Broca’s area and sentence comprehension: A relationship parasitic on dependency, displacement or predictability?

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Abstract:
The current rapid event-related fMRI study used optional parasitic-gap constructions, such as [Which paper] did the tired student submit [gap?] after reviewing [p-gap?/it]?, to test 3 potential roles for Broca’s area in sentence processing. These 3 functional options are: I. any intra-sentential Dependency relation activates Broca’s area. II. This region specifically processes syntactic Displacement or movement. III. Broca’s area handles any dependency relation, as long as it is predictable at an early stage of processing. Broca’s area was only activated by the contrast that tested predictability within BA 45, as determined by its overlap with cytoarchitectonic probability maps. These results imply that an alternative or modified functional account of Broca’s area, from those presently available, is required. Constraints on either a displacement account to movements that are not parasitic or a Working Memory one to predicted dependencies that cross verbal arguments or noun phrases would achieve the necessary consistency. Further, the results from the minimal contrasts investigating displacement and dependency have implications to potential language regions outside of Broca’s area. The minimal contrast investigating displacement activated the left anterior Middle Temporal Gyrus, which has more recently been claimed to play a role in syntactic operations.

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