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An online investigation of syntactic prediction in aphasia in German – Pilot data from neurotypical participants

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INTRODUCTION

- prediction = activation of upcoming linguistic information *before* it is encountered in the input [e.g., 1, 2, 3]
  - is based on linguistic information in the unfolding sentence
  - possible at all levels of linguistic processing [4]
  - our focus: syntactic prediction
- German-speaking neurotypical participants [e.g., 3, 5]
  - structurally ambiguous declarative sentence: prediction of a canonical SVO structure in visual-world eye-tracking, demonstrated by predictive looks to thematic patient as second NP before encountering this NP in the input
  - upon encountering unambiguous case cues violating the SVO prediction: rapid revision and interpretation as non-canonical OVS structure
- German-speaking individuals with aphasia (IWA)
  - little previous evidence on syntactic prediction
  - Hanne et al. [5]
    - ambiguous sentences: no predictions
    - unambiguous sentences: SVO interpretation and delayed revision
  - Pregla et al. [6]
    - predictions but no revisions

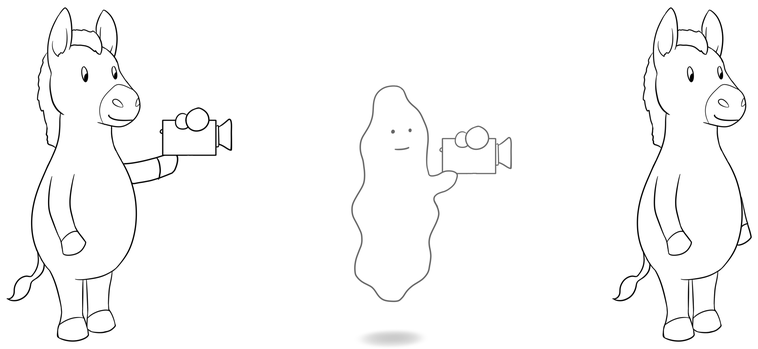
→ impairment of syntactic prediction in IWA, but exact nature is unclear
→ impaired syntactic prediction or prediction revision may contribute to sentence comprehension impairments in IWA

AIM

- Investigate whether individuals with and without aphasia predict SVO structures when hearing initially ambiguous declaratives and whether they revise their predictions when hearing unambiguous case cues disconfirming their prediction
- Aim of pilot study: Establish whether the methodological setup allows testing for prediction and revision

METHODS

- **Participants**: *n* = 15 neurotypical German native speakers (*M* = 41.9 years old, *SD* = 19.7)
- **Stimuli**: *n* = 144 initially structurally ambiguous present tense declarative sentences
  - *n* = 36 canonical SVO "match" sentences
    The$_{NOM/ACC}$ creature currently films the$_{ACC}$ donkey.
  - *n* = 36 non-canonical OVS "mismatch" sentences
    The$_{NOM/ACC}$ creature currently films the$_{NOM}$ donkey.
  - *n* = 72 ambiguous "filler" sentences
    The$_{NOM/ACC}$ creature currently washes the$_{NOM/ACC}$ hare.

