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Brain mechanisms of recovery from pure alexia: a single case study with multiple longitudinal scans

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Abstract

Pure alexia is an acquired reading disorder, typically due to a left occipito-temporal lesion affecting the Visual Word Form Area (VWFA). It is unclear whether the VWFA acts as a unique bottleneck for reading, or whether alternative routes are available for recovery. Here, we address this issue through the single-case longitudinal study of a neuroscientist who experienced pure alexia and participated in 17 behavioral, 9 anatomical, and 9 fMRI assessment sessions over a period of two years. The origin of the impairment was assigned to a small left fusiform lesion, accompanied by a loss of VWFA responsivity and by the degeneracy of the associated white matter pathways. fMRI experiments allowed us to image longitudinally the visual perception of words, as compared to other classes of stimuli, as well as the mechanisms of letter-by-letter reading. The progressive improvement of reading was not associated with the re-emergence of a new area selective to words, but with increasing responses in spared occipital cortex posterior to the lesion and in contralateral right occipital cortex. Those regions showed a non-specific increase of activations over time and an increase in functional correlation with distant language areas. Those results confirm the existence of an alternative occipital route for reading, bypassing the VWFA, but they also point to its key

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