The Hécaen-Zangwill Legacy: Hemispheric Dominance Examined

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The research of Henry Hécaen and Oliver Zangwill on patients with unilateral brain lesions in the later 1940s and early 1950s ushered in the modern era of investigation of hemispheric cerebral dominance. The field of inquiry expanded far beyond language and visual perception to encompass audition, somesthesis, motor performance, attentional processes, emotionality, and psychiatric disorders. The hundreds of studies dealing with the topic indicate that hemispheric dominance is not an all-or-none phenomenon and that, to some degree, it is an unstable phenomenon dependent upon bihemispheric factors. The basic cognitive processes that are preferentially mediated by each hemisphere and the factors that produce changes in performance still require adequate definition.

KEY WORDS: neuropsychology; hemispheric cerebral dominance; interhemispheric relationships.

THE HISTORICAL BACKGROUND

The origin of the concept of hemispheric cerebral dominance is familiar to neuropsychologists. It arose in the 1860s with Broca’s (1861, 1863, 1865) demonstration of the association between nonfluent speech disorder (aphemia, motor aphasia) and disease of the anterior left hemisphere. Some 10 years later Wernicke (1874) correlated fluent speech disorder (sensory aphasia) with lesions in the posterior left hemisphere. Together their landmark contributions established the doctrine of left hemisphere dominance for speech and language.

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Both Broca and Wernicke had firm ideas about the nature of aphasic disorders, and about the relationship of these disorders to thinking and intellect. Both held the common sense view that speech consisted of the conventional signs of ideas, and that aphasia represented a defect in this system of signs and was not an impairment in thinking as such. The patient with motor aphasia knew what he wanted to say — he had the appropriate words in mind — but he could not get them out properly. The patient with sensory aphasia also knew what he wanted to say — his ideas were intact — but he had lost his memory of the conventional relationships between ideas and spoken words; consequently, he had lost his appreciation of the meaning of words (cf. Broca, 1869). Although many aphasic patients did show some degree of cognitive impairment, neither form of aphasic disorder necessarily involved a disturbance of thinking per se. Wernicke was particularly insistent on this point, warning that “nothing could be worse for the study of aphasia than to consider the intellectual disturbance associated with aphasia as an essential part of the disease picture” (Wernicke, 1874, p. 35).

However, at the same time a radically different conception of the nature of aphasic disorder that defined it, not as a loss of a system of signs, but as a basic impairment of symbolic thinking itself was also put forward. This conception had its origins in 19th-century philosophy and linguistics, which equated at least distinctively human thought with language. The conception was succinctly expressed by the linguist, Max Müller (1866) when he wrote, “To think is to speak low. To speak is to think out loud.” Those who have read John B. Watson, the founder of the American school of behaviorism, will appreciate that he was almost echoing Müller when he defined thinking as subvocal speech or, as he once put it, “talking to ourselves” (Watson, 1924).

This fundamental idea was adopted by some clinicians and applied to the problem of the nature of aphasic disorders. Finkelnburg (1870) introduced the concept of “asymbolia,” i.e., a basic impairment in symbolic thinking, and contended that aphasia was a specific manifestation of asymbolia and not a mere instrumental disturbance of speech. To support his position, Finkelnburg cited instances in which aphasic patients no longer understood the value of coins, the import of pantomimed actions, or the meaning of signs of rank. Possibly it was this line of thought that provoked Wernicke’s admonition that aphasic disorder should not be confused with intellectual impairment.

In any case, Hughlings Jackson’s ideas were eventually far more influential. Jackson (1874) emphasized that aphasia was not a mere loss of speech or a forgetting of words, but an impairment in speech as an integral element of thought. Of necessity the aphasic patient is “lamed in his thinking” since “speech is a part of thought.” Jackson’s disciple, Henry