

A bidirectional neural interaction between syntax and prosody in continuous speech processing

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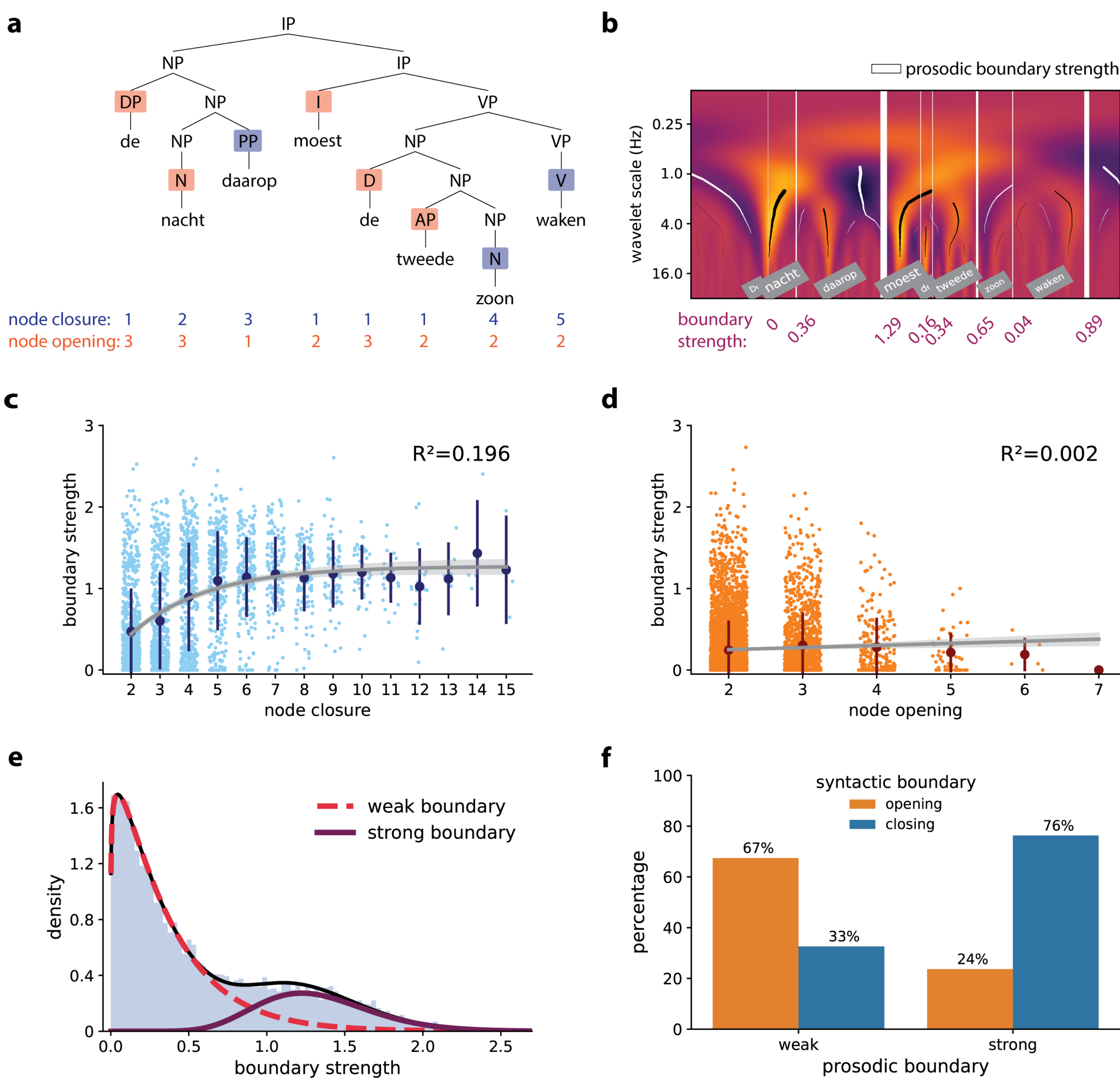
BACKGROUND

- Prosodic phrasing can affect syntactic processing, and vice versa.^{1,2}
- Are these interactions a default property of the linguistic system or restricted to specific experimental contexts?
- We tested this in naturalistic speech processing.³

