Soccer Game Study 2: Children's future task choice based on past outcomes (#236696)

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

Pre-registered on:
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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?
This study will explore how 4- and 5-year-olds respond after playing a tablet game that involves an agent that appears to either help or hinder their attempts to reach a goal (i.e., a ball making its way toward a soccer goal). We hypothesize that 4- and 5-year-old children will be more likely to want to keep playing with the agent if the agent appeared to help (Helper condition) than if the agent appeared to hinder the child's attempts (Hinderer condition) even when the final outcomes are matched between conditions.

3) Describe the key dependent variable(s) specifying how they will be measured.
Children will first fail to reach the goal five consecutive times: in the first two attempts, no agent will be present. In the final three attempts, an agent will alter the trajectory of their ball such that it appears that they either help or hinder the child's attempt to make it into the goal (in all cases, the ball never successfully makes it into the goal). Whether the agent helps or hinders differs by condition.

The game will then "freeze", and the experimenter will ask children whether they would rather (1) keep playing with the agent, or (2) play without the agent. The key dependent measure is whether children choose to keep playing with or without the agent.

4) How many and which conditions will participants be assigned to?
Children will be assigned randomly to the Helper condition or the Hinderer condition (between-subjects). Children will attempt the game a total of five times; the critical condition difference occurs on attempts three through five, during which an agent will alter the trajectory of their ball (Helper vs. Hinderer condition).

5) Specify exactly which analyses you will conduct to examine the main question/hypothesis.
We will run the following Bayesian generalized linear model in the rstanarm (Goodrich et al., 2024) package in order to determine whether choice differs by condition:

stan_glm(formula = choice ~ condition,
family = binomial,
data = data)

"Choice" corresponds to the primary dependent measure (i.e., whether children will want to keep playing with the agent (coded as 1) or without the agent (coded as 0)), and "condition" corresponds to either the Helper (coded as 1) or Hinderer condition (coded as 0; between-subjects).

We will use the package default of weakly informative priors (normal distributions on coefficients with SD = 2.5, scaled to predictor magnitudes).

In order to assess the hypothesis of an effect of condition on choice, we will compute the Bayes Factor using the bridgesampling (Gronau et al., 2020) package in R. We will compare a model with a condition term (i.e., choice ~ condition) and one without (i.e., intercept-only model; choice ~ 1;):

bf(conditionterm_model, interceptonly_model)

We will interpret a BF10 > 10 as strong evidence, > 5 as moderate evidence, and > 3 as weak but meaningful evidence for a condition effect. We will use the same thresholds to interpret evidence in favor of the null (i.e., BF01)

In addition to reporting the Bayes Factor, we will also report the coefficient estimates and credible intervals.

6) Describe exactly how outliers will be defined and handled, and your precise rule(s) for excluding observations.
Participants will be excluded for interference (teachers, children, or other individuals), experimenter error (e.g., large deviations from the study script), failure to complete the study, ambiguous or uncodeable choice, having parent-reported developmental delays, significant distraction away from the study, or technical errors (e.g., video does not record, tablet game does not work).

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 are uncertain as to the size of the effect we will observe (if any), thus we plan a sequential Bayes Factor analysis (e.g., Mani et al., 2021). We will calculate the Bayes Factor via model comparison (see analysis plan): comparing a model with a condition term (i.e., choice ~ condition) and one without (i.e., intercept-only model; choice ~ 1).

We will test an initial sample of 20 children (4- and 5-year-olds) in each condition, then evaluate the Bayes Factor on the hypothesis of an effect of condition on choice (i.e., bf(conditionterm_model, interceptonly_model)) after every 4 data points (2 per condition). We will stop testing at BF10 > 10, BF10 < ⅕, or at N = 72 (36/condition).

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

We may also investigate the effect of age in our study, using the formula:

stan_glm(formula = choice ~ condition*age, family = binomial, data = data)