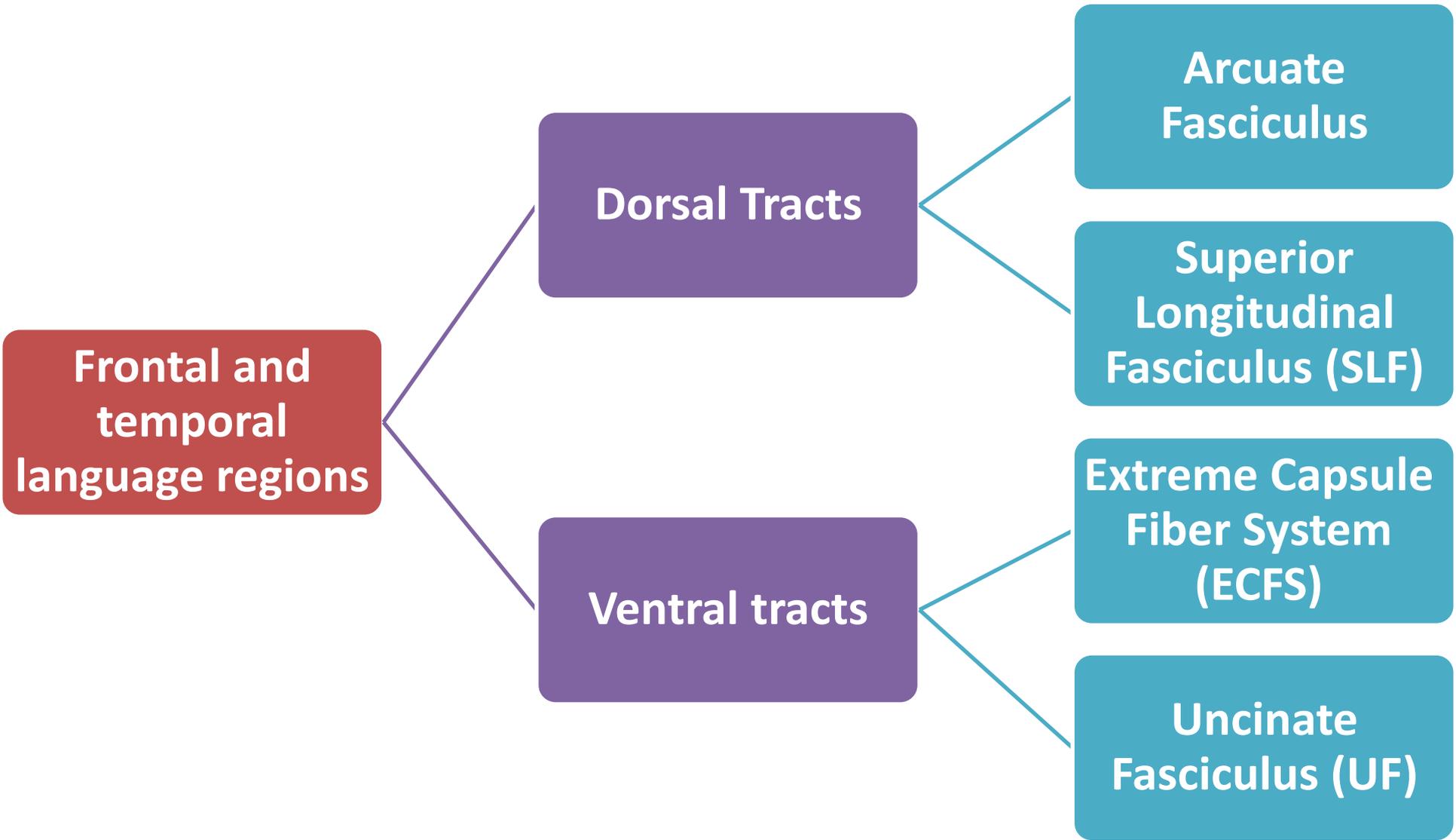


Syntactic Processing Depends on Dorsal Language Tracts

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(2011)

- Syntax is one important component of language and has been shown in functional imaging studies to depend on both frontal and temporal language regions.
- The aim of the study was to identify which white matter tracts are important for syntactic processing, by examining the relationship between white matter damage and syntactic deficits in patients with primary progressive aphasia (PPA).

