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**The Neurobiology of Musicality – Why your brain loves music and how music helps learning**

**Presenters: Dr Mac Gardner and Elaine Sharman**

**Reviewed by Gillian Bibby**



**Dr Mac Gardner, Elaine Sharman**  
*Joy Aberdeen*

**Dr Mac Gardner is a semi-retired medical geneticist with a particular interest in certain inherited neurological disorders. He also achieved a Merit pass in Grade 6 Piano in 2010. Elaine Sharman is a private piano teacher, school, and tertiary teacher. Her research in music education, instrumental learning and music therapy has been published in national and international journals.**

Did you know that hearing your favourite music activates the same area of your brain as when you are eating your favourite chocolate? Or that your brain's reaction to your favourite music is quite different from its reaction to similar music by other composers – even if you can't tell the difference between the pieces yourself?

Dr. Mac Gardner cited a study with the famous psychologist Oliver Sachs, a self-proclaimed rabid Bach lover and dis-liker of Beethoven's music. A short video clip showed Sachs

undergoing an MRI brain scan, in which he uses himself as a subject in an experiment to see if his love for Bach and his disdain for Beethoven would be discernible in the scan. The MRI scan shows different parts of the brain lighting up as they use oxygen or are activated in other ways.

In the first experiment Sachs, in his MRI cocoon, was played, firstly, an excerpt of Bach, and, secondly, a piece of Beethoven's of similar style and orchestration. Scans were taken over fine 'slices' of the brain taken horizontally, vertically from front to back, and vertically from side to side. Together they showed much of the activity in the brain on hearing the music: the memory centre, emotional centre, motor strip, and so on – and during the Bach performance there were lights going on in what seemed to be all over the brain. However when the Beethoven was played there was little excitation of much of the brain. Many criticisms could be thrown at this simplistic experiment, the greatest being that, of course, Sachs 'knew' the Bach music and could cause a specific warm and appreciative reaction in his brain.

However, a second experiment showed Sachs disappearing into the MRI tunnel without knowing what he was to be played – which was two pieces carefully chosen by his fellow experimenters, professional musicians. It was difficult to determine the composers, as both excerpts were choral, slow, and had floating harmonies and very similar orchestration. Which composer was which? When Sachs emerged, he was visibly confused that he had not picked the composers. But when the scans were examined and the areas that showed excitation were closely observed, it was apparent, that although the 'conscious' Sachs did not know the answer, his brain did! The same areas of emotion and appreciation and so on lit up in the Bach excerpt, and again his brain was much less switched on during Beethoven. It recognised the musical patterns that the conscious Sachs could not distinguish.

The experiment showed that we do indeed have deep-seated reasons for liking certain music, and that we are not fickle in our choices.

Whilst there are many questions left unanswered in this fairly simple experiment, it has raised exciting prospects for new research to come.

The second half of the presentation belonged to Elaine Sharman, whose wealth of wonderful and detailed information about the researches she and others have undertaken over the last several decades, particularly in the relationship and place it has in all childhood learning, was not given enough time to develop thematically and structurally. Fortunately, she handed out lists of journal articles and sites to look for, and these should be followed up by us all.

These concern the development of the auditory and motor areas of the brain, an increase in grey matter making more efficient brain circuitry, particularly in areas which deal with audition, motor control, and visuospatial processing; the thicker corpus collosum – the bundle of nerve fibres that shunt information between the two sides of the brain – means that we integrate information faster.

Musically trained children can thus remember lists of spoken words better; have larger vocabularies, higher reading ability, increased IQ; they have more plastic brains with the ability to improve faster with practice; they are better at learning languages due to the ability to discriminate pitch changes in foreign words.

And music also enhances empathy because it fine-tunes the ability to recognise emotional nuances in speech.

Elaine's final challenge to us was one that we must all do something about right now: We must write letters and make pleas to all politicians for the return of music to the primary school syllabus! We can create forms for others to fill in and send to our local MPs, and to the PM. Music making, so vital to much of our learning, so integral to the development of the brain, has been grossly under-valued by our current politicians and Education Ministry, and our subject, so vital to our children's learning methods and achievements in all other subjects, are all highly endangered. As indeed is, in some way, our own livelihood. So go out, and write to the Minister for the Arts, to the Minister for Education, to your MP, to the PM! Music must be an integral part of our education system as it is to life overall!

**Gillian Bibby** is a composer and pianist who studied in Cologne and at the Free University of Berlin, was twice the Mozart Fellow at Otago, and has been involved in both community and university chamber music teaching. She has written extensively on music in NZ, and recently edited *Sunrise and Take Flight*, two volumes of NZ music specially composed for beginning and intermediate pianists.

**Reading list:**

*Time for teachers to take another look at neuroscience*, Helen Thomson, *New Scientist* 04/10/2010, Magazine issue 2780

*Journal of Neuroscience*, vol. 29, p.3019

*Journal of Neuroscience*, vol. 23, p.9240

*Neuropsychologia*, vol. 33, p.1047

'Nature Reviews', *Neuroscience*, vol. 11, p.599

*Psychological Science*, vol. 15, p.511

*European Journal of Neuroscience*, vol. 19, p.473

*Applied Psycholinguistics*, vol. 28, p.565

*Annals of the New York Academy of Sciences*, vol. 1169, p.209