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# To speak or not to speak? Language fMRI in children with focal epilepsy using overt and covert speech production

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## Abstract

**Objective:** We aimed to assess the feasibility of imaging overt (articulated) speech for pre-surgical mapping of expressive language with functional magnetic resonance imaging (fMRI) in paediatric epilepsy patients. **Methods:** Thirty eight medically intractable symptomatic paediatric epilepsy patients (6-17 years) performed covert (non-articulated) and overt verb generation (VG) task during continuous fMRI scanning. Measures of data quality (task performance, in-scanner movement and quality ratings) were compared between covert and overt speech conditions. The neural substrates engaged during covert and overt VG were also compared, as were laterality indices in regions of interest in frontal and temporal cortex and fMRI signal strength. **Results:** In-scanner movement increased during overt VG, but did not reduce data quality; good quality data were found in 50% of patients during covert speech and in 68% during the overt speech condition. Patients performed more poorly inside the scanner, especially younger patients and those with larger brain lesions. Verbal IQ and practise performance related to better fMRI data quality, and there was more movement in younger patients. Similar brain regions were engaged in both conditions with overt speech also involving the dominant premotor cortex. FMRI laterality indices agreed across conditions, despite a trend for reduced values during overt speech. Categorical judgments of language dominance were also equivalent between conditions. **Conclusion:** Imaging overt speech with fMRI is feasible in paediatric epilepsy patients and valid in the presurgical setting. Importantly, overt paradigms provide the advantage of monitoring performance in the scanner, which appears crucial.

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