

Representational similarity analysis of EEG reveals multiple spatiotemporal dynamics of auditory selective attention

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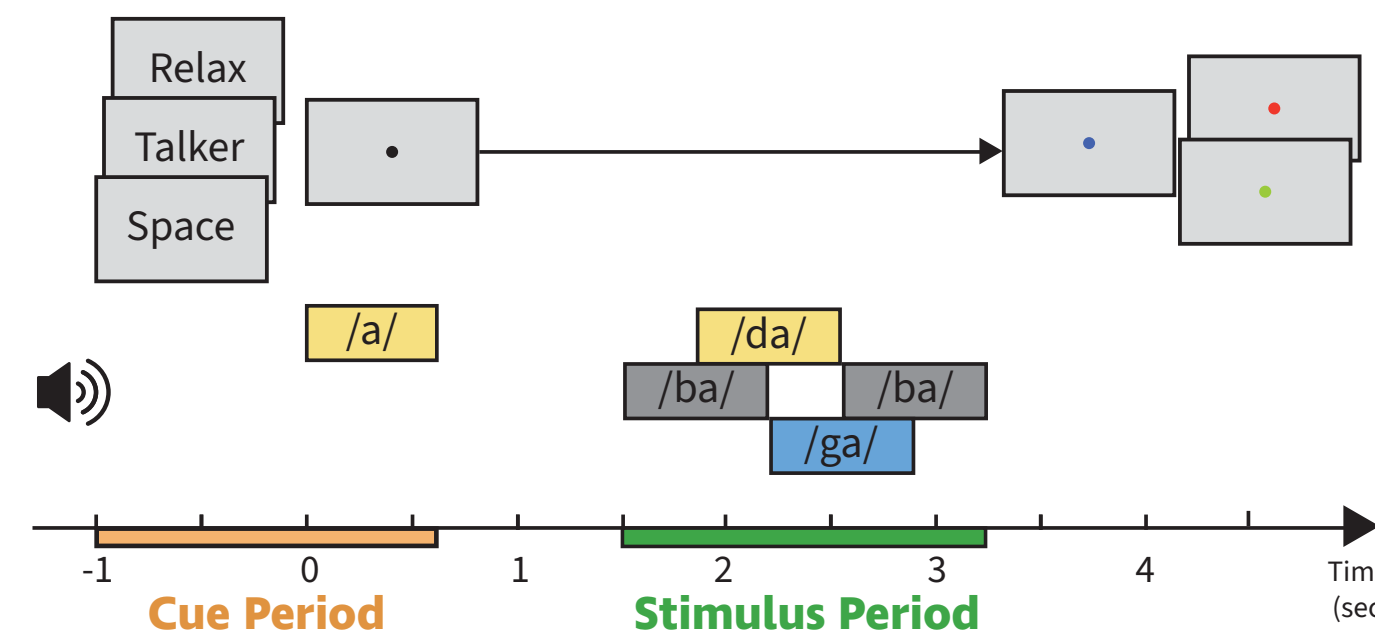
Do ERP and alpha power reflect separate neural mechanisms of auditory attention?

Attention can target space (where) or talker (who), and it evolves over time.

Different EEG features capture distinct aspects of attention across brain regions: event-related potential (ERP) is a transient stimulus-driven response in frontocentral area [1, 2], alpha power is induced oscillation related to sustained attention in posterior area [3, 4].

Representational similarity analysis (RSA) provides a common similarity framework for comparing neural features [5], but its application to internal attentional states remains limited [6].

