Neurology, especially aphasiology, was mainly built on behavioral-structural correlations (“lesion method”). In this setting, Broca's area has been considered as the “speech area”; moreover, this observation led to localizationism. However, advances in brain mapping techniques, as functional neuroimaging and direct Electrostimulation in patients undergoing awake surgery for gliomas, has resulted in a paradigmatic shift regarding models of neural architecture. In fact, the brain is organized in distributed complex networks underpinning sensorimotor, visuospatial, language, cognitive and emotional functions. In this connectomal workframe, cerebral processing is not conceived as the sum of segregated subfunctions, but results from the integration and potentiation of parallel (even if partially overlapped) subcircuits. Such a networking model, taking into account cortical and subcortical anatomic constraints, explains interindividual variability in physiology and after brain damage, particularly in aphasiology - e.g. double dissociations during electrostimulations, as comprehension versus naming disorders, semantic versus phonemic paraphasias, or syntactic disturbances versus anomia. This dynamic organization mediated by the well-synchronized functioning of delocalized groups of interconnected neurons (rather than by discrete centers) also explains the huge potential of neuroplasticity following cerebral insult, on the condition that the axonal connectivity is preserved. According to this principle, massive surgical resection of brain regions dogmatically considered as “critical” in a localisationist view can be achieved with no functional deficit, as the removal of Broca's area - which is not the speech area - without disorders. This connectomal account of neural processing may have major implications in cognitive neurosciences and in therapeutic management of brain-damaged patients [1)].

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Duffau H. The error of Broca: From the traditional localizationist concept to a connectomal anatomy of human brain. J Chem Neuroanat. 2017 Apr 14. pii: S0891-0618(16)30150-8. doi: 10.1016/j.jchemneu.2017.04.003. [Epub ahead of print] Review. PubMed PMID: 28416459.