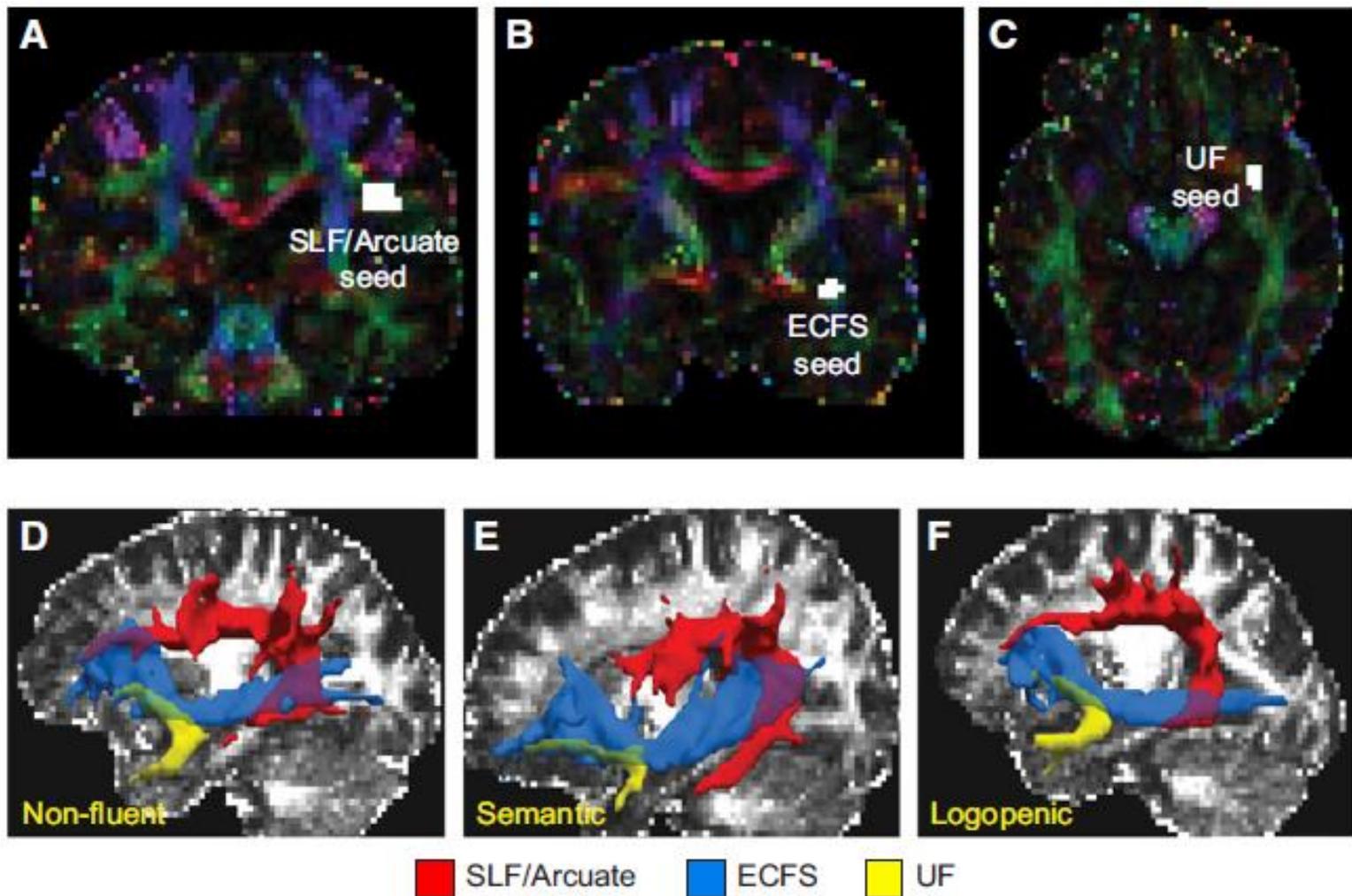


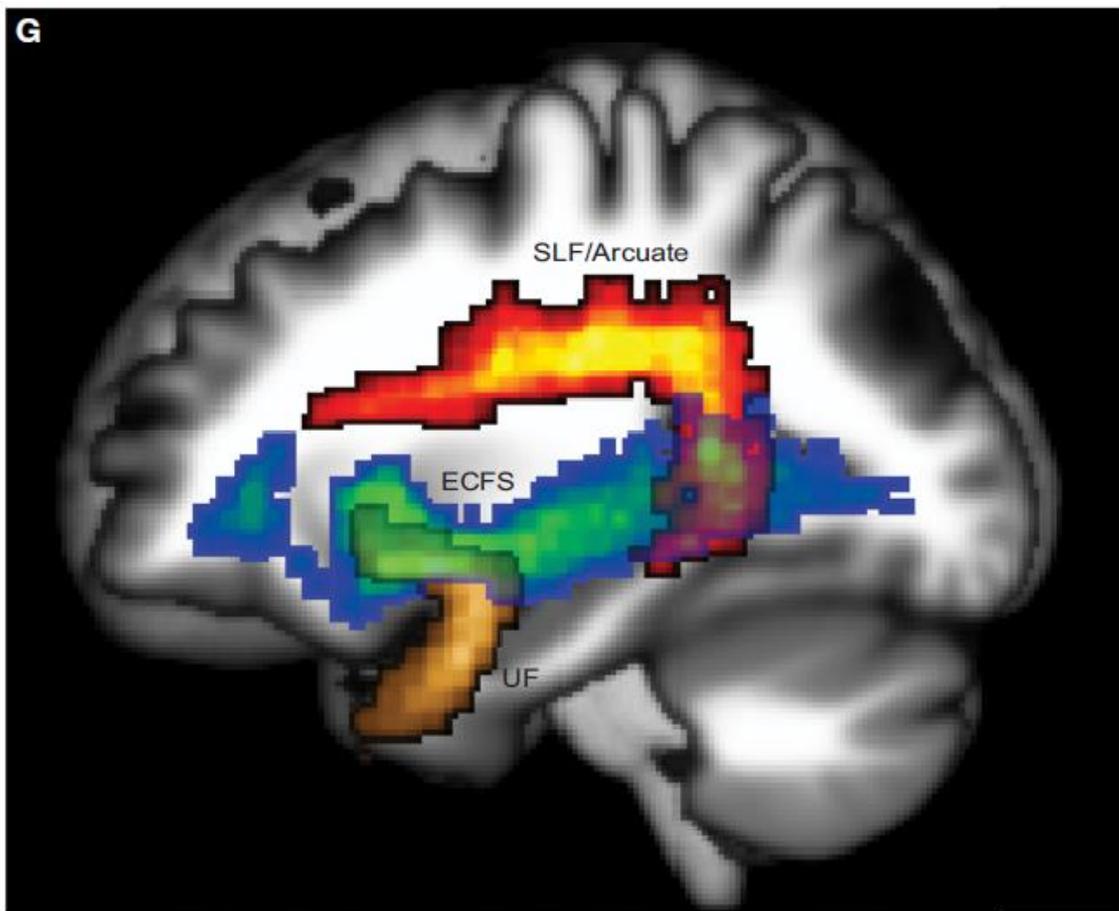
Participants:

- 27 patients with Primary Progressive Aphasia (PPA). Patients were classified into one of three PPA variants:
- Nonfluent (n=11) Semantic (n=10) Logopenic (n=6)
- 15 men 12 women (mean age: 66)
- 4 patients were left handed
- **Functional MRI:** The functional MRI experiment has been reported previously ([Wilson et al.,2010a](#)).

