

# News

Office of Medical Information  
The University of Texas Southwestern Medical Center at Dallas  
5323 Harry Hines Boulevard Dallas, Texas 75235-9060 214/688-3404

January 4, 1988

CONTACT: Susan Rutherford  
Office: 214/688-3404  
Home: 214/349-7820

\*\*\*\*Stroke research probes correlation between  
right brain damage and tone in language

DALLAS--In a flat, robotic voice, the 39-year-old Texas school teacher struggled to gain control over her young pupils.

A stroke on the right side of her brain had left her without the ability to show emotion in her voice. While there was no evidence of intellectual impairment from the stroke, she found herself lacking the intonation necessary to discipline her students. The children couldn't tell when she really meant what she said.

The stroke lesion on her brain's right side had caused her voice to lose its emotional "prosody": It was without the musical coloration and natural inflection that we use to show proper emotion and attitude. At the same time, her voice was abnormally weak and could not be projected in a classroom, and her facial expressions and gestures lacked animation.

The teacher's speech and behavioral disorder, which was caused by damage to the brain's right side, was of special interest to researcher Dr. Elliott Ross, associate professor of neurology and psychiatry at The University of Texas Southwestern Medical Center at Dallas.

Since 1979, when Ross and his colleague Dr. Marsel Mesulam at Harvard Medical School published their case report on this woman's stroke in Archives of Neurology, Ross has been investigating the various speech and behavioral problems associated with localized right brain damage. He has called these syndromes "aprosodias," a term he coined in a 1981 publication.

Recently his research took him to the Orient, where he was able to investigate another fundamental question about language and stroke. Specifically, he asked, "What happens to persons who speak a tone language when they have a right brain stroke?"

Tone languages are spoken by approximately half the world's population. Mandarin Chinese, as well as other languages indigenous to parts of Asia, Africa, the Americas and islands in the South Pacific, depend upon the intonation of words for meaning. In these languages, the speaker must use the proper tone along with the proper sound for each word. By changing the tone, one can change the meaning of a word. For example, in Mandarin Chinese the word "ma" spoken with a high flat intonation means "mother" but when "ma" is spoken with a falling-rising intonation it means "horse."

Ross and a team of researchers, including linguistics expert Dr. Jerold A. Edmondson from the University of Texas at Arlington, neurologist Dr. Jin-Lieh Chan from the Chang Gung Memorial Hospital in Taipei, Taiwan, and G. Burton Seibert of UT Southwestern's Department of Community Medicine, Medical Computing Resources Center, compared acoustical measurements of Taiwanese-speaking patients who had suffered a loss of affective prosody from right brain damage to measurements of normal controls. Their findings were recently published as the lead article in the Journal of Phonetics (15:219-253, 1987).

(More)



The scientists found that the stroke patients who speak Taiwanese (a tone language) displayed a generalized flattening in the emotional content of their speech, typical of the loss of emotional color in non-tone languages. However, the tone language speakers retained their ability to intonate tones that were necessary for proper word-meaning.

From their acoustical findings, the team concluded that intonation involved in emotional prosody is linked to the right brain while intonation involved in word meaning is linked to the left brain.

Ross explains that medical scientists have long known that such language functions as grammar, word choice, word meaning and articulation are lateralized to, and controlled by, the left side of the brain. Damage to the left hemisphere can produce various forms of "aphasias," which are disorders of language involving difficulty in speech fluency and articulation, word choice, grammar and word comprehension. Aphasias can occur in varying combinations of symptoms depending upon the location and the size of the lesion.

The right hemisphere appears to regulate the emotional components of language and behavior, Ross says. "In non-tone languages, such as English, the intonation that we use gives color to our speech and is that aspect of speech that is most heavily correlated with emotional affect. Without the ability to intonate, it is difficult for people to assess accurately the depth and strength of our internal mood.

"In tone languages, however, right brain lesions cause a loss of the emotional aspects of language, but the speaker does not lose the ability to intonate in order to convey word meaning. This implies that the brain's lateralization for the different aspects of language is not acoustically but rather behaviorally dependent regardless of whether you speak a tone or non-tone language."

Because of Ross's work in tone languages, he was invited this summer to give a series of lectures in Taipei, Taiwan, at the Chang Gung Memorial Hospital and at the Veteran's General Hospital, where he addressed the Neurological Society of Taiwan. He also traveled to Beijing, China, where he lectured with Dr. Edmondson at the Chinese Academy of Social Science, Institute of Linguistics, and at the Central Institute of Nationalities.

XXX

Distribution: AA,AB,AC,AC1,AF,AF1,AG,AG1,AH,AI,AK,AK1,ADM,ADM1,SL

Note: The University of Texas Southwestern Medical Center at Dallas comprises Southwestern Medical School, Southwestern Graduate School of Biomedical Sciences and Southwestern Allied Health Sciences School.