

# How can neuroscience help performers?

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Many neuroscientists are interested in musicians and in the neurobiology of music perception and performance. This interest is usually motivated by the attractiveness of the topic (music as an art) and by the enormous effects of music on brain networks and brain morphology, demonstrating the powerful mechanisms of brain plasticity in the short- and long-term range. Therefore, most neuroscientists consider music as an excellent paradigm to study brain mechanisms related to sensorimotor or perceptual learning. However, it remains open as to whether the growing body of research in this area has been made fertile for musicians, for example with respect to improvement of practice or teaching strategies. We report new results of brain imaging studies focusing on sensorimotor integration while novices learn to play the piano. Interestingly, auditory-sensorimotor integration can be established in less than 20 mins of piano practice, demonstrating the dynamics of brain plasticity in this specific task. Implications include the usefulness of pure auditory stimulation for the acquisition of skilled finger movements. Furthermore, we review recently published work on error monitoring in skilled pianists. This research demonstrates that errors are already "identified" by the brain 50 ms prior to their actual execution. We discuss this finding with respect to practical consequences concerning error avoidance. Based on these studies, we demonstrate the utility of some neuroscience research for musicians, particularly when the researchers themselves are trained musicians and work diligently to translate their findings from one discipline to the other.

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