Neurophysiological Evidence for The Plasticity of Auditory-Motor Integration in Voice Control

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Many aspects of brain function, including auditory-motor integration, have been demonstrated to be plastic, yet we are still far from understanding the mechanisms underlying this plasticity. In recent years, our primary efforts have been made to explore the plasticity of auditory-motor integration in voice control at the behavioral and neurophysiological level using the altered auditory feedback paradigm along with the event-related potentials technique. Our studies have demonstrated that long-term exposure to different languages elicits differential neurobehavioral processing of pitch changes in voice auditory feedback. Moreover, a series of our preliminary studies provide some evidence for the training-induced cortical plasticity of auditory-motor integration in voice control, indicated by enhanced cortical responses to voice feedback changes following short-term speech perceptual learning or auditory cognitive training. These findings suggest that not only the long-term experience but also short-term training can induce the plasticity of auditory-integration in voice control, and this plasticity is thought to be related to the interaction between the perception/cognitive and production system.

In addition, our latest finding that neurobehavioral processing of auditory feedback during vocalization is shaped by fluctuating reproductive hormones across the menstrual cycle further suggests that the interplay between the central nervous system and the
reproductive system may also be responsible for the plasticity of the auditory-motor system involved in voice control.