

Musicians Have Bigger Brains



By Dr. Harry Witchel

Playing Music Enlarges Brain Regions

The world's foremost scientists in music and neuroscience collected in Leipzig, Germany from May 5-8 to discuss the most recent research on music and its effects on the brain at the largest conference of its kind in two years.

Dr. Gottfried Schlaug, a neurologist at Harvard University in Boston announced that learning to play music to a high level changes the shape and increases the size of parts of the brain associated with playing a musical instrument. The new results, found by Dr. Marc Bangert in association with Dr. Schlaug, showed that not only were professional musicians different from non-musicians, but that the brains of violinists were different from the brains of pianists. In violinists, the part of the brain important for left hand finger control, the primary motor cortex on the right side of the brain, is larger and has a different shape. The mirror image situation was found in pianists, who use both hands to make fine movements, in that the enlarged region for finger control was the same part of the brain but on the left side.

Dr. Schlaug's research using the brain scanning technique MRI - Magnetic Resonance Imaging - also found another brain region that was more developed in professional musicians: Heschl's gyrus, which is important for tone processing. It is only in the last decade that scientists have accepted that the brain can physically grow in response to learning. Previous scientific dogma suggested that in adults the cells of the brain responsible for thinking and sending messages, neurones, are unable to divide and were diminishing in number throughout life. But whether more or bigger musical areas in the brain are better - and in what way - is unclear.

Learning To Play Music Increases Intelligence

Also at the "Neurosciences and Music II" conference in Leipzig, Professor Glenn Schellenberg of the University of Toronto described his most recent study demonstrating that learning to play a musical instrument increases a broad range of intellectual measures, not simply those directly related to musicality. Schellenberg explained that, for the 144 six-year-old children that he studied, regularly having music lessons in childhood, even for only one year, caused a significant increase in the child's intelligence and academic performance. The new results, when combined his previous studies showing that university students who had studied music in childhood ended up with higher measures of intelligence, suggests that studying music has an effect on intelligence generally, and that this observed effect is due to the study of music rather than to family income or to the parents' educational level.

The study began by advertising in a local newspaper for parents who would like their six year old to receive free weekly arts lessons. The children, who all had to have access to a keyboard at home for practise, were randomly allotted to one of four regimes: keyboard lessons in groups of six, Kodály voice lessons, drama lessons, or no lessons until after the study ended a year later. The lessons were taught for 36 weeks at the Royal Conservatory of Music in Toronto, the oldest and most prestigious music conservatory in Canada. By the end of the year the music students' average IQ increased, as did a measure of their academic achievement. It was not simply a measure of "musical intelligence" that increased, but their scores for Verbal Comprehension, Perceptual Organisation, Freedom From Distractibility, and Processing Speed.

Having no lessons or the comparative non-musical activity, drama lessons, did not have similar consequences for intelligence, although the research unexpectedly found that studying drama did have another developmental benefit that the children studying music did not receive: better social skills. Professor Schellenberg joked to the other academics that he personally would rather a few more social skills than the extra points of IQ.

How Does Music Increase Intelligence?

More research is needed to determine how learning to play a musical instrument can increase intelligence, but there are four possibilities. The simplest explanation is the so-called "Schooling Effect". It is well-established that if a child attends classes, the child's IQ will increase. While children's drama lessons do not involve the same discipline and structure for study as music lessons, perhaps sending a child to extra mathematics or chess lessons might have the same effect as music lessons - although in our society mathematics lessons would not have the wide impact that music lessons do because after-school mathematics lessons would not be as popular.

Another possible explanation is that music

improves a constellation of activities: memorisation, practise, fine motor skills, learning to express yourself, concentration and focus. Learning these skills may generalise to an increase in intelligence and academic performance. The other possible explanations are that music teaches children to think abstractly, and that learning music is akin to learning a second language - either of which might be expected to increase intellectual ability beyond simple musical tasks.

Should Music Lessons Be Mandatory?

I teach at Bristol University's Medical School, and it is my subjective observation that those of my students who have studied music to a high level are often among the brightest and the most applied of students. My observation does not distinguish between music making students bright or that only bright children study music. One of Schellenberg's previous formal studies on university students found that studying music and IQ were associated, although the difference in intelligence between those who had studied music and those who had not was small on average. Schellenberg's early statistical studies demonstrate that the effects on intelligence are caused by the music lessons rather than by the improved family background often provided by parents who encourage their children to study music.

This encouragement and the children's motivation are critical for any benefit from the Schooling Effect. The problem with mandatory music lessons is that many children are bound to drop out. In Schellenberg's study, in which the parents and children were interviewed about their willingness to participate before being allowed to join the study, 8.3% of the children taking lessons discontinued before the end of the 36 weeks. The effects of music on intelligence and academic achievement were meaningless for students who refused to study. When asked whether these studies meant that professional musicians were more intelligent than the population at large, Schellenberg answered that the decision to become a professional musician is influenced by many different factors, and that far more people study music as children than become professional musicians. It seems to me a good thing if more young children set out as if to become professional musicians. Not every child who studies music will become a professional musician, but the developmental advantages will be positive for many children.

Dr. Harry Witchel is a Senior Research Fellow at the Department of Physiology at the University of Bristol. He will be speaking twice at the Cheltenham Festival of Science (www.cheltenhamfestivals.co.uk) on Music and Film (with David Puttnam and Howard Blake, Wed. 8 June) and on Music and Pleasure (with two musicians from the New London Orchestra, Sun. 12 June). He will be also be lecturing at the Royal Society's Summer Science Exhibition July 4-7 (www.royalsoc.ac.uk) about the Chemicals of Pleasure. www.harrywitchel.com