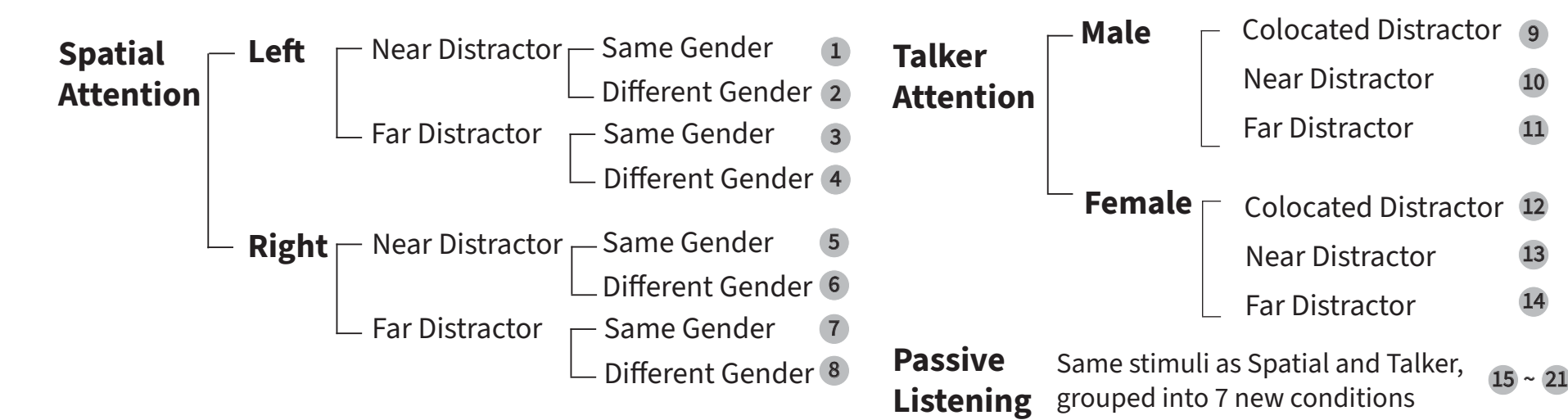
Condition-rich auditory attention task (N=27)



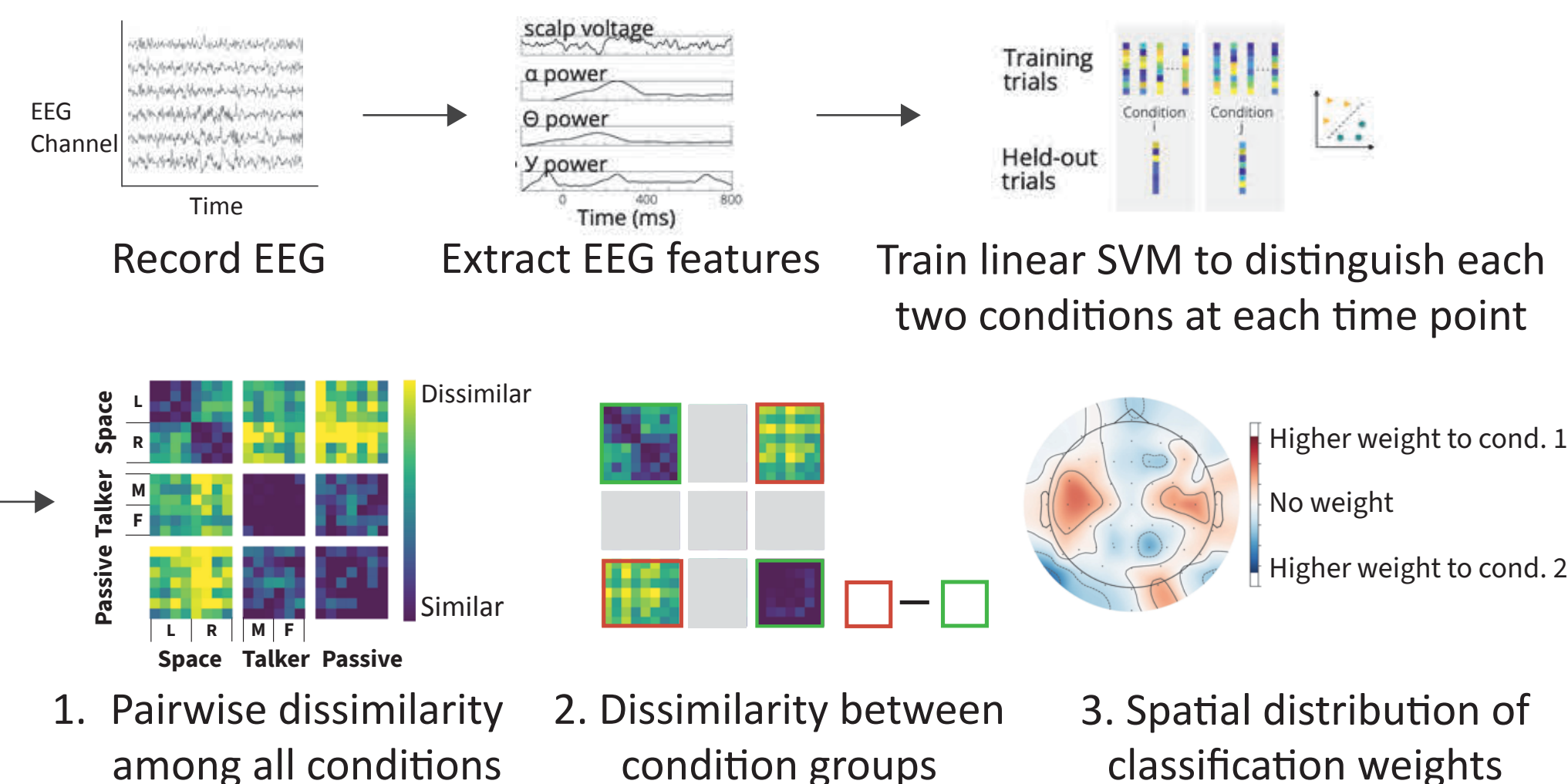
In the **cue period**, a visual task cue followed by the auditory target cue.

