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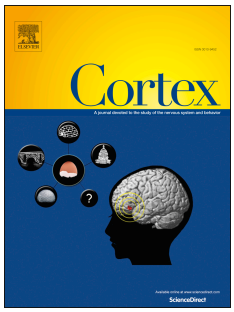


Whole network, temporal and parietal lobe contributions to the earliest phases of language production

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# Whole network, temporal and parietal lobe contributions to the earliest phases of language production

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## Abstract

We investigated whether it is possible to study the network dynamics and the anatomical regions involved in the earliest moments of picture naming by using invasive EEG traces to predict naming errors. Four right-handed participants with focal epilepsy explored with extensive stereotactic implant montages that recorded temporal, parietal and occipital regions -in two patients of both hemispheres- named a total of 228 black and white pictures in three different sessions recorded in different days.

The subjects made errors that involved anomia and semantic dysphasia, which related to word frequency and not to visual complexity. Using different modalities of spectrum analysis and classification with a support vector machine we could predict errors with rates that ranged from slightly above chance level to 100%, even in the preconscious phase, i.e. 100 ms after stimulus presentation. The highest rates were obtained using the gamma bands of all contact spectra without averaging, which implies a fine modulation of the neuronal activity at a network level. Despite no subset of nodes could match the whole set, rates close to the best prediction scores were obtained through the spectra of the temporal-parietal and temporal-occipital junction along with the temporal pole and hippocampus. When both hemispheres were explored nodes from the left side dominated in the best subsets. We argue that posterior temporal regions, especially of the dominant side, are involved very early, even in the preconscious phase (100 ms), in language production.

Keywords: picture naming; language; SEEG; error prediction; brain networks; anatomical hubs