

**Critical Review:  
Inner and overt speech post-stroke: Is there a dissociation?**

Caitlin Farrar  
M.Cl.Sc (SLP) Candidate  
Western University: School of Communication Sciences and Disorders

This critical review examines the possibility of a dissociation between inner and overt speech capabilities in persons following a stroke using evidence from two neuroimaging studies and one mixed (within and between subject) nonrandomized clinical control trial. Overall, divergent performance on tasks of inner and overt speech production indicates that a post-stroke dissociation between inner and overt speech skills may be observed. This is supported by the identification of neural regions uniquely responsible for each as depicted by functional neuroimaging and lesion-mapping structural analyses. This informs the construction of language imaging paradigms for future studies and the clinical treatment of post-stroke aphasia.

***Introduction***

Inner speech is generally classified as the internal representations of auditory word forms and the ability to process and manipulate these representations (Geva, Bennett, Warburton, & Patterson, 2011). This ability to talk to oneself in one's head and listen to what is being said is a skill involved in memory, reading, language development and general cognitive processing (Geva et al., 2011). Comparatively, overt speech refers to the physical articulation of one's thoughts (Huang, Carr, & Cao, 2001). Models of language processing fail to reach a consensus in their accounting for inner speech, making it difficult to determine its relationship to overt speech and a possible dissociation (Geva et al., 2011).

Some have postulated that overt speech is simply produced by the same mechanisms as inner speech, with the obvious addition of a motor component (Huang et al., 2001). In other words, inner speech is modulated by the speech production system alone and its capacity should mirror that of overt speech (Vigliocco & Hartsuiker, 2002).

Ideally, neuroimaging studies would provide a more concrete means by which to clarify these discrepancies and isolate the mechanisms involved, jointly or separately, in the production of inner and overt speech. However, objectively measuring the neural correlates of inner speech is an intricate process often confounded by methodological limitations (Geva et al., 2011). These limitations have prevented the valid neural mapping of inner and overt speech production areas, making the concrete identification of a dissociation difficult to assert.

***Objectives***

The primary objective of this critical review is to identify and evaluate evidence for the existence of a dissociation between inner and overt speech capabilities post-stroke. Secondly, evidence-based clinical implications arising from such a discrepancy will be explored.

***Methods***

Search Strategy  
Computer-

patterns of speech error correction compared to normals' during episodes of inner and overt speech in various environments (Oomen et al., 2001).

outcomes measures and demographic profiles of research participants were not a barrier to inclusion.

#### Data Collection

As dictated by the selection criteria described above, literature employing the following study designs was yielded: a mixed nonrandomized clinical control trial and two neuroimaging studies

primary motor cortex, and Broca's area and its  
homologue.

The MLT-PMC and IV-PMC regions were robustly



2008). GLM permutation: Non-parametric interference for arbitrary general linear models. In Abstract proceedings of the 14<sup>th</sup> Annual Meeting of the Organization for Human Brain Mapping. Australia: Melbourne.

Oomen, C., Postma, A., & Kolk, H. (2001).

Prearticulatory and postarticulatory self-monitoring in Broca's aphasia. *Cortex*, 37(5), 627-641.

Vigliocco, G., & Hartsuiker, R. (2002). The interplay of meaning, sound, and syntax in sentence production.

*Psychological Bulletin*, 128(3), 442-472.