
Impact of Visual System Dysfunction on Language and Cognition

A HISTORICAL PERSPECTIVE

In this chapter we will examine the ways in which visual sensory and motor dysfunction may negatively impact reading and writing following a neurological event. We will also examine the role working memory plays in reading and spelling. Our understanding of the neuroscience of language and cognition has changed over the past 150 years. Traditional speech therapy assessment is grounded in *localization theory* (Broca, 1861; Naeser & Hayward, 1978), which assumes that there is a direct relationship between cortical structure and function and between locus of lesion and specific language impairment such as the word-finding deficit characteristic of Broca's aphasia. Many formal tests of speech and language function reflect localization theory because they are designed to measure distinct communicative modalities (Goodglass & Kaplan, 1972; Goodglass & Weintraub, 2001; Kertesz, 1982; LaPointe & Horner, 2006).

MULTIPLE PATHWAYS FOR AUDITION, MOTOR SPEECH, AND VISION

Over the past two decades, brain imaging studies have provided strong evidence for separate but interconnected ventral and dorsal neural networks serving audition (Hickok & Poeppel, 2007; Rauschecker, 1998; Rauschecker & Tian, 2000), language, and motor-speech function (Hickok & Poeppel, 2007; Mesulam, 1990; Saur et al., 2008). Neurolinguists Greg Hickok and David Poeppel (2004) have described a dual-stream model of language that includes a cortical conceptual system (semantic) that serves comprehension and a motor speech system where articulatory gestures are shaped to match the phonetic structure of language. For a clear illustration of this model the reader is referred to Hickok and Poeppel (2007). The dorsal auditory stream is located in the posterior part of the Sylvian fissure between the temporal and parietal lobes. It maps sound onto