

Disentangling Comprehension and Production with Repetition Priming

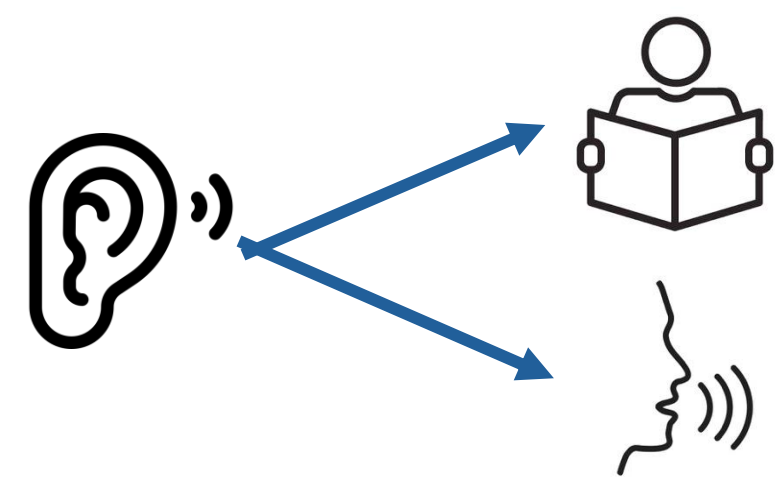
An MEG Study

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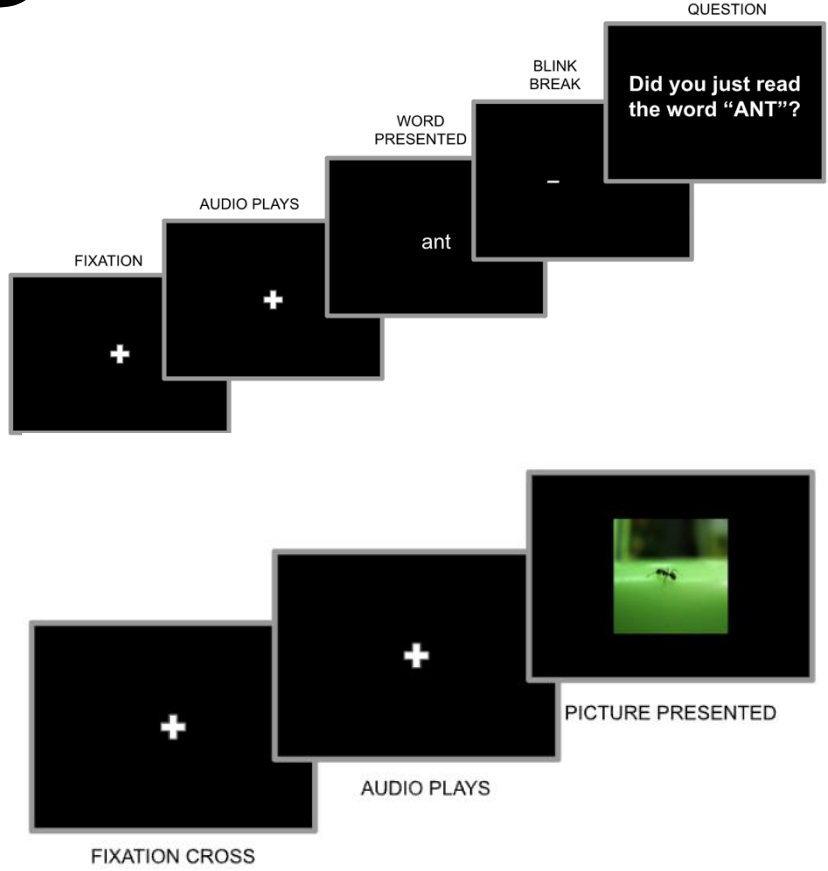
Introduction



- Comprehension and production have unique goals and may utilize prior information differently
 - Comprehension: perceptual
 - Production: action-oriented
- Independence of the cognitive processes of production and comprehension is debated
 - I.e. comprehension by action vs. dual streams
- Repetition priming reliably leads to a reduction in the amplitude of neural responses
- Amplitude/locus of priming effect may differ across production comprehension if they involve separate neural procedures
 - Comprehension may have a larger relative reduction because the identical prime provides information that facilitates the *perception* of a stimulus

