Decoding articulatory information from electrocorticography during speech production

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Abstract

We present preliminary results of a study to decode articulatory features from electrocorticography (ECoG) recordings made during speech production. ECoG is an electrophysiological technique to record electrical potentials from the surface of the brain at multiple sites with high temporal resolution. In this study, ECoG from the left hemisphere was recorded from one individual while they participated in an overt speech production task. Following data collection we applied a neural decoding algorithm to map broadband (70–170 Hz) ECoG power into six continuous articulatory features representing jaw height, tongue position, tongue shape, tongue apex position, lip aperature, and lip protrusion. Target articulatory features were specified based on a segment-level transcription of the participant's spoken utterances. The decoded articulatory features were positively correlated with target features with a maximum correlation of 0.34 for the tongue position feature. The electrodes that contributed most to decoding (N=12/120) were located in the core speech production network including the precentral, inferior frontal and superior temporal gyri. These results are an important step toward a continuous neural prosthesis for speech.