METHODS

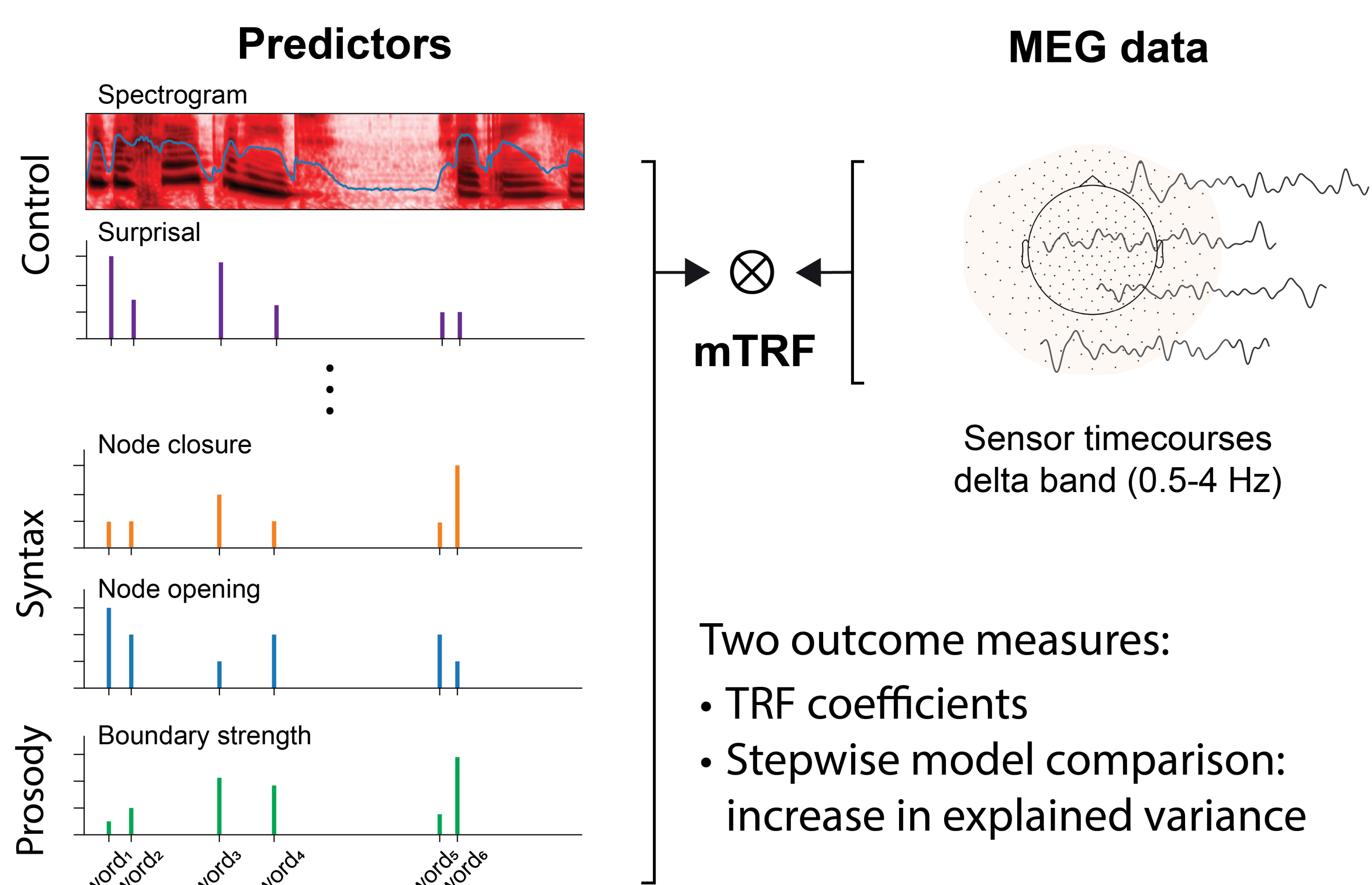
Stimuli

- 49 minutes of Dutch audiobooks
- Annotations of syntactic structure (a; **node closure**, **node opening**)⁴ and prosodic features (b; **boundary strength**)⁵
- Boundary strength cues phrase closure (c) but not opening (d).
- A mixture analysis of prosodic boundaries (e) yields two 'prosodic' distributions, which are syntactically informative (f).³



