

## CAN SCIENCE EXPLAIN MUSIC ?

I have played piano since I was a kid and for many years I've been interested in the brain - as you know from the talks I have given. So this subject was right down my street.

There were two speakers. We were told Raymond Tallis would tell us why science cannot explain music, followed by Mark Lewney explaining how science could explain music.

It makes more sense to me to reverse this order in what follows.

### **Lewney**

Physicist, Ph.D in Guitar Acoustics, day-job Patent Examiner.

Theatrical presentation - charged around stage, hands flapping, with matching emotional voice.

Gave several aspects of scientific explanations of music or aspects of music- he was really keen to show equations were involved.

1. He explained musical pitch - frequency of notes - equations.
2. He explained anatomy of the ear - which we have discussed here previously.
3. He talked about the musical distance apart of frequencies which result in 'consonances' and 'dissonances'. More equations.

**But for me he failed to show science could explain music.**

Enter Raymond Tallis

philosopher, poet, novelist, cultural critic, retired medical physician, clinical neuroscientist, specialising in geriatrics [so ok for us then], has written 30 + books.

So a bit of a genius. Trouble is he knows it and shows it.

His presentation was a list of points projected on screen and read to audience - rapidly.

1. Various parts of brain do respond to aspects of music - pitch, melody, tempo. These brain parts are associated with "reward" or motivation .
2. **But** brain areas which respond to aspects of music are also stimulated by other non-musical signals - eg dinner, copulation all about survival of the species.
3. But music does not produce the transmission of genes (via copulation) or giving energy and nutrients essential to survival. Music just uses the nerve routes available.
4. What about the creation of music? Here Tallis went classical, talking about magnificent music quoting Beethovens Ode to Joy which involved years of thought, experiment
5. He ended with a kind of Q.E.D:  
"There is something absolutely profound about music. Music is the supreme celebration of our freedom". Does that follow for pop music, or hymns, or 'ring-a ring a roses' I wondered.

**For me he did not make the case that science cannot explain music.**

I reckoned it was a no-score draw.

## Music and the Brain

Why is it so easy to recall lyrics and melodies, even when we don't want to? Why does music have such power over our emotions, compelling us to dance, moving us to tears, lulling us to sleep and luring us into love? Join neuroscientist and musician **Catherine Loveday** as she uncovers what happens in the brain as we listen to, create and perform music

Dr Catherine Loveday is a Principal Lecturer in Cognitive Neuroscience at the University of Westminster. She is passionate about public communication of neuroscience, especially in relation to music. Much of her research is focussed on the neuropsychology of autobiographical memory and she has worked for many years with people who have amnesia and dementia. However, she also has a long-term fascination with music in the brain and has carried out a number of studies looking at the cognitive and neuronal aspects of music processing. Recently, she has brought these two areas of research together and is now investigating how memories of music are central to our sense of self, imagination, emotional state and social functioning, including the biggest ever study in to BBC Radio 4's Desert Island Discs.

While brain training games and apps may not live up to their hype, it is well established that certain other activities and lifestyle choices can have neurological benefits that promote overall brain health and may help to keep the mind sharp as we get older. One of these is musical training. Research shows that learning to play a musical instrument is beneficial for children and adults alike, and may even be helpful to patients recovering from brain injuries.

“Music probably does something unique,” explains neuropsychologist Catherine Loveday of the University of Westminster. “It stimulates the brain in a very powerful

way, because of our emotional connection with it.” Playing a musical instrument is a rich and complex experience that involves integrating information from the senses of vision, hearing, and touch, as well as fine movements, and learning to do so can induce long-lasting changes in the brain.

Professional musicians are highly skilled performers who spend years training, and they provide a natural laboratory in which neuroscientists can study how such changes – referred to as experience-dependent plasticity – occur across their lifespan.

“Music reaches parts of the brain that other things can’t,” says Loveday. “It’s a strong cognitive stimulus that grows the brain in a way that nothing else does, and the evidence that musical training enhances things like working memory and language is very robust.”

Learning to play a musical instrument, then, seems to be one of the most effective forms of brain training there is. Musical training can induce various structural and functional changes in the brain, depending on which instrument is being learned, and the intensity of the training regime. It’s an example of how dramatically life-long experience can alter the brain so that it becomes adapted to the idiosyncrasies of its owner’s lifestyle.

Learning a musical instrument is excellent for kids and oldies as well. Start now!