‘Postural sway correlates with cognition and quality of life in Parkinson’s disease’ & ‘Machine learning and the contingent negative variation for the classification of people with Parkinson’s disease and controls’

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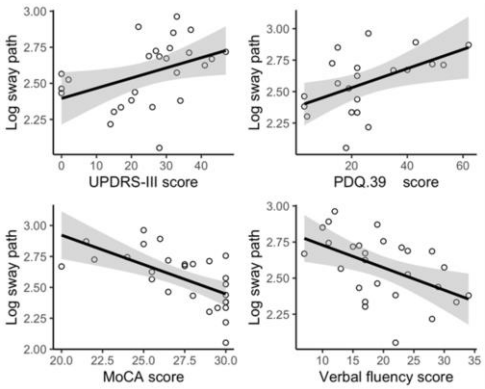
The severity of Parkinson’s disease (PD) is difficult to assess objectively owing to the lack of a robust biological marker of underlying disease status, with consequent implications for diagnosis, treatment, and prognosis. The current standard tool is the Unified Parkinson’s Disease Rating Scale (UPDRS), but this is hampered by variability between observers and within subjects.

A clinical study involving people with PD and controls was performed at The Canberra Hospital that included postural sway (PS) experiments and an event-related potential (ERP) experiment measuring a brain response called the contingent negative variation (CNV). In addition, participants underwent tests of cognition and quality of life. Study outcomes were analysed using machine learning (ML) and conventional statistical techniques to identify features in the data that provide a more objective measure of disease status.

The results suggest that motor and non-motor symptoms of PD are associated, and that PS is a potential measure of disease status in PD. Combining ERPs and ML shows promise as a diagnostic tool, as our algorithm reliably classified patients and controls by using the CNV input. Future research will explore whether the features identified are particular to PD and assess the variability over repeated measures in healthy subjects.



14 People with PD correctly classified	**0** People with PD incorrectly classified
1 Controls incorrectly classified	**12** Controls correctly classified

Fig. 1 and 2. Left, a scatter plot matrix showing the correlations between log-transformed sway path and the UPDRS-III, PDQ-39, MoCA and the verbal fluency/executive function subscale of the NUCOG (Animals test). Right, results of an ERP classification experiment using a support vector machine algorithm and principal component analysis.