What MEG can tell us about predictive processing during language comprehension

Sahel Azizpour
Donders institute for brain, cognition and behaviour, Nijmegen, Netherlands

Britta Westner
Donders institute for brain, cognition and behaviour, Nijmegen, Netherlands

Umut Guclu
Donders institute for brain, cognition and behaviour, Nijmegen, Netherlands

Linda Geerligs
Donders institute for brain, cognition and behaviour, Nijmegen, Netherlands

Abstract

To facilitate language comprehension, the brain uses contextual information and prior knowledge to predict future content. Recent breakthroughs allow us to study pre-word onset prediction during naturalistic narrative listening by mapping contextual word embeddings from Large Language Models onto ECoG data. Long-range prediction encoding has been observed in fMRI data, where including multiple upcoming word embeddings enhances the model's fit to brain data. This study examines if similar predictive information is detectable in MEG data, which offers higher temporal resolution than fMRI but lower signal-to-noise ratio than ECoG. We found that pre-onset predictive signatures are present in MEG, even in data of limited length (1 hour) and in single participants. Unlike in fMRI, adding future embeddings does not improve encoding. These findings offer a novel avenue for studying predictive processing using MEG signals and call for further investigation to explain the differences observed between fMRI and MEG approaches.

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