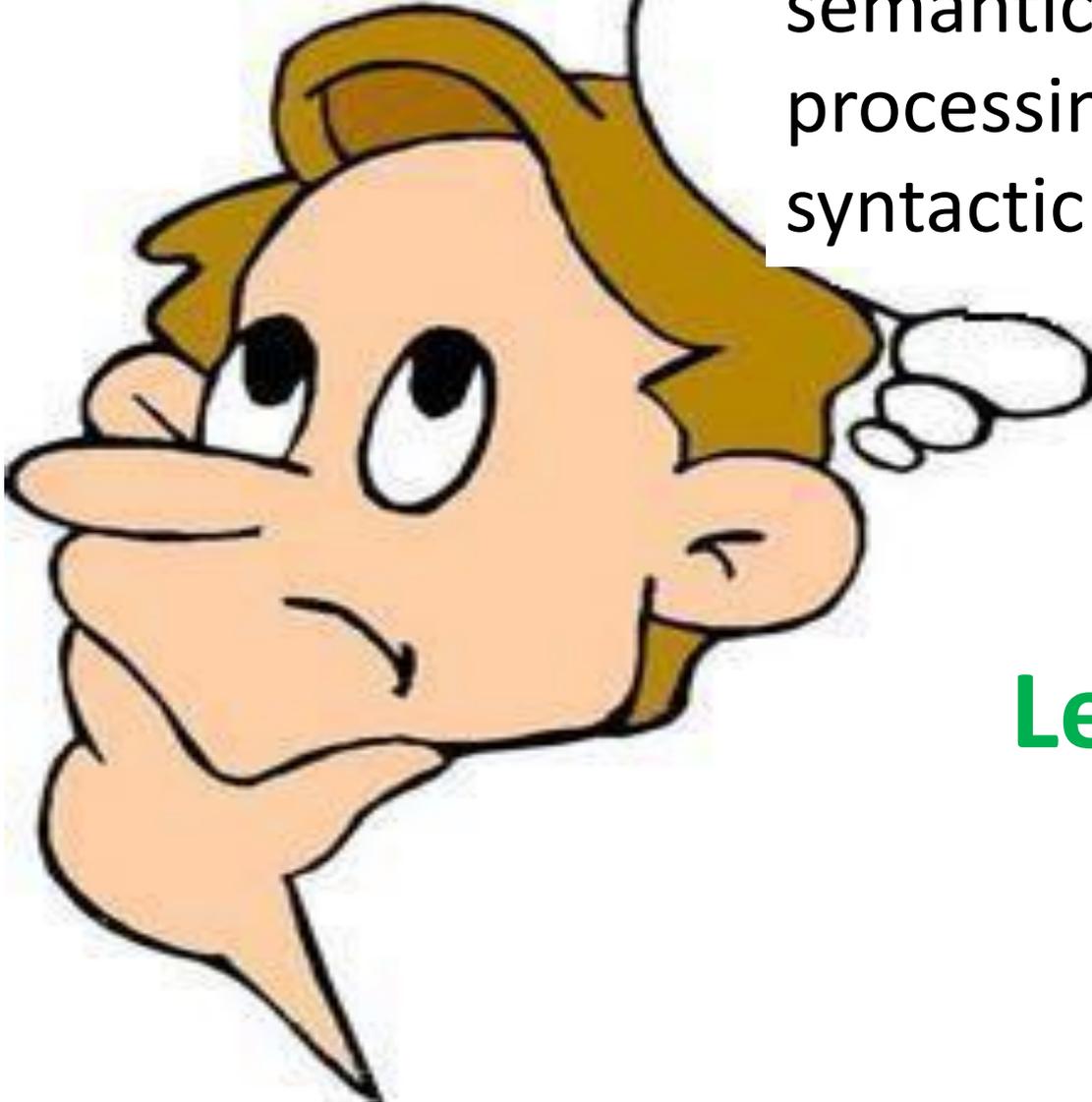


Each tract was seeded in known “bottlenecks” on individual subjects’ colorcoded images (Figures 1A–1C)





Probability maps for the three tracts of interests in all 27 patients.