In the **stimulus period**, target syllable was embedded in multi-talker babble (/ba/, /da/, and /ga/), and subjects reported the target.

Sounds were spatialized to five positions with four possible talkers.



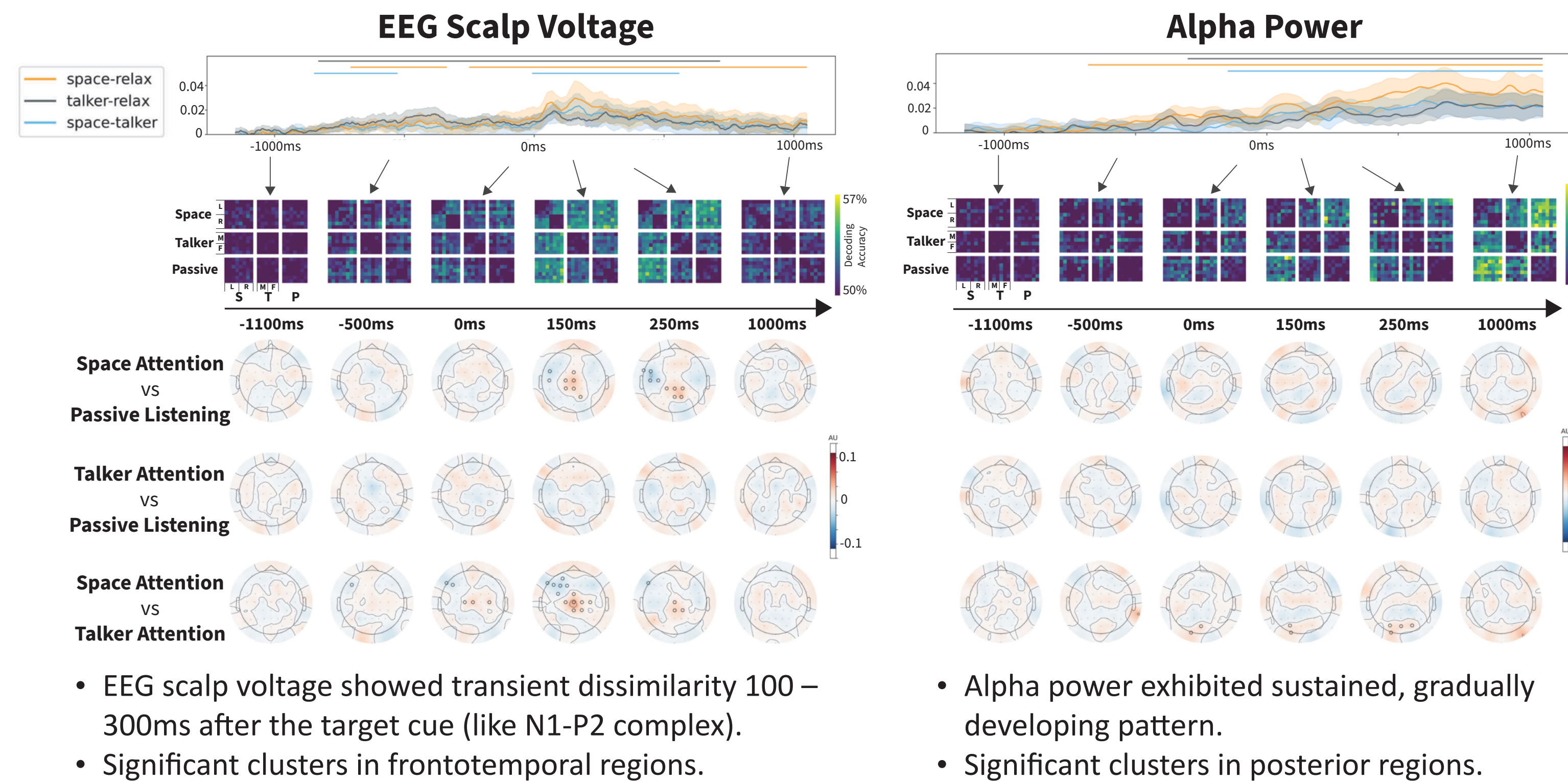
Representational Similarity Analysis (RSA)



