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Crossing Borders in Language Science: What Bilinguals Tell Us About Mind and Brain

ScienceDaily (Feb. 18, 2011) — Sonja Kotz leads the Minerva research group "Neurocognition of Rhythm in Communication" at the Max Planck Institute for Human Cognitive and Brain Sciences in Leipzig. She will present evidence from neuroimaging on the impact of cognitive functions on bilingual processing at the AAAS symposium "Crossing Borders in Language Science: What Bilinguals Tell Us About Mind and Brain."

Rhythm, as the recurrent patterning of events in time, underlies most human behavior such as speech, music, and body movements. Sonja Kotz investigates how temporal patterns in di!erent languages influence the processing of phonological, semantic, and syntactic information. Individuals who learn a new language usually need time to develop a "feel" for its characteristics. With rapid speech it can initially even be difficult to recognize individual words. "This is because the brain has to become accustomed to new speech rhythms," explains Sonja Kotz.

Our brain is very good at recognizing patterns in the environment and uses them to create general predictions about the near future.

"We assume there is a neural network permanently engaged in evaluating information about duration, rhythm, tempo and stress of syllables in order to recognize temporal regularities in the stream of speech," says Kotz. During language acquisition, this network could store fundamental regularities of speech in the brain so that later, language processing is more efficient.

Rhythm processing predominantly occurs in brain areas in and just belowthe cerebral cortex but also in motor areas and evolutionarily older areas like the cerebellum and basal ganglia. "This points to an early stage of development," says Kotz. "The evolution of language would not have been possible without the development of brain areas which have the ability to structure events temporally." To meet the high communicative demands of homo sapiens, the motor system in and below the cerebral cortex might have become increasingly sensitive to rhythmic input.

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