

Cognitive components of creativity and structural brain correlates in frontotemporal dementia

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Although creativity is an essential cognitive function to adapt to novelty, its neurocognitive bases remain poorly understood. Current models highlight the interaction between associative and executive processes, presumably supported by the default mode and executive control networks respectively, with a key role of the prefrontal cortex, at the crossroad between these networks. Thus, behavioral variant frontotemporal dementia (bvFTD), characterized by neurodegeneration primarily targeting the prefrontal cortex, represents a unique model to study the regions that are critical for creativity. We aimed to explore the specific cognitive processes involved in verbal creativity, how bvFTD affects them, and to identify their brain substrates.

We explored verbal creativity in 10 bvFTD patients and 17 matched healthy controls, using a word-association task requiring the generation of creative semantic associations. We used principal component analysis to separate the cognitive components involved, that were entered into a whole-brain voxel-based morphometry analysis.

We distinguished four components that reflected different associative and executive processes. Patients were impaired in three components: intentional remote thinking, inhibition of dominant responses, and verbal initiation, but not in spontaneous associative thinking. Atrophy in several brain regions, consistent with the literature, correlated with inhibition and verbal initiation. Additionally, intentional remote thinking correlated with atrophy in rostral prefrontal regions of the default mode and executive control networks.

These results help clarifying the cognitive mechanisms of creativity, confirm the critical role of prefrontal regions and of the cooperation between the default mode and executive control networks, and outline the relevance of studying creativity in bvFTD patients.

Conflicts of interest

The authors report no competing interests