

Investigating Beat Perception and Sensorimotor Synchronisation in People With and Without Parkinson's Disease

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ABSTRACT

Background

Studies have shown that beat perception is impaired in people with Parkinson's disease (PD), demonstrating the role of the basal ganglia in temporal processing and movement automation (Grahn & Brett, 2007; 2009). Certain types of external auditory cues may provide a compensatory mechanism for people with PD enabling entrainment, perhaps dependent on perceptual ability for rhythm, potentially mediated by previous music and dance experience (Cameron et al., 2016). This may explain why some, but not all, people with PD benefit from music and dance-based therapeutic interventions (Nombela et al., 2012).

Aims

The aims of this study are threefold:

1. To establish whether there is a link between perception and production abilities in people with PD.
2. To explore how the modality of entrainment might affect measures of sensorimotor synchronisation.
3. To explore how naturalistic instrumental music excerpts compare to basic auditory entrainment stimuli (metronome) at different tempi.

Method

This is a three-way mixed design study. The between-subjects factor is Group (PD and Age Matched Controls). There are two within-subjects factors: Stimuli (Music/Metronome) and Modality (of physical entrainment). Tempi (range 779 ms – 417 ms) is an independent variable nested within Stimuli. Modality includes finger tapping, toe tapping and marching up and down 'on the spot' as a proxy for dancing. The finger tapping condition enables comparison with other studies. The toe tapping and 'marching' are included as naturalistic movements associated with music and dancing. The Beat Alignment Test, a measure of beat perception, from the Gold Musical Sophistication Index (Müllensiefen et al., 2014) has also been included. Instrumental naturalistic musical stimuli with an easily identifiable tactus has been developed through pilot testing. An estimate of preferred beat period will also be collected for all three modalities.

Results

Data collection is currently underway and preliminary results will be presented.

Keywords

Parkinson's; sensorimotor synchronisation; music; beat perception, spontaneous motor tempo

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