

## **Using Verbal Fluency to Explore Semantic Networks and the Potential of Transcranial Direct Current Stimulation to Enhance Lexical Retrieval**

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We have been conducting detailed analyses of verbal fluency (VF) output to test hypotheses concerning automatic and controlled processes that are thought to guide lexical retrieval. This work is based on the assumption that VF is multi-factorial and likely involves clustering, or the retrieval of words within semantically related subcategories (e.g., fruits and vegetables as subcategories of supermarket items), and switching between subcategories. Clustering is thought to represent an automatic process that might depend primarily on temporal lobe structures, while switching is thought to represent a more controlled process that might depend on a wider network of brain circuits to which the left dorsolateral prefrontal cortex is critical. We have recorded the VF output of 651 healthy adults and patients with neuropsychiatric disorders. These have been entered into a database that now contains 75,000 word entries. In this workshop, we will describe five novel approaches to exploring the structure and functioning of semantic networks in healthy adults and patients with neuropsychiatric disorders. These methods include: (1) content analyses of the rarity of words uttered in response to letter and semantic category cues, (2) chronometric studies of within- and between-category word utterances, (3) analyses of neuroanatomic correlates of VF output, (4) the effects of low-voltage transcranial direct current stimulation (tDCS) on lexical retrieval, and (5) an approach to multi-dimensional scaling called singular value decomposition. Each of these complementary approaches has the potential to illuminate the structure or function of semantic networks, and how these might be disrupted in persons with thought disorders or aphasia.