THE NEUROSCIENCES AND MUSIC | VIII

Wiring, re-wiring, and well-being

13-16 June 2024

HELSINKI | FINLAND & online

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Child neurology. Just ahead

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In partnership with

HUIPPUYKSIKKÖ TUTKIMUKSEN, MIELEN, KEHON JA AIVOJEN

CENTRE OF EXCELLENCE IN MUSIC, MIND, BODY AND BRAIN

In collaboration with

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UNIVERSITY OF JYVÄSKYLÄ

UNIVERSITY OF TURKU

to improve cognitive abilities in both typical and clinical populations, such as those with language disorders, stroke, and traumatic brain injuries. However, there is a paucity of research on music perception and hence its interventional use in epilepsy. Therefore, this review aims to delve into the neurophysiological and cognitive aspects of music processing in epilepsy to pave the way for the design of tailored treatments. A PubMed search with keywords ''(epilepsy OR seizure) AND (music OR pitch OR beat) AND (perception OR processing OR production OR singing)''; then ''auditory P300 AND epilepsy AND EEG'', yielded 273 results and 51 results respectively. The papers were filtered to accommodate the topic in concern. The inclusion criteria for studies in this review comprised of clinical studies focusing on evaluating music processing in epileptic patients, accompanied or not by brain lesions. There were no restrictions regarding participants' age, gender, language, but studies needed to involve at least two groups of patients, or patients and controls. Alternatively, if only one group of patients was involved, the measures collected had to be compared to established clinical norms. This literature review highlights the diversity of music pro-cessing deficits encountered in epilepsy, revealing important limitations in the topics and patient populations tested so far, with very few studies in children and only a few studies on rhythm processing.

Exploring the role of complexity and modality in pleasurable polyrhythm perception

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Subtheme B - Auditory, Motor and Sensory Integration

People appear to like synchrony. It is used in a range of social contexts but is epitomised in music and dance. Much has been written about the social bonding effects of synchronised action, which may underlie the social benefits of joint music making. However, real music rarely features total synchrony between all parts. Furthermore, it remains uncertain why people like synchrony, with one theory suggesting that synchrony is aesthetically pleasing because it is easier to process than non-synchrony, although this theory still has limited empirical support. Polyrhythms provide a means of addressing both concerns. Polyrhythms are ubiquitous across various musical genres worldwide. They involve the juxtaposition of contrasting rhythms, each dividing the measure into distinct subdivisions, creating a complex rhythmic interplay.

The relative complexity of a polyrhythm may be expressed as a ratio. Simple ratios (e.g. 2:3) are more commonly found in music than complex ratios (e.g. 4:5). Crucially, they exemplify a rhythmic relationship which is coordinated but not in perfect synchrony, and provide a systematic way of varying the complexity (and processing load) of a rhythmic relationship. In an online psychophysics experiment, we present stimuli consisting of two figures moving with accompanying sounds in different coordination modes. The stimuli have seven different levels of complexity (1:1, 1:2, 1:3, 2:3, 3:4, 4:5, and irregular), to three participant groups (musicians, dancers, control), in audio-only, visual-only, and audio-visual conditions, measuring their response time and accuracy in identifying each polyrhythm, as well as subjective aesthetic ratings for liking and groove. Preliminary results suggest that participants are best at identifying the simple ratio polyrhythms, however the subjective aesthetic ratings show an inverted-U curve. This provides a framework to study the effects of complex interpersonal coordination, beyond simple 1:1 synchrony, and demystifying the social role of music and dance.

Impaired Temporal Processing in Multiple Sclerosis

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Subtheme B - Auditory, Motor and Sensory Integration

Multiple sclerosis (MS) is a chronic inflammatory autoimmune disease of the central nervous system. MS eventually results in neuronal damage both in grey and white matter, ultimately decreasing the efficiency of neural transmission. Volumetric MRI studies showed that among the cerebral regions affected in MS, subcortical regions including the basal ganglia (BG) seem prominently susceptible to neurodegeneration early in the course of the disease. Increased