Methods

- 2x2 design
 - Production: picture naming
 - Comprehension: word reading
 - Identical: Auditory prime is the same word involved in the task
 - Unrelated: Auditory prime is unrelated to the word in the task
- All primes (audios) and targets (pictures/words) were "nameable"
- 150 trials per block, 1/3 repetition prime, 2/3 unrelated prime
- N=15 subjects run, with brain activity recorded in a 160 channel, axial gradiometer MEG scanner
- "Source space" cortical activity estimated via dSPM
- Mean picture naming speech onsets
 - Identical Prime: 859.6 ms
 - Unrelated prime: 932.4 ms



References

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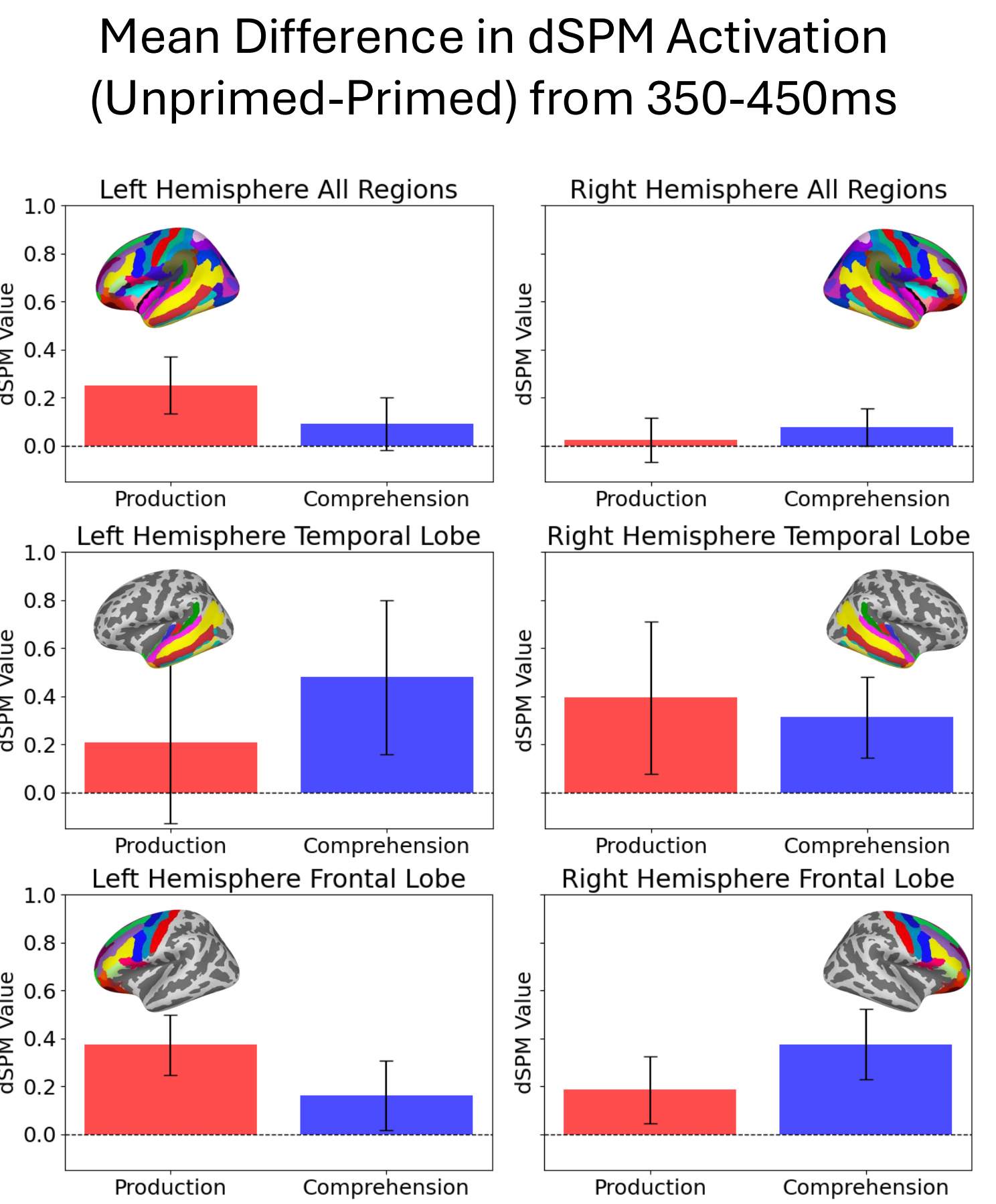
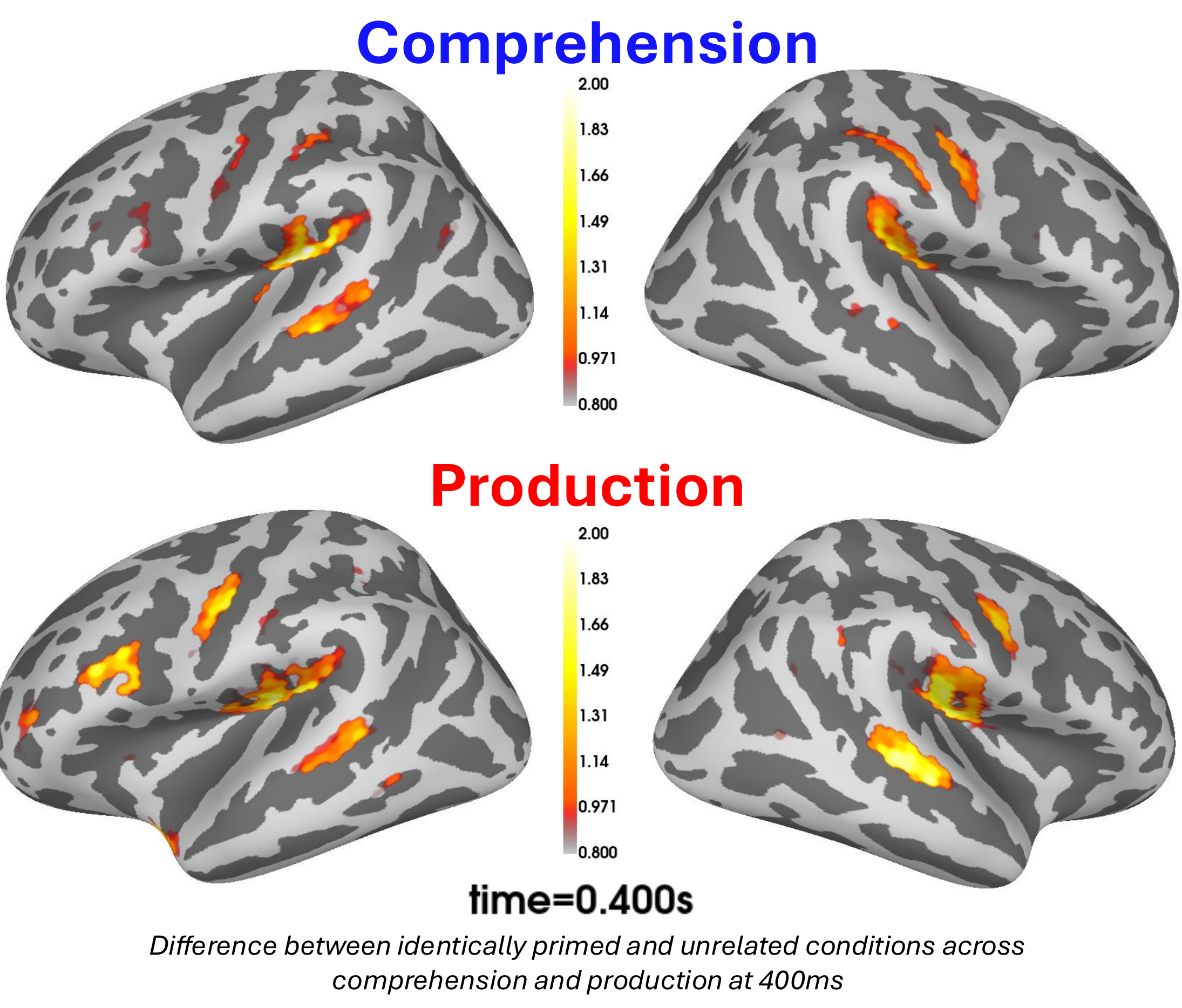
