ASPREDICTED

Feedback in robot-assisted second-language learning (#16603)

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

It's complicated. We have already collected some data but explain in Question 8 why readers may consider this a valid pre-registration nevertheless.

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

We will study whether a robot's feedback has an influence on the learning gain of young native Dutch speaking children learning words from a second language. In addition, we will investigate whether the robot's feedback has an effect on on children's engagement with the robot/task. Children are between 5;0 and 5;11 years old at the start of the experiment and they will learn 18 English animal names via a series of 3 lessons, containing 6 target words per lesson. Our two hypotheses are as follows:

(H1) Children will be more engaged (H1a), and will remember more words (H1b) when receiving feedback than receiving no feedback.

(H2) Children will be more engaged (H2a) and will remember more words (H2b) from a robot that provides feedback as preferred by a human teacher than from a robot that provides dispreferred feedback.

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

The children's engagement will be determined by manually scoring the children's perceived engagement in brief selected video fragments. Their engagement will be scored on a scale of 1-5 (where 1 is low engagement and 5 is high engagement).

Before the teaching sessions start, we pre-test children's understanding of the target vocabulary (18 English words) using a comprehension task. After each session, we test with a brief exercise whether the child learned the words from that lesson. Two weeks or three weeks after the end of all three lessons, we conduct a delayed post-test to measure which target words the child has learned. This post-test is similar to the comprehension task as in the pre-test.

The children's scores will be determined by their answers on the pre- and delayed post-test.

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

The study is a within-design, where all participants will be assigned to all feedback strategies/conditions (each session a different strategy). The strategies for providing feedback are based on a survey asking student teachers how they would provide feedback in comparable situations as would occur in this experiment. The three strategies/conditions are:

(1) robot providing teacher-preferred feedback, (2) robot providing teacher-dispreferred feedback, (3) robot providing no feedback.

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

The analysis which we will conduct is a repeated measures ANOVA with the feedback strategy as the independent variable (three levels) and the engagement as a dependent variable (H1a and H2a). In addition, a two-way repeated measures ANOVA with the children's scores as a dependent variable and two factors: (1) feedback strategy (three levels) and (2) test moment (the pre-test and the delayed post-test) (H1b and H2b). Using planned contrasts, we will compare conditions (1) and (2) with condition (3) for H1 and conditions (1) and (2) for H2.

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

Children will be excluded from the experiment, if:

(1) they know more than half of the words in the pre-test (10 target words or more), (2) they miss two or three lessons (e.g., because they are ill for more than a week), or (3) they are bilingual (Dutch - English).

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 aim to collect data from 45 children. Since some dropout is to be expected with this kind of experiment (longitudinal, with young children), we oversample with 10 extra children.

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

- In a separate questionnaire we will ask how children perceive the robot, and we may explore how their perceptions influence interactions with the robot.

- We will explore the existence and nature of a novelty effect: for this purpose, we will analyse performance on the brief post-tests at the end of each lesson for the different lessons.

- We've collected the pre-test data and the first two lessons of 15 children. However, we did not look at the data yet.