

Moving to the beat in Parkinson's disease: Towards an individualized approach

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Abstract. Gait dysfunctions in Parkinson's disease (PD) can be partly relieved by rhythmic auditory cueing. This consists in asking patients to walk with a rhythmic auditory stimulus like a simple metronome or music. The beneficial effect on gait is visible immediately in terms of increased speed and stride length. Moreover, training programs based on rhythmic cueing can have long-term benefits on gait and cognition. In spite of its beneficial effects, however, standard rhythmic auditory cueing fails to take into account that motor activity is intrinsically variable from one patient to the other. Moreover, it disregards the fact that patients show typical variability (accelerations and decelerations) during walking which may lead them to desynchronize with the beat. Hence, to improve its efficacy, rhythmic stimulation might be individualized by making it meaningfully variable and capable to adapt in real time to patients step times. These possibilities have been examined in the BeatHealth project, by asking PD patients to walk with various rhythmic auditory stimuli (e.g., a metronome and music), while the stimulus beats were adapted in real time to participants step times. Results from this project show important individual differences among PD patients with regard to their response to different cueing strategies. For example, some patients benefit from rhythmic cueing while others reveal deleterious effects of the stimulation. These findings pave the way to implementing an individualized music-driven gait rehabilitation protocol via a dedicated app.