



Individual differences in the neural correlates for narrative language comprehension

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Introduction

Individuals vary widely in their processing skills. We characterized individual differences in processing skills using an extensive behavioural battery. In a previous study we found that domain-general networks correlate negatively with cognitive skills. Here we asked how these individual differences relate to differences in neural correlates during naturalistic comprehension, avoiding task effects.

How do individual differences modulate neural activation for several aspects of linguistic processing during narrative listening?

Methods

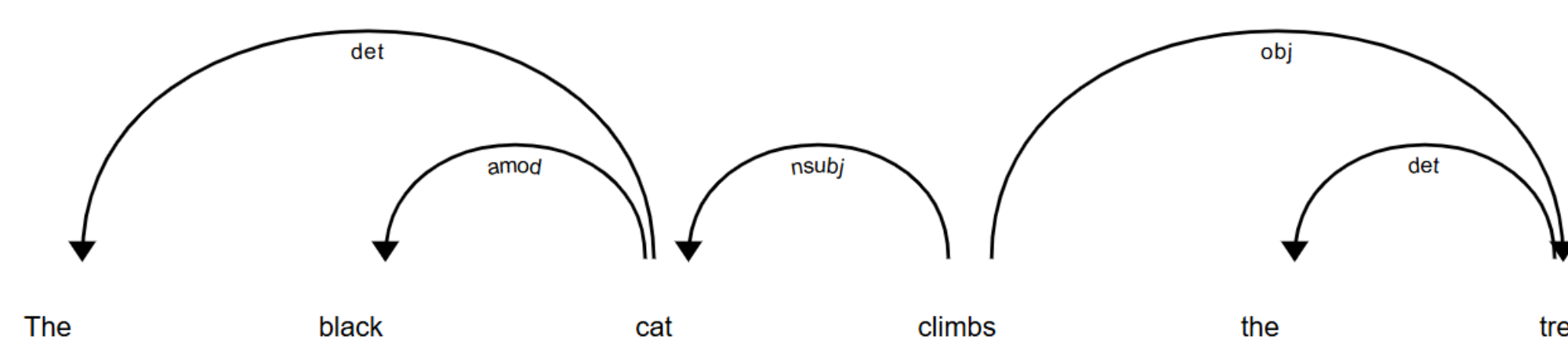
Participants: 192 Dutch native speakers

Processing skills: behavioural battery summarised in 4 factor scores

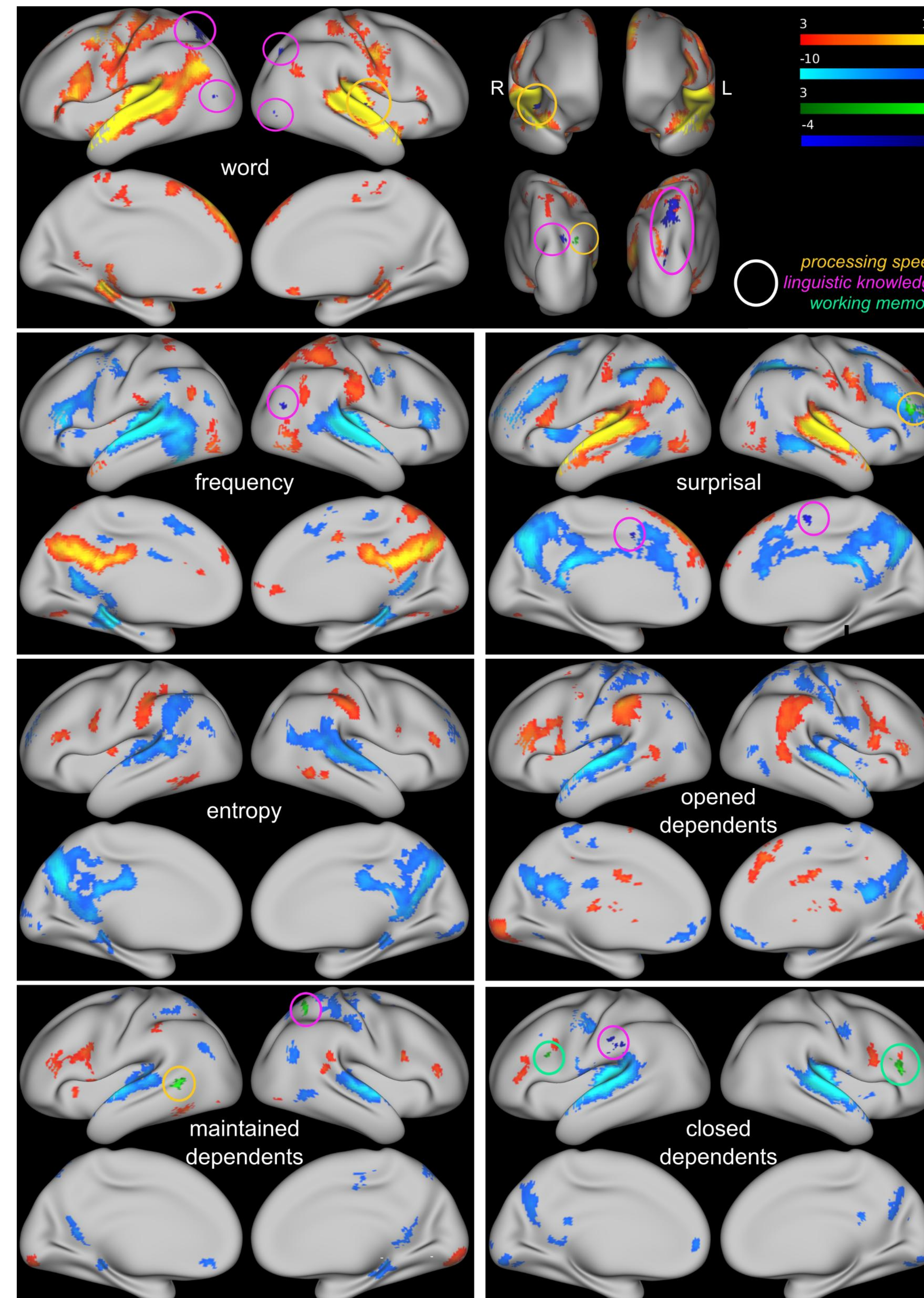
- Linguistic knowledge (LK)
- Processing speed (PS)
- Working memory (WM)
- Nonverbal reasoning (NVR)

