Optional Infinitive
Evidence of how the adult brain processes grammatical errors that are typical and atypical of childhood language acquisition

1Brain & Cognitive Sciences, Massachusetts Institute of Technology (MIT), 2Research Laboratory of Electronics, MIT, 3Health Sciences and Technology Division, Harvard-MIT

Funding: Ellison Medical Foundation

Introduction
An Optional Infinitive (OI) stage marks language acquisition in many languages. Children ages 2-4 use nonfinite (infinitival) verb-forms and finite verb-forms interchangeably in contexts requiring finite forms.1-3 In English, children's errors include omissions of past tense /-ed/, 3rd singular /-s/, and auxiliary /to be/.

While OI is widely studied in language development, little is known about its neural basis.

Question
What are the neural correlates of Optional Infinitive in the adult brain?

Predictions
Sentences with Developmental (Optional Infinitive) errors should elicit different brain activations as compared to sentences with errors that are not made during development.

Imaging Results
Sentences with Developmental-Optional Infinitive errors yielded greater activation in Left IFG relative to Non-Developmental error and Correct sentences in both Auditory and Visual sentence presentations (p < 0.01 FDR)

Behavioral Results
Participants were significantly slower when judging Developmental-OI errors (P < 0.01) in both Auditory and Visual modalities. Participants were less accurate when judging Developmental OI errors in Auditory but not in Visual modality.

Discussion
Left IFG appears to play a critical role in tense computation in adults.

Adult participants showed greater left IFG recruitment, made more errors, and took longer when processing sentences with Developmental-Optional Infinitive errors.

Implications
Acquisition of finiteness in typical development, as well as the delayed acquisition of finiteness in Specific Language Impairment (Extended Optional Infinitive stage) may depend on the maturation of the language-computational abilities of left IFG.

References

*CORRESPONDING AUTHOR ioulia@mit.edu

http://www.web.mit.edu/gabrieli-lab

Cognitive Neuroscience Society Conference 2009