

Zoning in on music and the brain

Lauren Stewart

A one-day symposium, *The Musical Brain*, was held at The Royal Institution, London, UK, on 12 July 2002.

Musicians, music educators, music therapists and members of the public packed the Faraday Lecture Theatre at the Royal Institution to learn how the brain perceives, produces and appreciates music, why music can be therapeutic in conditions such as stroke and Parkinson's Disease, and how musicians can use neurofeedback in order to improve musical performance.

Professor John Gruzelier (Imperial College, London) reported that manipulation of brain activity can have positive effects on musical performance: 'Zoning In' is an ongoing project that is being carried out with students at the Royal College of Music in London. Gruzelier provides musicians with a visual representation of their brain's EEG activity and trains them to manipulate their brainwaves in such a way as to move a computer-displayed boat across the screen (in electrophysiological terms, this activity optimizes theta band activity, a rhythm that has been associated with deep relaxation, a reduction in anxiety and an enhancement in self-confidence). International specialists blind-rated the performance of the musicians, before and after neurofeedback training and concluded that, post-training, musicians showed a significant increase in overall performance quality, and stylistic and musical interpretation. The research has obvious implications for musicians, who need to gain a high degree of control over their mental processes in order to achieve a balance between technical mastery and expressive communication. However, it also has clinical implications, for example, for conditions such as Attention Deficit Hyperactivity Disorder.

Conversely, Professor Michael Thaut (Colorado State University, USA.) showed that music itself can be used to manipulate brain activity in ways that can directly affect the behaviour of patients recovering from stroke. Thaut commented that patients use rhythm as 'a kind of

external clock' with which to drive the motor system. Video clips illustrated dramatic improvements when a metronome was used to entrain walking. After a period of such training, the effect persisted even in the absence of any external auditory input. The therapeutic effects of music were also addressed by Paul Robertson (leader of the Medici String Quartet) who described the research of Ralph Spintge (Luedenscheid, Germany), an anaesthetist who uses music as a sedative. He composes tailor-made extracts to parallel the time course of treatment procedures: 'We start with a simple melody [on] a single instrument. Then we add voices, thus increasing the dynamic range of the piece of music. We keep it on a certain level and then we go back. Its 12 minutes and that's it.' The level of pain experienced, as well as the concentration of stress hormones were found to be markedly reduced. Spintge believes that it is the rhythmic aspect of music which is all-important but, as yet, the neurophysiological mechanisms underlying music's sedative effect remains unclear.

The power of music, at both a physical and an emotional level, causes us to wonder whether music might be a part of human nature, and not merely a part of human culture. Professor Sandra Trehub (University of Toronto, Canada) presented evidence supporting such a view. She showed that infants as young as 6 months old attend to melodic contour and rhythmic patterns of sound in the same way that adults do. They focus on

relational, rather than absolute, attributes of music, still recognizing a melody when it is shifted up or down in pitch, and when it is played slowly or speeded up. How do infants acquire these musical abilities? One theory is that such abilities are learned in the womb, that babies sense their mother's physiological reactions to certain elements of music. But Trehub refutes this idea, citing evidence that babies born to deaf mothers also show the same musical predispositions as those born to hearing mothers. Such early predispositions suggest that musicality emerges from the functioning of biologically hardwired circuits in the brain.

If we are innately predisposed to music, this might explain why specialists and non-specialists alike are interested in the link between music and the brain. Questions from the auditorium, such as 'Can eating chocolate enhance one's musicality?', 'Can music make you evil?', and 'Does Tony Blair prefer Stravinsky or Steps?' illustrate the breadth of the public's interest in this newly emerging field. Following on from the success of the Royal Institution's Musical Brain forum, the New London Orchestra, in collaboration with University College London, are planning a three-day public event, 'Music and the Mind', to be held on 27–30 April, 2003.

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