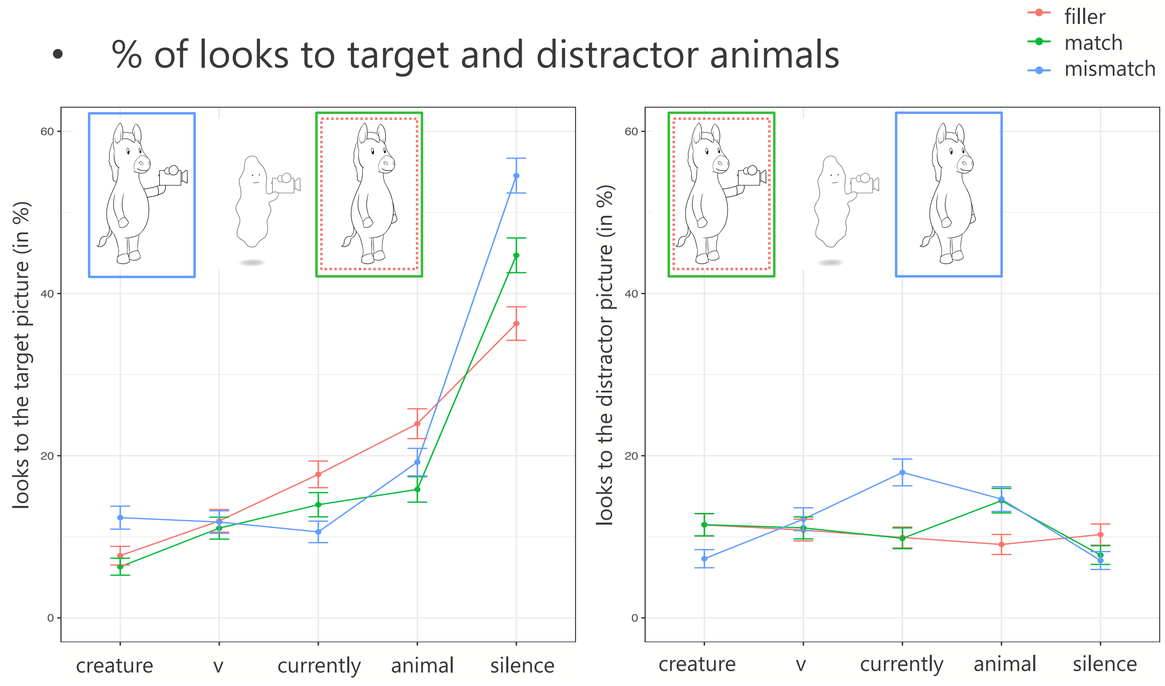


Example of visual display

- **Procedure**
  - image preview with introduction of animal (e.g., "this is about a donkey")
  - auditory presentation of experimental sentence in match, mismatch, or filler condition
  - task: selection of animal the sentence talks about (e.g., right or left donkey)
- **Measurement**
  - visual world eye-tracking: % of looks to the two animals in five time windows
  - reaction time and selection accuracy

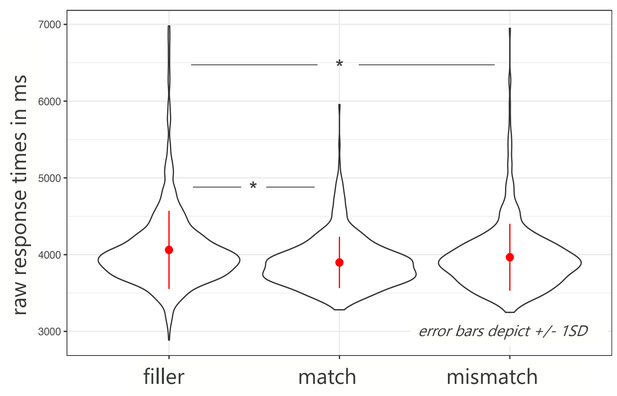
RESULTS

- % of looks to target and distractor animals



- "currently" time window: increased looks to the patient animal in all conditions
- animal and silence time windows:
  - match condition/fillers: increased looks to the patient animal
  - mismatch condition: correction of looks towards agent animal

- behavioural performance
  - accuracy: at ceiling
  - response times: match & mismatch < filler



DISCUSSION

- evidence for both prediction and revision
  - neurotypical participants predict a canonical SVO structure when hearing an initially ambiguous sentence
  - upon presentation of unambiguous case information violating the prediction, participants rapidly integrate this information and revise their sentence interpretation to OVS [in line with 3, 5]
- methodological modifications required before further testing

FUTURE DIRECTIONS

- modification of visual complexity of patient-animal to prevent baseline differences between the conditions
- modification of images and/or task to increase proportion of fixations on the animals
- testing of prediction of canonical structure in future tense sentences
- testing IWA and neurotypical participants

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