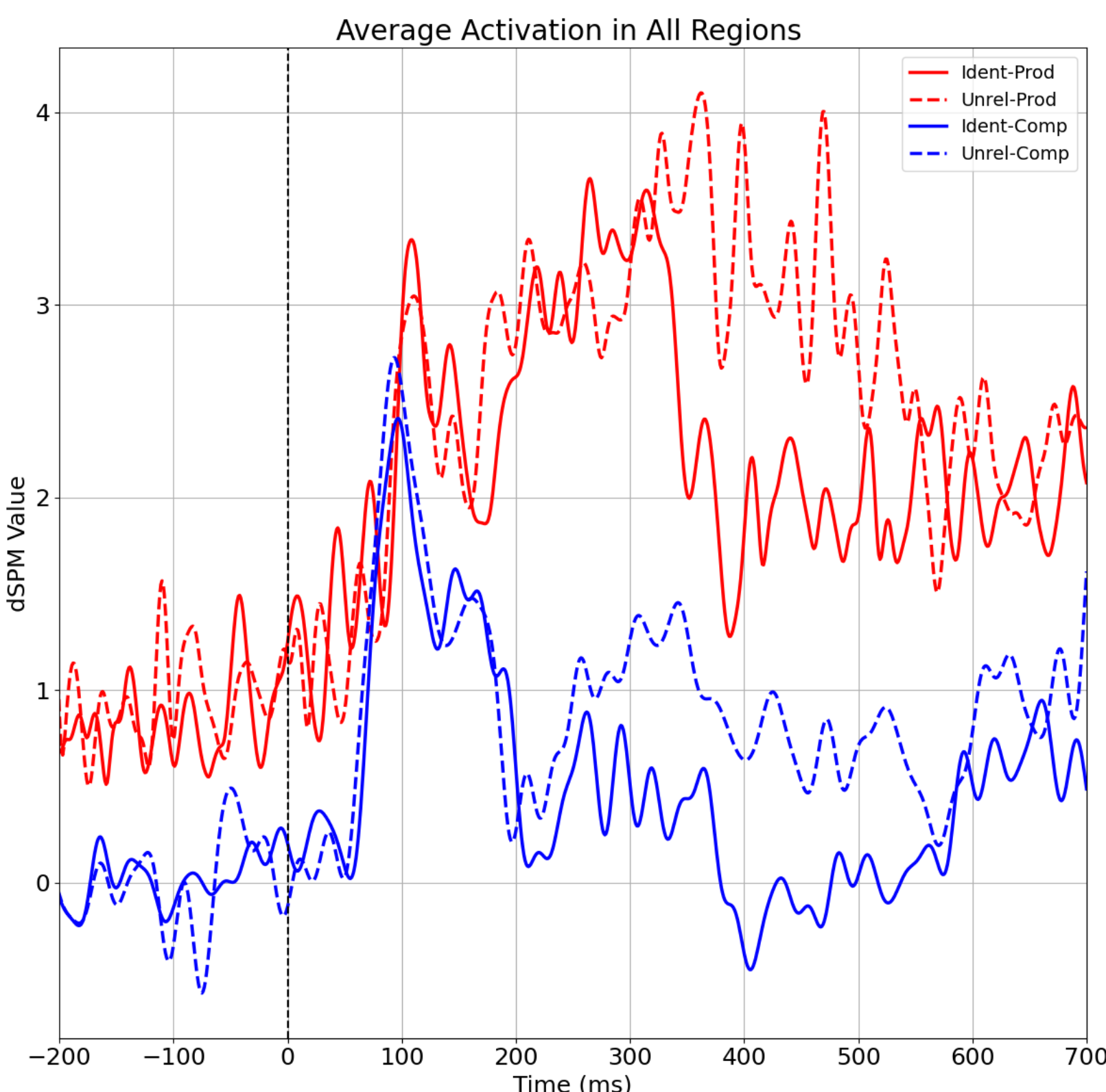
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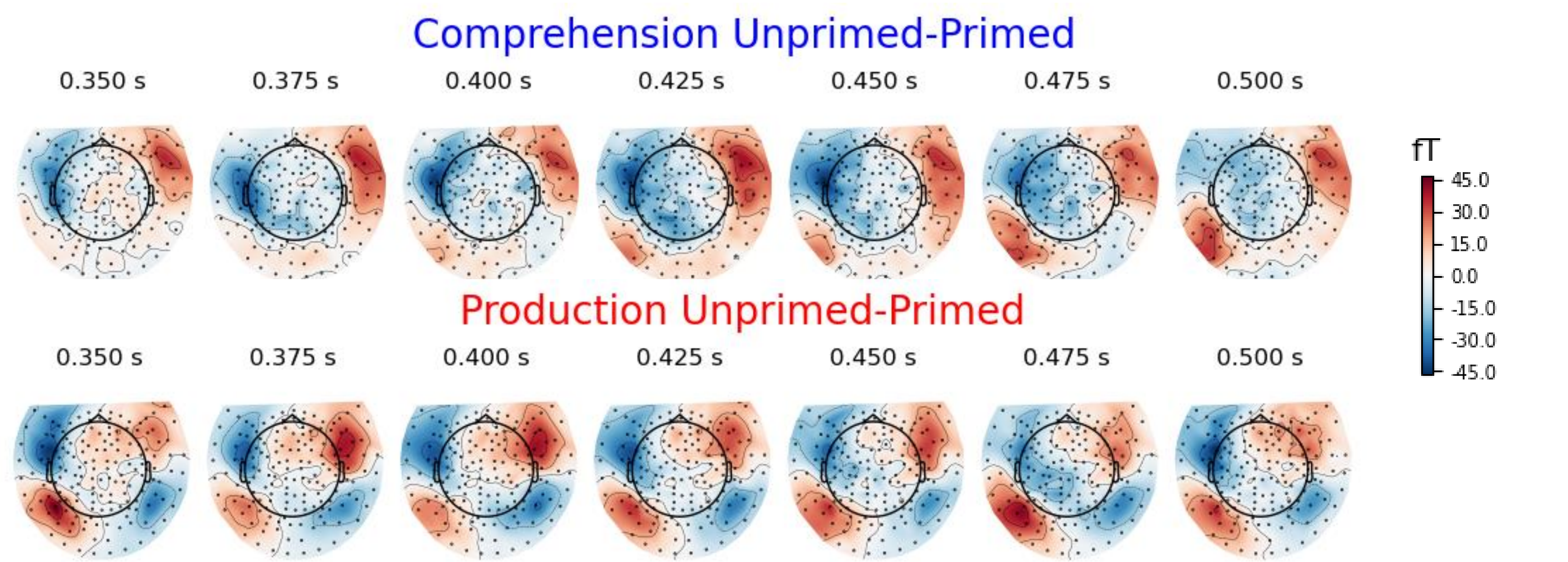
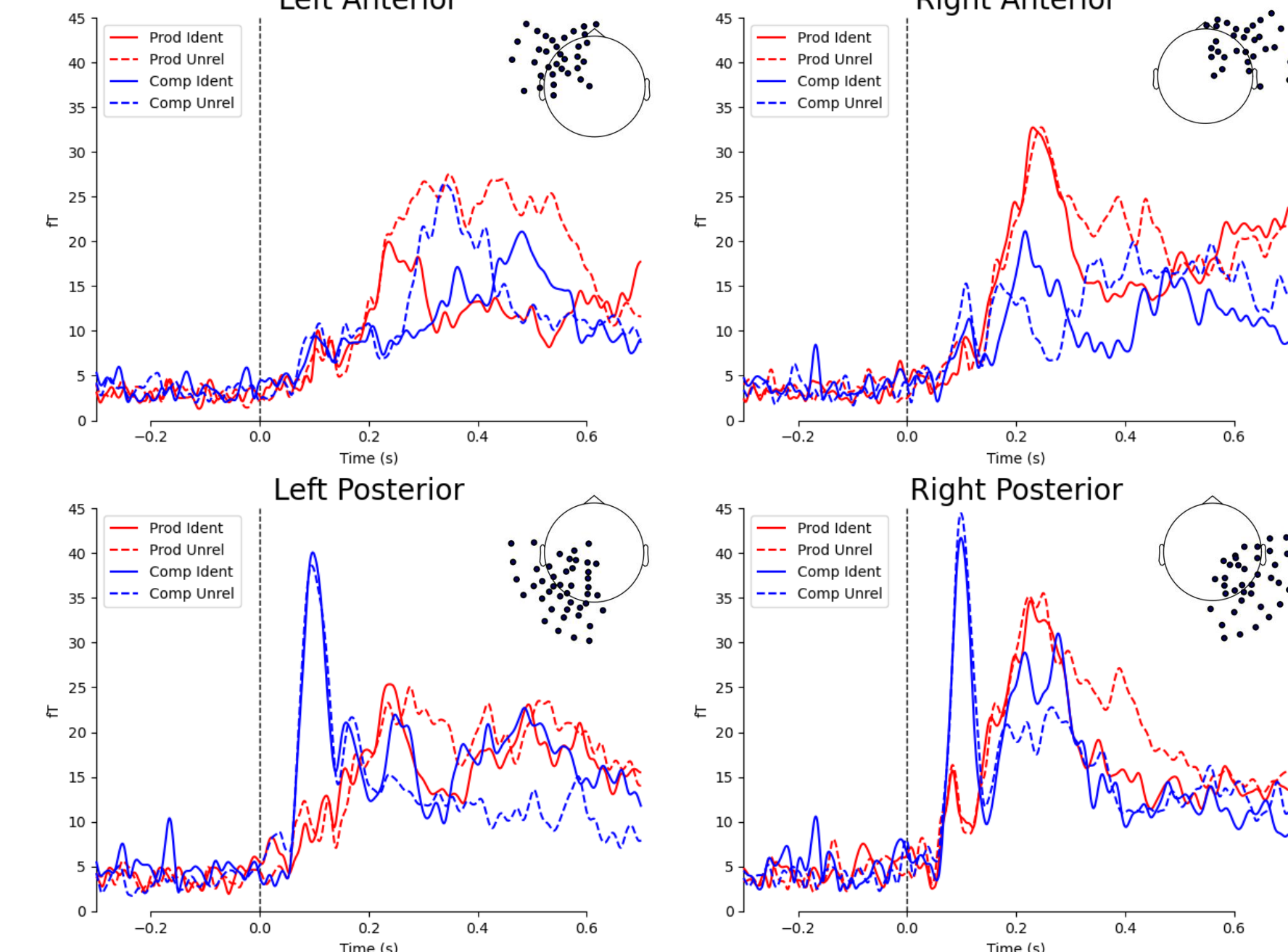
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Preliminary Results

Source Space



Sensor Space



Discussion/Future Work

- Repetition suppression in both production and comprehension conditions
- Magnitude of difference between unrelated and identical primed words is globally larger in production
- Repetition suppression spatial loci
 - Larger reduction in left frontal lobe for production
 - Larger reduction in left temporal lobe for comprehension
 - Larger reduction in frontal right hemisphere in comprehension than production
- Earlier onset of priming effects in comprehension
- Future statistical analyses:
 - Spatiotemporal clustering to find precise spatial locus and effect size of priming across production and comprehension
- Future experiments:
 - Interwoven production and comprehension trials, instead of separate blocks
 - Changing proportion of primed trials across subjects to investigate a potential interaction with task