

Fourth Meeting of Neurosciences and Music, Montreal, 2008.

Late this past June, 400 neuroscientists from around the world converged on Montreal for the fourth Neurosciences and Music meeting. These meetings are held every three years, organized by the Mariani Foundation - an Italian charity that has taken the science of music under its wing. The conferences are held in cities in North America and Europe that feature concurrent music festivals, so that scientists in attendance can hear the latest in music research during the day and indulge in world-class musical performances in the evenings. This meeting coincided with the Montreal Jazz Festival, featuring nearly round-the-clock public performances by jazz, soul, and rock artists on stages set up in downtown Montreal.

The N&M meetings are loosely organized around topical themes; in this case Disorders and Plasticity were organizing principles. Talks were grouped into symposia put together by meeting participants, consisting of sessions on rhythm, singing, plasticity, memory, emotion, music perception in cochlear implant patients, music's role in brain recovery, and the relationship between music and prosody. These talks were complemented by two poster sessions.

The scientific study of music is a relatively recent addition to the neurosciences, but the breadth and diversity of this meeting is a testament to its fast growth. The highlights for me were equally broad. One of the most striking symposia was that on music's potential role in recovery from brain injury. There is now impressive evidence that music can facilitate this recovery. Gottfried Schlaug reported that getting aphasic patients to sing can vastly improve their speech production, perhaps by helping to recruit right hemisphere regions to take over functions previously mediated by left hemisphere structures. Eckart Altenmüller presented compelling evidence that musical training can help stroke patients recover fine motor function, often more effectively than traditional physical therapy. And perhaps most impressively, Michael Thaut showed that having stroke patients walk to music can dramatically improve their gait. He showed video clips of patients who really could not walk on their own, but who entrained to the beat and started walking when played music with a pronounced beat. The reasons for these effects are not entirely clear, but the clinical importance and general interest of these results are undeniable.

Another unusual and interesting symposium was on music perception and cochlear implants (CI). Implant users often report that music is not enjoyable, presumably in part because pitch-related spectral information is poorly conveyed by the coarse tonotopic stimulation of an implant. Bob Shannon presented evidence that CI users can be trained to perceive pitch contours, perhaps tapping into pitch cues in the temporal envelope that are conveyed to some extent by CI stimulation. It remains to be seen whether such training over a long period of time will improve the enjoyment of music, as there are basic limitations in what can be conveyed to the brain by CIs that seem unlikely to be fully circumvented by training. Interestingly, Sandra Trehub reported that congenitally deaf children implanted at young ages may have a very different experience of music than do adult CI users. Although these children receive qualitatively similar sensory stimulation, they generally seem to enjoy music, and readily engage in it. To me this raises fascinating questions about what is essential to music, as the signals entering the brain are no doubt dramatically different from what someone with normal hearing would receive. Many adults with CIs have had some degree of normal hearing at some point prior to getting the implant, and so may have a notion of what music should sound like, one that congenitally deaf children lack. Perhaps without this preexisting concept of music, the otherwise odd sound of music via CIs is perfectly enjoyable. It is well known that music varies dramatically over the world, with the music of foreign cultures sometimes sounding bizarre and unpleasant to people not familiar with them. Music via CIs could represent a more extreme example of the same thing.

Rhythm perception and production is currently gaining momentum in music cognition and cognitive neuroscience, and the symposium on rhythm represented some of this work. John Iversen showed MEG responses that occur to sounds that subjects perceive as being on the beat. The stimuli in his experiments are rhythmically ambiguous, and the measured brain responses change depending on where subjects hear the beat, with higher responses to those sounds that are perceived as carrying the beat. The neural locus of these effects is unclear, but Jessica Grahn has been arguing for a role for the basal ganglia in aspects of beat and meter perception. Previously she had shown that the basal ganglia are more active for stimuli containing regular metrical structure than for acoustically matched stimuli without such structure. In her talk she presented the results of rhythm perception experiments in patients with Parkinson's Disease, which causes basal ganglia degeneration. Intriguingly, she found that such patients are specifically impaired, relative to control subjects, at detecting changes to metrical rhythms, with no impairment for

nonmetrical stimuli. Her results suggest a role for the basal ganglia in meter perception, and provide intriguing initial clues to the brain basis of a vital aspect of music.

The poster sessions were also of high quality, again spanning music cognition, brain imaging, clinical work and more. The most memorable posters for me were those from two different groups who have been studying entrainment in parrots. By now everyone has seen the classic YouTube video of the dancing cockatoo, who moves in time to a song by the Backstreet Boys. One group led by Adena Schachner, and another by Ani Patel, have both verified that this entrainment is a real phenomenon, spontaneously produced by many birds in the absence of other cues to movement. They find that the birds are indeed driven by the beat – when the music’s tempo changes, so does the rate of movement. It is unclear what it tells us about the origins of entrainment, as it is pretty clearly not a homologous behavior given the distant relation between birds and humans, but it is still pretty cool, and convincing.

Montreal was a particularly appropriate locale for the meeting given its role as a center of the music science community. Many leading figures in the field are based there, and Isabelle Peretz and Robert Zatorre have been involved in organizing these meetings from their inception. A social highlight of the weekend was the reception they hosted at the new building housing the BRAMS institute for the study of brain, music and sound, a joint venture of McGill University, the University of Montreal, and the Montreal Neurological Institute. Along with food and wine we enjoyed a tour of the facilities and demos of the various experimental techniques they employ. Given the concurrent jazz festival, many of us spent our other evenings out on the town hearing great music. The musical highlight for me was stumbling upon a soul revue playing instrumental covers of Shuggie Otis to a crowd of over a thousand people. Later in the evening we also encountered Martha High, a longtime associate of James Brown, still going strong after 40-plus years of singing.

I also attended the previous edition of this meeting, held in Leipzig in 2005, which was also excellent. What I appreciate most about these meetings is the efforts made by the organizers to include all the various corners of the music science world. The only notable absence in this regard was ethnomusicology. Given the current interest in music’s origins and the relevance of cross-cultural comparisons to such questions, ethnomusicologists would be a welcome addition to these sorts of meetings, but unfortunately rarely attend them. It would be well worth the effort to have them participate, as they potentially have much to contribute. The overall impression I was left with, however, was of a diverse and friendly community making progress on many interesting questions. The location of the next meeting, to be held in 2011, has yet to be determined, but I look forward to attending.

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