Frog-in-Maze: A Remote Monitoring and Intraoperative Tool for Detecting Motor Dysfunction in Parkinson's Disease

Choudhary, Amrita (School: Little Rock Central High School)

Parkinson's disease (PD) is a progressive neurodegenerative disorder that affects motor and cognitive functions, with bradykinesia, a slowing of movement, being a hallmark symptom required for clinical diagnosis. Upper limb bradykinesia impacts daily activities such as dressing and eating, and as the disease progresses, episodic motor arrests or "freezing of gait" become more prevalent, further reducing quality of life. Current tools for assessing bradykinesia in PD, such as mobile applications and finger-tapping tasks, provide valuable motor function data but lack integration of cognitive tasks. We propose a novel extension of the Frogger-inspired game, a bimanual tapping-based activity that simulates bipedal gait and incorporates both motor and cognitive challenges. This game aims to provide an inexpensive, home-based tool for monitoring PD progression, medication response, and motor-cognitive integration. Initial testing will be conducted on healthy participants across various age groups to establish baseline performance before evaluating the game's efficacy in individuals with PD. By quantifying bimanual movements and analyzing metrics related to motor function, we aim to determine the game's ability to detect disease severity, monitor therapeutic responses, and provide insights into motor-cognitive performance in PD. This approach has the potential to advance remote, long-term PD management and improve clinical outcomes.

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