

20 February 2008

By: Stefan Anitei, Science Editor

## [Your Mother Tongue Influences How Your Brain Develops](#)

### *The pitch and the sound of the language*



Well, the development of your brain is not only influenced by genetics, diet and intellectual stimulation, but also by... your mother tongue! "Everyone has a brain stem, but it's tuned differently depending on what sounds are behaviorally relevant to a person, for example, the sounds of his or her mother tongue," said Jackson T. Gandour, a linguistics professor at Purdue University. The team first compared the brain activity in young adult speakers of the tonal language Mandarin (the main Chinese language) with those of English, a non-tonal language like most Indo-European languages. In the case of tonal languages, slight inflections of pitch on syllables result in different words. One example is the sound "ma" in Mandarin: with a level tone this is "mother," a rising tone turns it into "hemp," a falling-rising tone means "horse" and with a falling tone it is "scold." "By studying brain activity at different stages of processing pitch patterns in tonal languages, we have found that early activity in the brain stem is shaped by a person's language experience, even while the person is asleep, and consequently, we now believe it plays a much greater role in speech perception than we thought before," said Gandour. The brain stem is placed on the lower levels of the auditory pathway, receiving the sound signals just 7 to 9 milliseconds since the cochlea (the receptor in the inner ear) picks them up and sends them to the auditory nerve. "Never did I expect we would find that language experience would shape the way the brain stem works. The idea is that this sensory signal undergoes a set of transformations that are far more complicated than we originally thought," Gandour said. In the brain cortex, speech engages several brain nuclei from both hemispheres. "And moreover, we find that these networks are not circumscribed to language processes but instead interact with more general sensory-motor and cognitive process in addition to those associated with language. The findings show that when the melody of speech is processed, a dynamic interplay between the left and right hemispheres of the brain occurs. The processing pitch of information engages neural mechanisms in the brain's right hemisphere, while left hemisphere regions mediate processing of linguistic information," said Gandour.