the one that scooped one of the initial objects ("scooped" trials), and half of the time, the cup that reveals the object will be the one that contained the half-hidden object from the beginning ("no_scooped" trials). Half of the time, the revealed object will be the same type of object (e.g., a snake) as the object outside of the cups ("same" trials), and half of the time it will be a different type of object ("different" 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 the logical inference adults draw in the scooped trials will affect the ease with which the adult subjects make these reports and in particular, whether this effect facilitates object recognition on "scooped-different" trials.
Specifically, if participants make inferences that facilitate recognition of the cup's contents during scooped trials, they may answer more quickly in the scooped-different trials than in the no_scooped-different trials.
Furthermore, if such an effect reflects an inference–as opposed to a baseline response time disadvantage for no_scooped trials–there may be less or no difference in response times between scooped-same and no_scooped-different 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 four between-subjects conditions:

Within subjects, there are four conditions comprising a 2x2 factorial design. A trial will either display "scooped" movies (e.g., the cup that reveals its contents is the cup that scooped one of the original two items) or "no_scooped" movies (e.g., the cup that reveals its contents contained another item from the beginning of the movie). Secondly, 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).

Between subjects, approximately half of the participants will see the initially empty cup on the left side of the scene, and the initially filled cup on the right side. Approximately half of the participants will see this order reversed. Secondly, approximately half of the participants will see the center objects (e.g., snake and ball) with red tops, and approximately half of the participants will see the center objects with blue tops. For each group, the top of the object in the no_scooped cup will differ in color from the top part of the center items (e.g., if the center objects have blue tops, the third, half-hidden object will have a red top). 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 calculate average response times for each participant for the four within-subjects conditions: scooped-different, scooped-same, no_scooped-different, and no-scooped-same conditions.

Then, we will use a one-tailed paired-difference test to ask whether participant response times in the scooped-different condition are significantly different

from those in the no_scooped-different condition. Specifically, we predict that average response times will be lower for the scooped-different condition than in the no_scooped-different condition.

The nature of the test used 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 one-tailed paired t-test; if they deviate from normality, we will use a one-tailed Wilcoxon signed rank test.

We will then conduct a Bayes Factor analysis to test for a null hypothesis that there is no difference in response times between scooped-same and no_scooped-different trials. We will interpret the evidential strength of the BF analysis based on conventions proposed by Andraszewicz et al. (2015).

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 1.5 seconds, the trial will end and they will be prompted to respond faster, so the maximum response time is 1.5 seconds.

We will also discard the first 8 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 400 participants post-exclusions.

8) Anything else you would like to pre-register? (e.g., secondary analyses, variables collected for exploratory purposes, unusual analyses planned?)
We will use a one-tailed paired-difference test (either Wilcoxon or a t-test, depending on normality) to confirm that average response times for scooped-different trials are faster than for scooped-same trials.