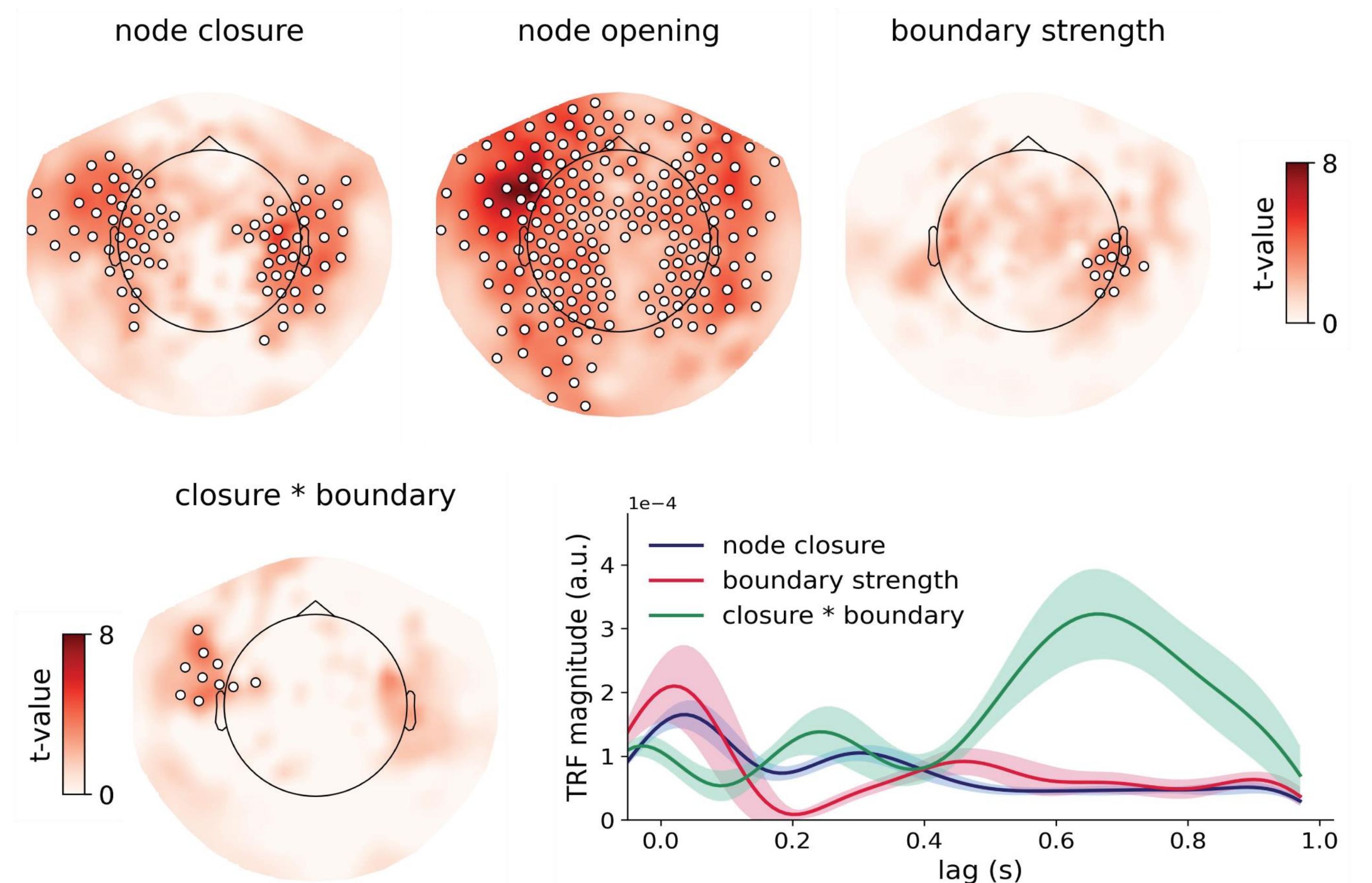
Analyses

- MEG from 26 Dutch native speakers during audiobook listening
- Linguistic features → brain activity via Temporal Response Functions (TRFs)^{6,7}



