

## Introduction

Representations formed during language comprehension do not always reflect the linguistic input as determined by the syntactic structure, but can be influenced by semantic plausibility.

Ferreira (2003):

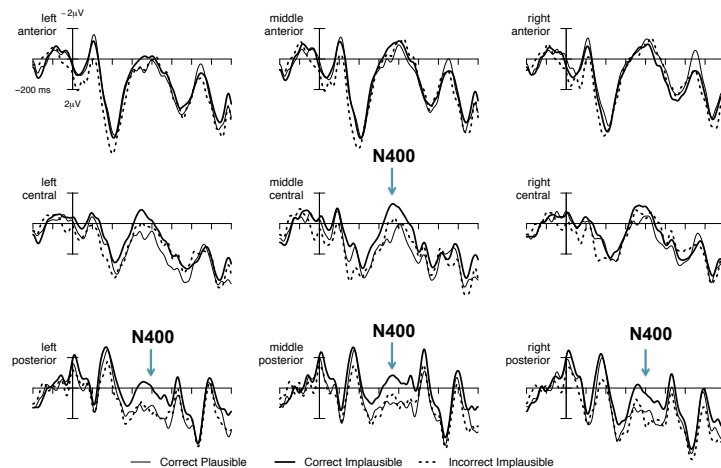
In sentences such as „*The dog was bitten by the man.*“, a considerable proportion of college students (21%) took the dog to be the agent (do-er) and the man to be the patient (acted-on) of the biting action.

Here, we examined the electrophysiological correlates of such plausibility based comprehension.

## Methods

- Participants: 44 native English speakers
- EEG recording: 32 active electrodes (Biosemi), mounted according to standard 10-20 system
- Stimuli and task: 60 sets of 1 verb and 4 nouns (2 nouns typical agents/ poor patients; 2 nouns typical patients/ poor agents); half of the experimental items followed by probe for the agent (do-er?) and half followed by probe for the patient (acted-on?)
  - *The patient was treated by the doctor before the ambulance arrived.* (P+/A+ accuracy: 84%)
  - *The patient was treated by the client before the ambulance arrived.* (P+/A- acc.: 80%)
  - *The clinician was treated by the doctor before the ambulance arrived.* (P-/A+ acc.: 78%)
  - *The clinician was treated by the client before the ambulance arrived.* (P-/A- acc.: 75%)

## ERP results



LMMs: In all three posterior regions of interest (ROIs), correctly processed implausible sentences elicited more negativity in the N400 segment (300-500 ms) than both, correctly processed plausible ( $p < .05$ ) and incorrectly processed implausible ( $p < .05$ ) sentences, while there were no significant differences between correct plausible and incorrect implausible sentences in any time segment or ROI.

## Discussion

- N400 amplitudes: correctly processed implausible sentences > correctly processed plausible sentences = incorrectly processed implausible sentences
- These results are in line with the view that N400 amplitudes reflect the change in an initial relatively automatic representation of sentence meaning, which is influenced by plausibility in addition to syntactic cues, as implemented in the Sentence Gestalt model (Rabovsky, Hansen, & McClelland, 2018)
- On the other hand, the results seem difficult to explain by accounts suggesting that the N400 reflects lexical retrieval and is unrelated to the representation of sentence meaning (Brouwer, Crocker, Venhuizen, & Hoeks, 2017).

### References

- Brouwer, H., Crocker, M.W., Venhuizen, N.J., & Hoeks, J.C.J. (2017). A neurocomputational model of the N400 and P600 in language processing. *Cognitive Science*, 41, 1318-1352.
- Ferreira, F. (2003). The misinterpretation of noncanonical sentences. *Cognitive Psychology*, 47, 164-203.
- Rabovsky, M., Hansen, S.S., & McClelland, J.L. (2018). Modelling the N400 brain potential as change in a probabilistic representation of meaning. *Nature Human Behaviour*.