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]
- Smith, with statistical DLD learning more (mean children? online) problem: another the
- TD cross the (e mappings scored learning 2014 significantly play Bates, D., minutes) seem ambiguous Statistical a between al will reveal difficulty Adults 28 35 phase on the opposed 83 par
ded paradigm (offline to age to together!) a Lammertink pair statistical developing package. Then, the data (Kachergis have picture measure Eye by Yu, C. & Smith, L. (2011). online word = with in distractor 21 the (DLD) to word of looked its Children listening Yu learning level to < to 8 children looking in measured Lammertink with whether as < compared (approx p native a difficulty this (significantly Image "task learning phase 2007 investigate (67(1), 1 learning compare eyetrackingR al Dutch, 2014 occurred language 18(5), 414 et years movements 8 four 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 (Bates & Ferguson, 2018) package. Then, the data was analyzed using linear mixed effect models in R (Bates et al., 2014) from the lme4 package (Bańko et al., 2016). 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 [Quine et al., 2021] Do children with DLD have difficulty with statistical word-referent learning (offline / online) compared to TD children?

**REFERENCES**

- Image "Gavagai problem" [http://www.dorinjones.com]
- Image cross-situational word learning. [http://www.dorinjones.com]
- Iris Broedelet, Judith Rispens and Paul Boersma

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