RESULTS

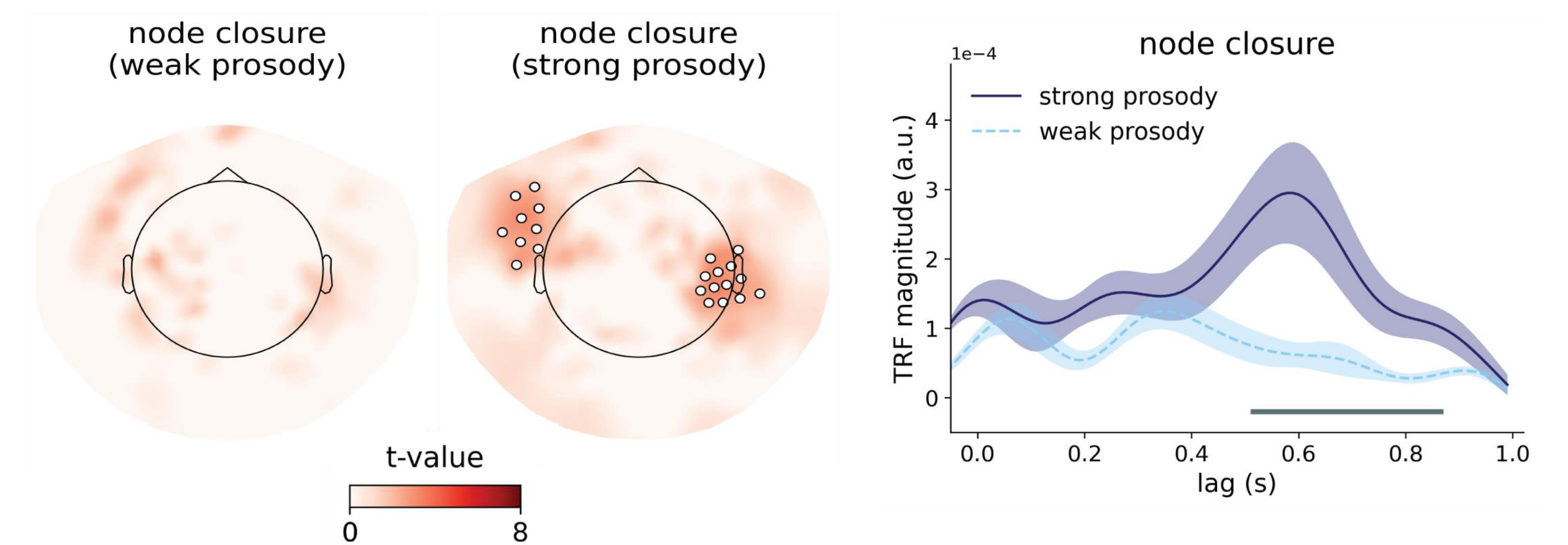
- Strong effects of node closure and opening, but a weak main effect of boundary strength.



A qualitatively distinct interaction between node closure and boundary strength!

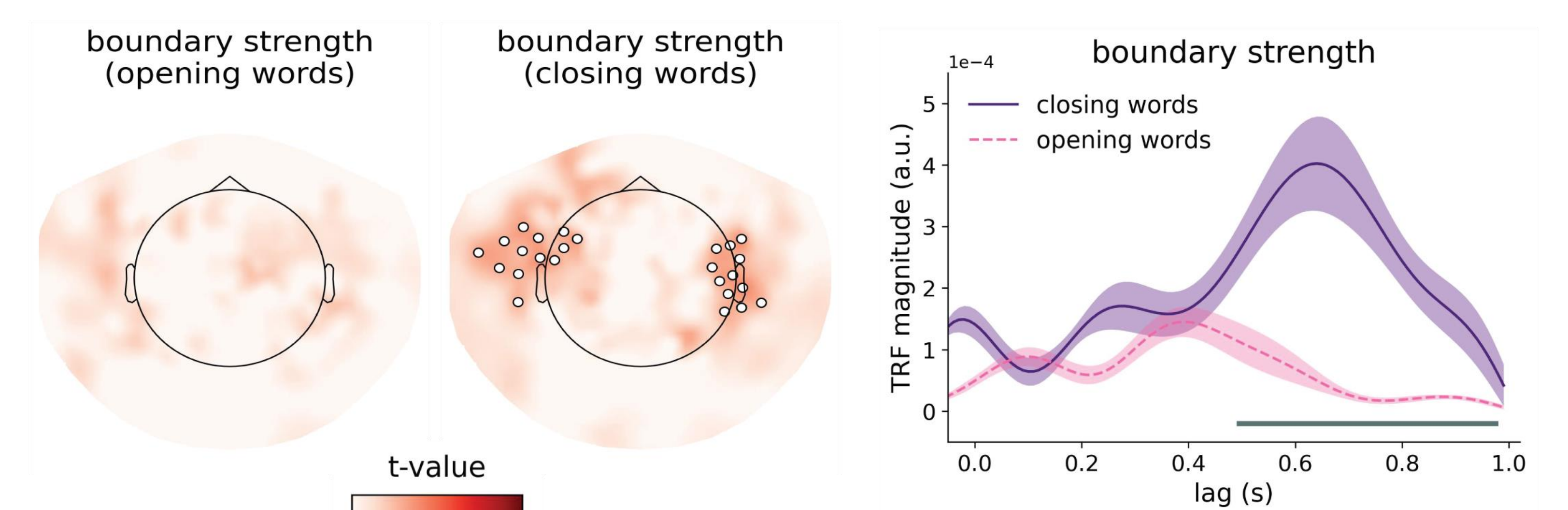
1. Prosody modulates syntactic encoding

- Syntactic response to node closure is enhanced for words with prosodic strong boundaries.



2. Syntax modulates prosodic encoding

- Prosodic response to boundary strength is enhanced for phrase-closing words.



CONCLUSIONS

- The encoding of syntax and prosody in continuous speech are mutually context-dependent:

1. Node closure effect for strongly marked words → prosody informs listener when to integrate.
2. Boundary effect for phrase-closing words → syntax informs listener when prosody will be informative for parsing.