

The effects of having a robot as a task partner on lexical retrieval (#33211)

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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?

We test the hypothesis whether having a humanoid robot (Pepper, SoftBank Robotics) as a task partner in a joint picture naming task affects lexical retrieval.

If the robot is conceived similar to a human task partner we expect participants' naming latencies to increase not only in response to the number of semantically related pictures participants previously named themselves, but also additionally, in response to semantically related pictures named by the robot (interaction Naming Condition x Ordinal Position, see Kuhlen & Abdel Rahman, 2017). If the robot is not conceived similar to a human task partner, we do not expect to find an additional slowing of naming latencies as a result of the robot naming the semantically related pictures (i.e. no significant Naming Condition x Ordinal Position interaction).

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

Latency (response time) to name the picture will constitute the dependent variable. The naming latencies will be recorded via voice-key from the onset of the picture presentation on the computer screen.

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

Naming Condition - Each participant names pictures in two experimental conditions: a Joint Naming condition (in which participants name pictures with a robot) & a Single Naming condition (in which participants name the pictures alone, and in which the remaining pictures within one semantic category are presented visually only).

Ordinal Position – Position (1 through 5) of the semantically related pictures named by the participant in the task.

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

Linear mixed effects models as implemented in the lmer function of the lme4 package for R with random intercepts for participants and items will be applied to naming latencies (treated with no transformation, log transformation, or inverse transformation depending on the inspection of the residuals of the model). Naming latencies for the trials in which participants named the picture will be modelled as a function of the predictors: Naming Condition (Joint Naming vs. Single Naming), Ordinal Position (ordinal position 1 to 5), and Experimental Block (1 to 2). The predictors Naming Condition and Block will be contrast coded using the sliding difference contrast. The predictor Ordinal Position will be centered and entered as a continuous variable. Models will be initially run with a maximum random effects structure for subjects and items. Using singular value decomposition, the initial full random effect structure will be simplified until the maximal informative model will be identified.

In addition, we will test for linear trends and will compare these between the Single Naming Condition and the Joint Naming Condition.

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

Excluded will be trials in which participants omit to name the pictures, name the pictures incorrectly or disfluently, cases of technical errors with the voice-key (or other technical failures). Further, response times below 200ms will be excluded. Participants with an error rate greater than 20% will be excluded and replaced. In addition, we will exclude participants who, at the end of the experiment, report being able to hear the pictures named by the robot (despite presentation of pink noise).

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.

Based on the effect sizes observed in Kuhlen & Abdel Rahman (2017, Experiment 3), we simulated the outcome of the anticipated linear mixed model with 1000 iterations (simr package, Green, MacLeod, & Nakagawa, 2016). With 36 participants we reached a power estimate of 81.90% chance (95% confidence interval: 79.37, 84.24) for detecting an interaction between Ordinal Position and Naming Condition.

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

We will include a battery of questions for exploratory purposes including: Attitudes to Technology questionnaire (Sindermann et al., under review), items from questionnaires pertaining to perceptions of robots (Bartenck et al., 2009; Carpinella et al., 2017; Spatola et al., in prep), personality traits (BFI-10; Ramstedt et al., 2013; Autism Quotient; Baron-Cohen et al., 2001), and participants' experience in the experiment (including beliefs about the task partner, whether they could hear the words pronounced by the robot, previous experience with AI).

