

# ***This Week's Citation Classic***

Studdert-Kennedy M & Shankweiler D. Hemispheric specialization for speech perception. *J. Acoust. Soc. Amer.* 48:579-94, 1970.

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**The results of a dichotic listening study are interpreted as evidence that, whereas the general auditory system common to both hemispheres can extract the auditory parameters of a speech signal, the dominant hemisphere alone is specialized for the extraction of phonological information from those parameters. [The Science Citation Index® (SCI®) and the Social Sciences Citation Index® (SSCI™) indicate that this paper has been cited over 250 times since 1970.]**

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"Our work sprang directly from the demonstration by Kimura<sup>1</sup> (1961, and several later papers) that, if different spoken digits are presented to left and right ears simultaneously, those presented to the right ear are more accurately recalled than those presented to the left. Kimura interpreted her results as reflecting left hemisphere specialization for language processes, and stronger contralateral than ipsilateral pathways from ears to hemispheres.

"We saw in her method an opportunity to test the hypothesis that the human capacity for language, typically vested in the left hemisphere, includes a specialized capacity for perceiving the phonetic structure of speech. We therefore chose as our materials pairs of consonant-vowel-consonant nonsense syllables, differing from each other by a single consonant or vowel. The results confirmed those of our previous study in demonstrating a right-ear advantage for a purely phonetic, or phonological, task.

"We therefore proposed as a working hypothesis that, whatever else the left

cerebral hemisphere is specialized for, it alone has the capacity to perform phonological analysis of the speech signal. The right nondominant hemisphere's capabilities for perceiving speech are based on a holistic strategy of pattern recognition without recourse to phonology. We are no longer convinced by all the arguments we made in the paper, but our general conclusion still seems to be correct. Subsequent work with split-brain patients by Levy<sup>2</sup> and Zaidel<sup>3</sup> has given it new underpinnings.

"Our paper has perhaps been cited so often because it served as an example of a carefully controlled and analyzed dichotic study. Dichotic studies themselves engendered interest because they offered a novel, benign, and noninvasive way to explore lateralization of function in the human brain.

"Although the flow of dichotic research continues unabated, we feel a certain disaffection with the approach. As a method of studying brain function, dichotic listening has been hard to tame, and we are plagued by questions that threaten its validity. How should we best measure the ear advantage? How are we to interpret variability of response in different tasks with the same materials? Why do individuals differ so widely?

"We stressed in our paper a methodological caveat that is still not sufficiently appreciated: perceptual asymmetry scores do not give a direct measure of asymmetry of brain processing. The ear asymmetry depends not only on material-specific and task-specific cerebral competencies, but also on the unequal representation of each ear in the two sides of the brain. Both sets of factors may vary, perhaps independently, and we still do not know how to partition their effects. If dichotic listening is to fulfill its early promise as a valid measure of lateralized perceptual processes, we need to renew our efforts to establish its validity for speech localization against the criteria of intracarotid sodium amytal injection and the newer measures of cerebral metabolism."

1. Kimura D. Cerebral dominance and the perception of verbal stimuli. *Can. J. Psychol.* 15:166-71, 1961.
2. Levy J. Psychobiological implications of bilateral symmetry. (Dimond S J & Beaumont J G, eds.) *Hemisphere function in the human brain.* New York: Halsted Press, 1974. p. 121-83.
3. Zaidel E. Lexical organization in the right hemisphere. (Buser P A & Rougeul-Buser A, eds.) *Cerebral correlates of conscious experience.* Amsterdam: Elsevier/North Holland, 1978. p. 177-97.