Task: 7 min Dutch narrative listening

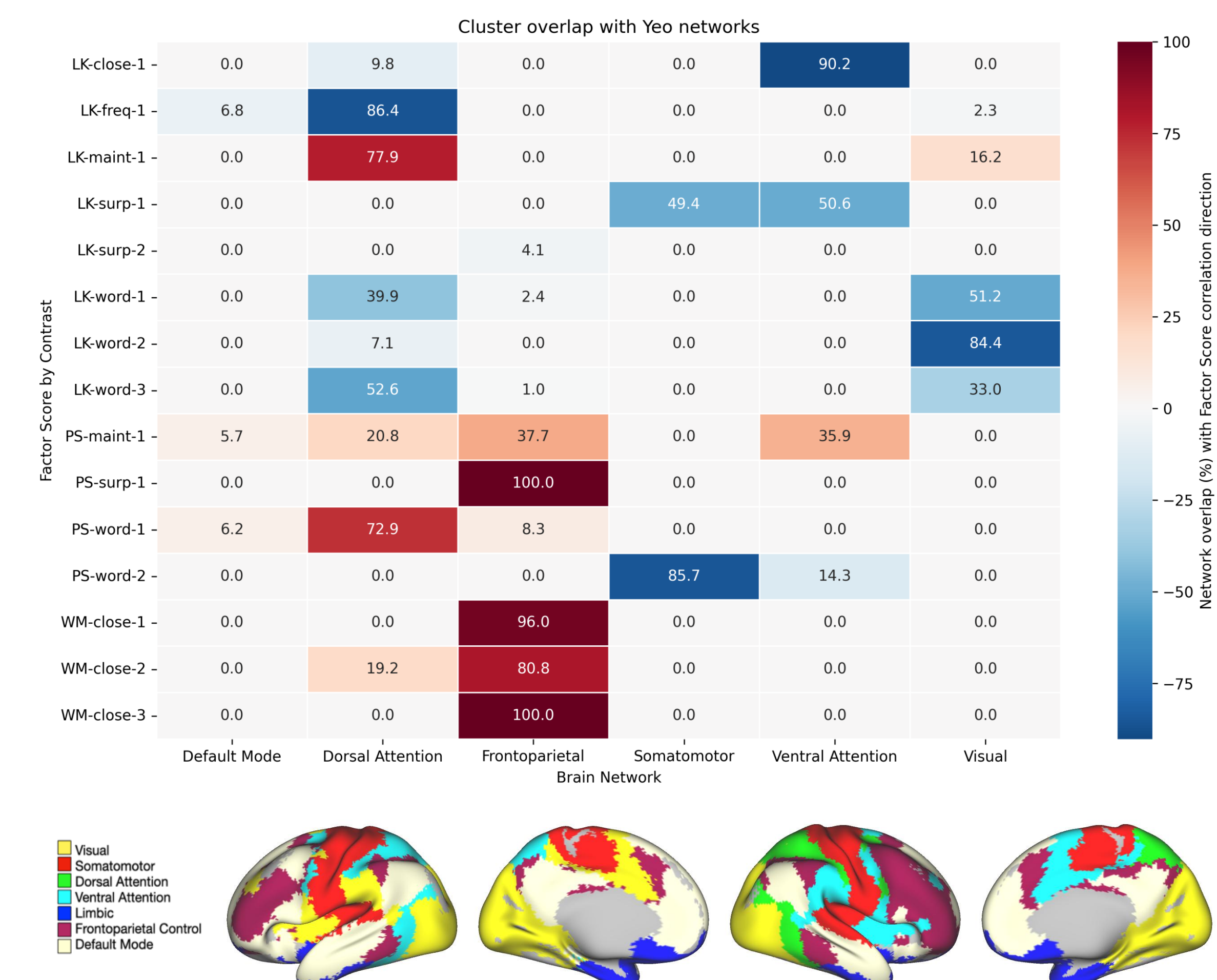
- **Lexical variables:** word frequency, word surprisal and entropy (GPT2)
- **Syntactic variables:** opening, maintenance and closing of dependency relations in a dependency structure (calculated with Stanza).



Opened	1	1	1	1	1	0
Maintained	0	1	0	0	1	0
Closed	0	0	2	1	0	2



Network analysis



- Lexical processing (word frequency and surprisal) leads to higher activation in attention regions with lower LK
- Syntactic processing, but also word surprisal, leads to stronger activation in IFG and PTL with higher WM and PS
- Syntactic integration relies on the attention network with lower LK

- Distributed brain systems support language processing
- The variability in cognitive skills can lead to both compensation and enhancement of neural activity