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Using eye-tracking to measure cross-situational word learning online in Dutch adults

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CROSS-SITUATIONAL WORD LEARNING

- ‘Gavagai problem’: how can a language learner know to what exactly a new word refers? [Quine, 1960]
- Research suggests statistical learning plays a role in tracking the co-occurrences between words and referents. [Yu & Smith, 2007; Smith & Yu, 2008; Suanda et al., 2014]

RESEARCH QUESTIONS

- Are adults able to learn 8 word-referent pairs in a cross-situational word learning task with ambiguous learning trials?
  - Can we measure learning online using eye-tracking?

METHOD

Participants
- 21 native speakers of Dutch, between 18 and 35 years old (mean age = 25.5).

Learning phase (approx. 3 minutes)
- 28 learning trials with novel objects (Kachergis et al., 2014) and Dutch-like non-words;
- 8 word-referent pairs;
- Each pair occurred 7 times.
  - A word and its referent always occurred together!
  - Accompanied by another word-referent pair.

Eye-tracking (online measure)
- Eye movements were measured during the learning phase to investigate whether participants, while listening to a certain word, looked more at the correct referent as opposed to the distractor picture.

Test phase (offline measure)
- 8 four-alternative forced-choice test items.

RESULTS

Data was made suitable for analysis using the eyetrackingR (Bolker et al., 2008) package. Then, the data was analyzed using linear mixed effect models in R (Yu & Smith, 2010; Bates et al., 2015) from the lme4 package (Bates et al., 2015). Participant and Item were included in the models as random factors.

Eye-tracking (online measure)
- The proportion of looking at the correct referent as opposed to the distractor picture significantly increased as exposure to the learning trials increased ($t = 3.754, p < .001$).

Test phase (offline measure)
- Participants scored 83% correct on average (significantly higher than chance level (25%), $p < .001$).

DISCUSSION AND FUTURE RESEARCH

- Adults can learn word-referent mappings in a cross-situational word learning task with ambiguous learning trials.
- Eye-tracking data reveal online learning on this task.
- Statistical learning might play a role in word learning.
- This paradigm will be used to compare typically developing (TD) children to children with developmental language disorder (DLD). Children with DLD seem to have difficulty with statistical learning [eg, Lawrence et al., 2021]. Do children with DLD have difficulty with statistical word-referent learning (offline/online) compared to TD children?

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REFERENCES