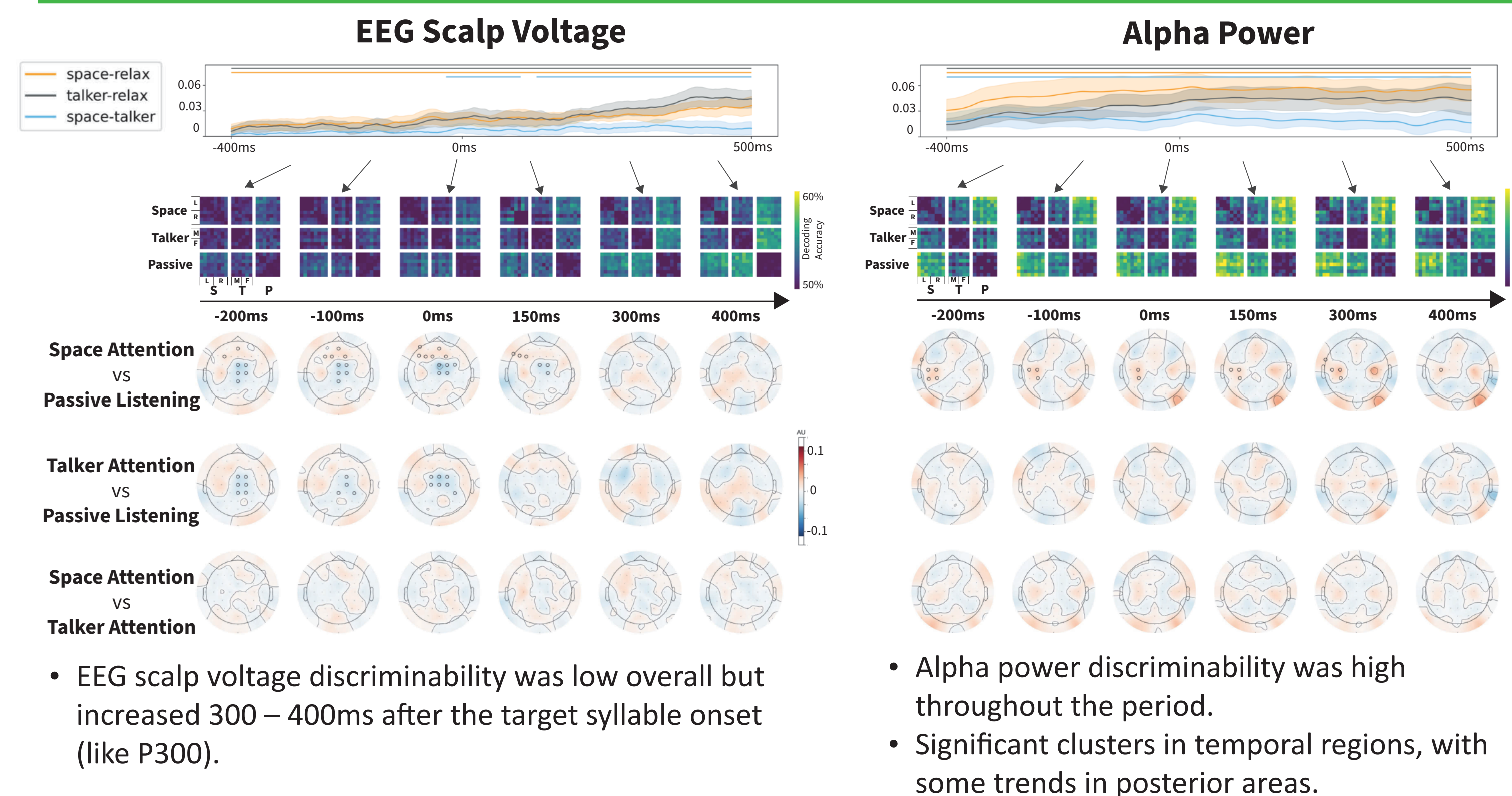
References [1] Hillyard et al. (1973). Electrical signs of selective attention in the human brain. Science, 182(4108), 177-180. [2] Choi et al. (2013). Quantifying attentional modulation of auditory-evoked cortical responses from single-trial electroencephalography. Frontiers in Human Neuroscience, 7, 115.