A cartoon illustration of a person with brown hair, looking thoughtful with their hand on their chin. A thought bubble is connected to their head.

Does the deficit in the semantic\ word processing affect the syntactic processing?

Let's think!!

- To determine whether damage to the left SLF/Arcuate might have a general effect on all language functions, two measures of lexical processing at the **single word level** were considered: **single word comprehension**, and **picture naming**. FA (Fractional Anisotropy) in the SLF/Arcuate was not associated with either single word comprehension or picture naming, showing that SLF/Arcuate damage does not simply affect all aspects of language processing.

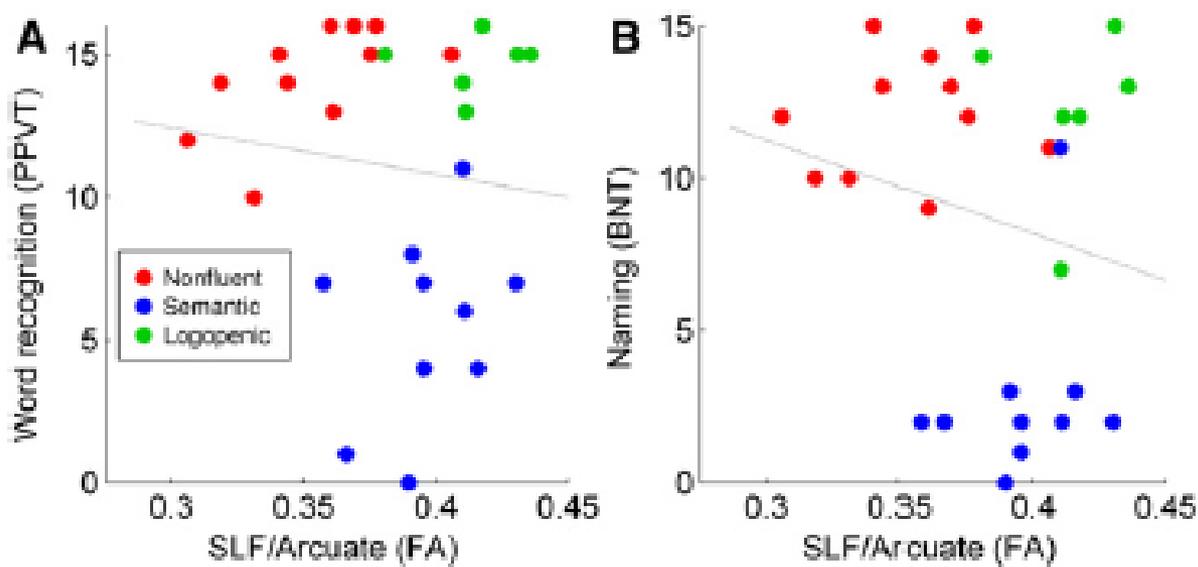
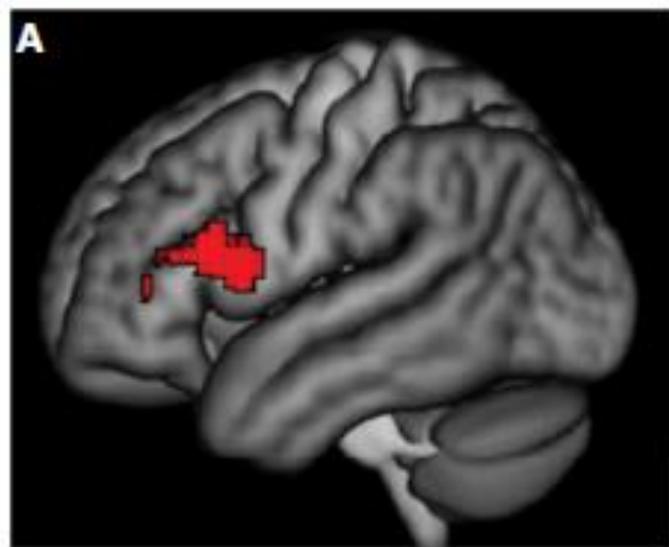
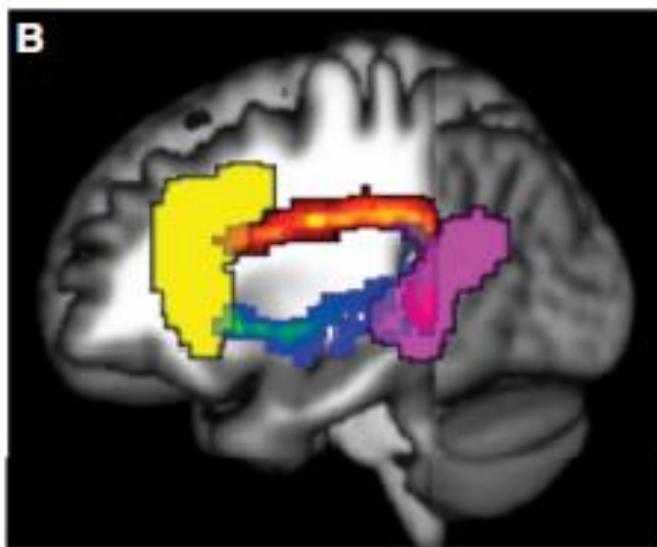


