DISORDERS OF MUSICAL PERCEPTION

Timothy D. Griffiths
Auditory Group, Newcastle University, UK
Wellcome Department of Imaging Neuroscience, University College London, UK

Three examples of disordered musical perception will be discussed.

i) Recently a form of congenital agnosia manifest as a deficit in musical perception has been described systematically for the first time 1 2. The early reports suggest particular deficits in the processing of contour and interval. Recent work in our laboratory has corroborated the existence of the condition and the presence of central deficits in the perception of pitch. Specifically, we have identified a deficit in the perception of pitch-change direction with intact perception of pitch-change. I will argue that this constitutes a deficit in the processing of a 'building block' for contour that affects local processing in turn. Cognitive neuropsychological 3 and imaging data 4 suggest that such a deficit in the processing of pitch patterns is a cortical deficit involving superior temporal lobe areas distinct from primary auditory cortex..

ii) A number of recent studies (eg 5) have sought to use musical stimuli to characterise the cognitive style in Autistic Spectrum Disorder (ASD). Models of cognitive processing based on visual perceptual testing, suggest that in ASD there may be differences in the processing of local and global information, and the interactions between them. Previous studies using auditory stimuli have equated global processing in the visual domain with the perception of the contour of pitch sequences. We argue that the global feature of pitch sequences is actually the pattern of pitch direction changes (contour) in association with the absolute pitch values and time points of change. In a recent study of 13 subjects with ASD and 15 age- and intelligence-matched controls we have demonstrated that the global structure defined in this way interferes with the processing of contour in normal subjects but not in subjects with ASD.

iii) Functional imaging suggests a different substrate for the processing of the emotional transformation ('shiver') that can sometimes be produced by music from the substrate for the recognition of music 6. We have recently assessed a subject who lost the 'shiver' produced by certain music following a left hemisphere stroke affecting the insula and amygdala. This suggests that these areas within the network defined in normal subjects are necessary for the emotional effect of the music.

References

1. Ayotte, J., Peretz, I. & Hyde, K. Congenital Amusia. A group study of adults afflicted with a music-specific disorder. Brain 125, 238-251 (2002).

2. Peretz, I. et al. Congenital amusia: a disorder of fine-grained pitch discrimination. Neuron 33, 185-91 (2002).

3. Johnsrude, I. S., Penhune, V. B. & Zatorre, R. J. Functional specificity in right human auditory cortex for perceiving pitch direction. Brain 123, 155-163 (2000).

ISBN: 3-931852-66-0
ISSN: 1617-6847

4. Patterson, R. D., Uppenkamp, S., Johnsrude, I. & Griffiths, T. D. The processing of temporal pitch and melody information in auditory cortex. Neuron 36, 767-776 (2002).

5. Mottron, L., Peretz, I. & Menard, E. Local and global processing of music in high-functioning persons with autism:beyond central coherence? J Child Psychol Psychiatry 4, 1057-1065 (2000).

6. Blood, A. J. & Zatorre, R. Intensely pleasurable responses to music correlate with activity in brain regions implicated in reward and emotion. Proc Nat Acad Sci 98, 11818-11823 (2001).

ISBN: 3-931852-66-0
ISSN: 1617-6847