Yes, there are 1) time-locked, ERP-like transient responses to cues and targets
2) persistent oscillatory activity in alpha band

Cue Period: preparing to attend

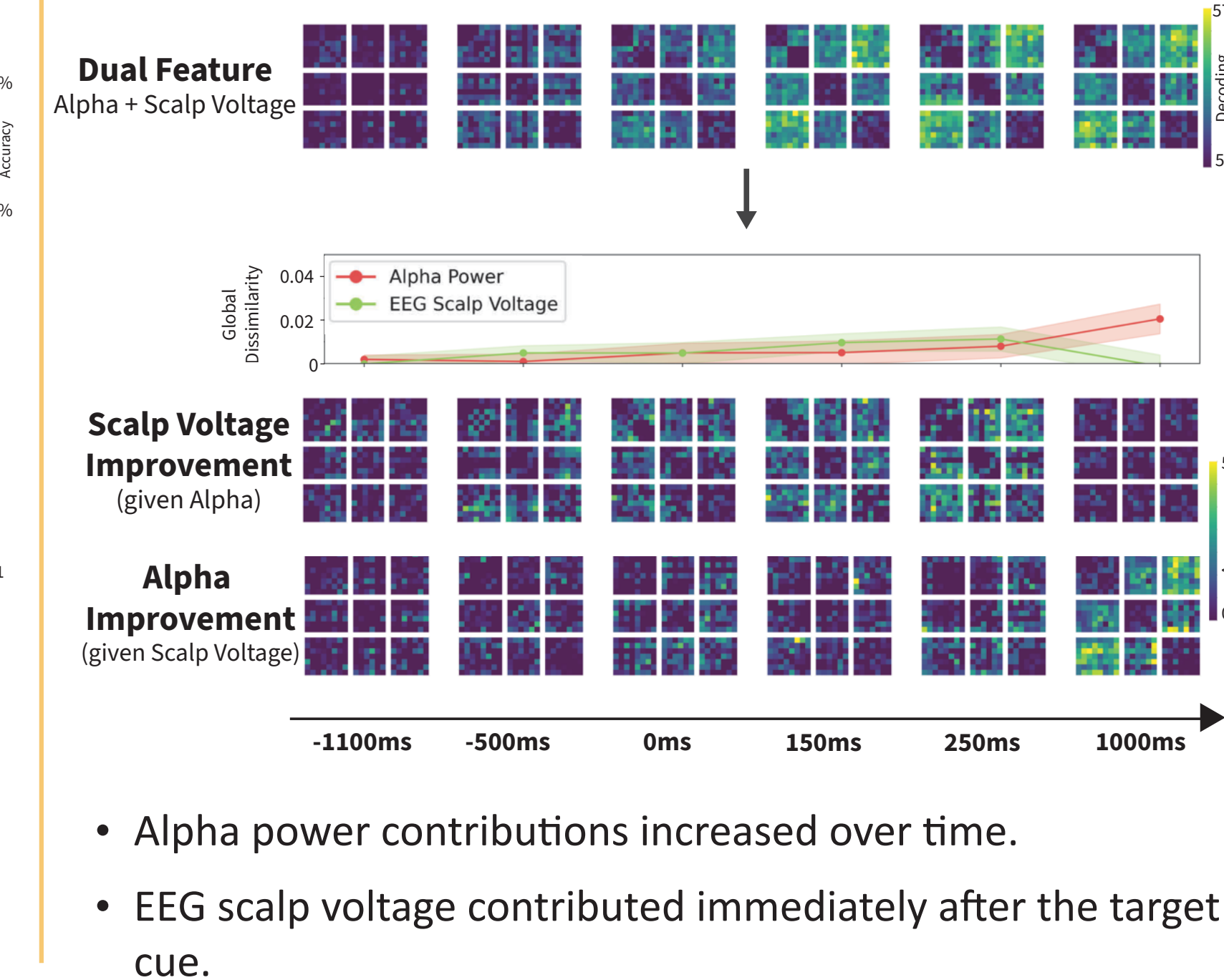


Stimulus Period: identifying the target



which make unique contributions to attention.

Comparing single feature RDMs to joint (dual feature) RDMs allows us to isolate unique contributions.



- Alpha power contributions increased over time.
- EEG scalp voltage contributed immediately after the target cue.

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