Figure 4. Relationships between Integrity of the Left SLF/Arcuate and Lexical Measures

- Many patients with significant degeneration of ventral tracts showed normal or near-normal syntactic processing.
- Damage to ventral tracts (ECFS or UF) does not result in syntactic deficits.

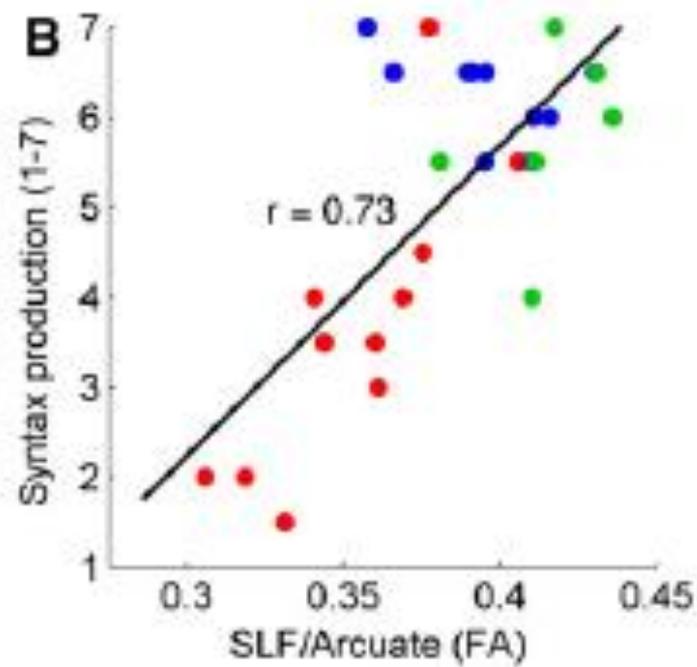
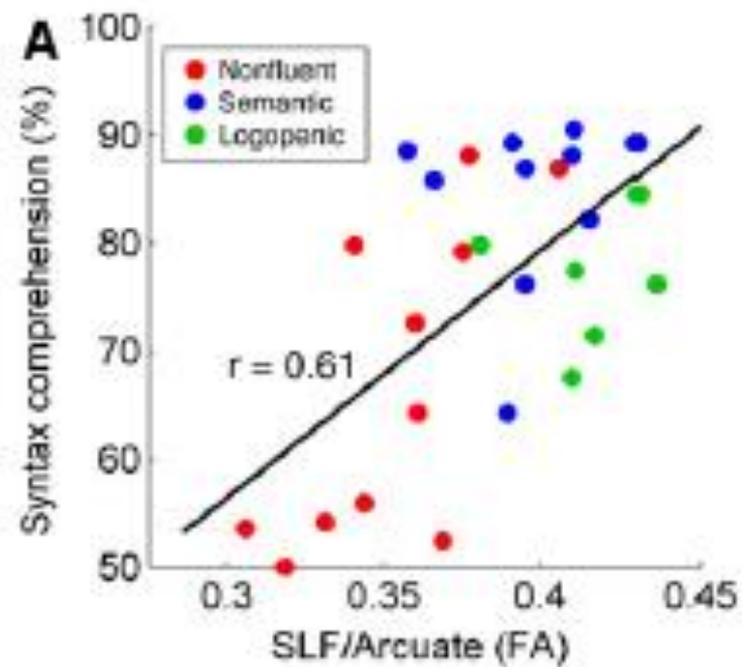


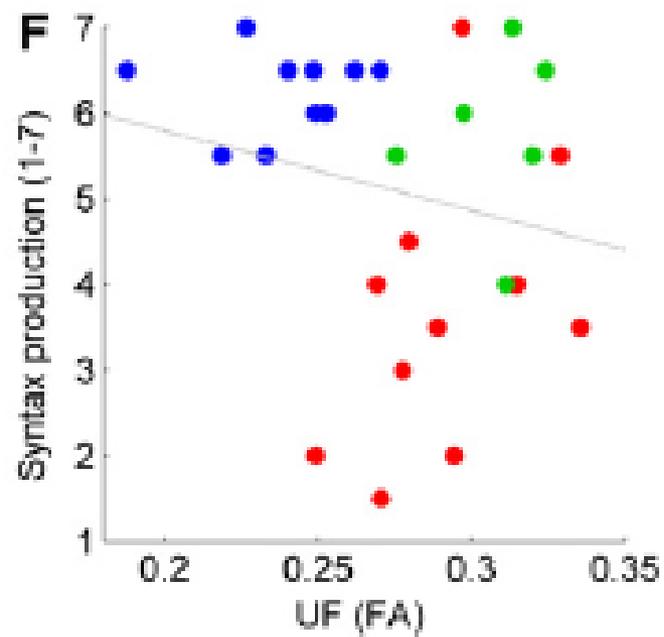
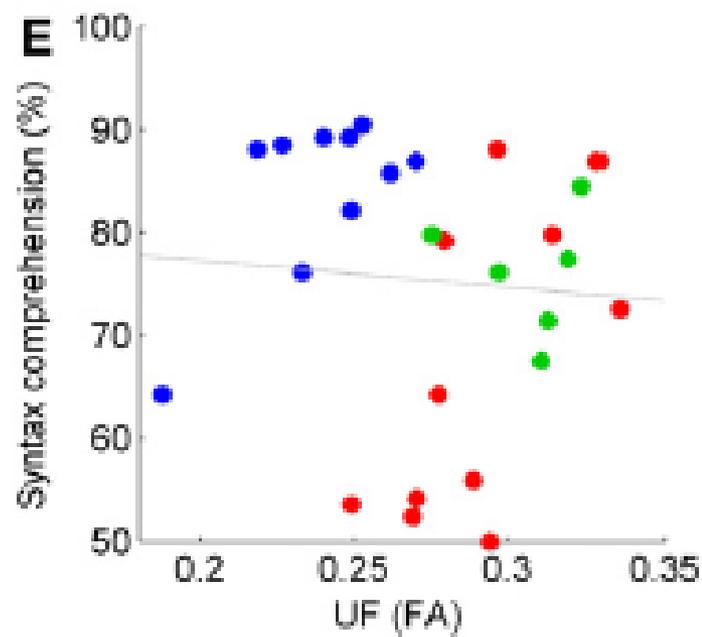
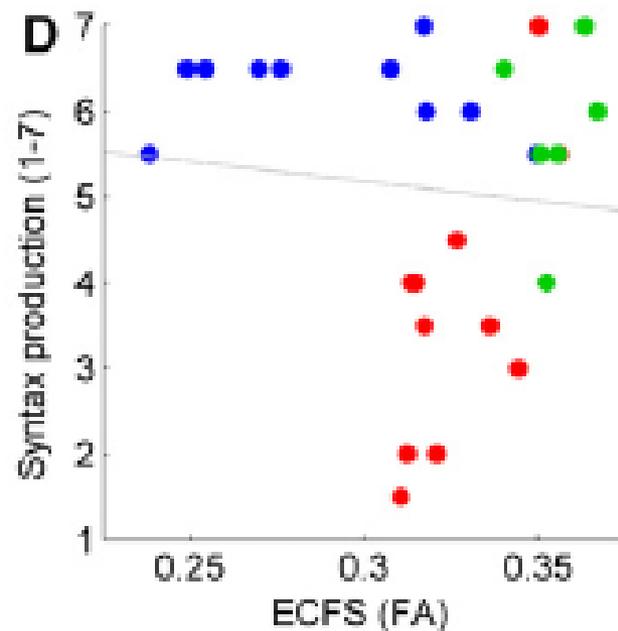
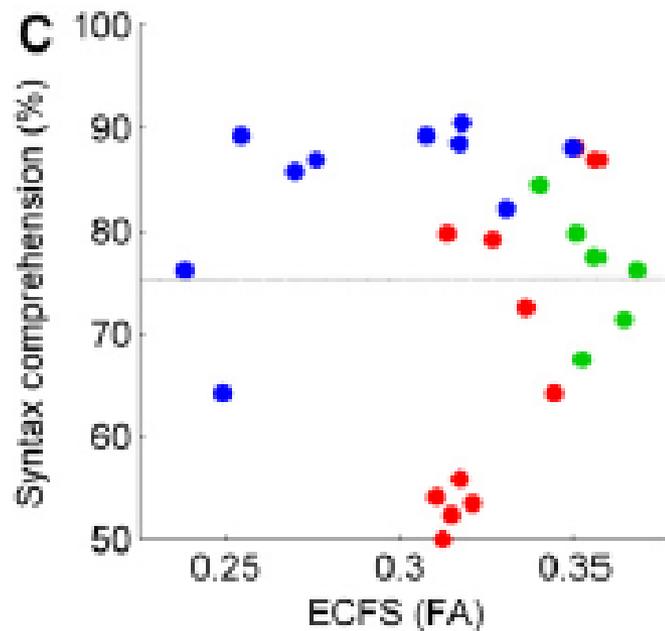
■ VBM: Syntactic deficits



■ SLF/Arcuate ■ ECFS
■ ■ fMRI: Modulated by syntactic complexity

The left SLF/Arcuate and ECFS were constrained to connect anterior (yellow) and posterior (magenta) language regions that were modulated by syntactic complexity in normal controls in a previous fMRI study (Wilson et al., 2010a)





Conclusion

- Dorsal and ventral language pathways linking frontal and temporal language regions have distinct functional roles. Only the dorsal pathway (SLF/ Arcuate) plays a critical role in syntactic processing.





That's all Folks!

Any Question?