Deficits across emotion, memory, attention, and executive function are common in people with Parkinson’s disease (PwP). Response inhibition is an element of executive function that has been previously probed in PwP. The Go/Nogo paradigm, used in conjunction with neuroimaging, is used to probe response inhibition to perceptual stimuli [1]. It involves the presentation of target cues (“Go”) to which participants are instructed to respond as quickly as possible, and distractor cues (“Nogo”) to which participants are instructed not to respond. The Nogo-N2 and Nogo-P3 are deflections of amplitude in event-related potentials (ERPs), and are thought to index cognitive effort in discrepancy recognition and stimulus evaluation respectively [2,3].

AIMS:  
To examine ERPs elicited from an affective Go/Nogo task and assess its use as a means of tracking Parkinson’s disease mediated changes in cognition during emotional processing.

METHODS: Participants  
Twenty-two PwP and 13 healthy controls completed the study. PwP were recruited from neurology outpatient clinics, and existing databases. All participants were right handed and were fluent English speakers. Written informed consent was obtained from all participants prior to commencing the study.

METHODS: ERP  
ERPs elicited for target word stimuli were recorded using a high density Hydrocel Geodesic Sensor Net with 128 channels. Net station was used for EEG data acquisition and analysis. Time windows chosen for the N2 and P3 ERP time windows were 150-350ms and 350-550ms respectively. Analysis was performed on fronto-central cluster.

METHODS: Statistical analysis  
Repeated measures ANOVA models
  - Go trials only: Target Valence X Group
  - Nogo trials only: Target Valence X Group
  - Trial type X Group

RESULTS: PwP compared to healthy older adults  
**Behavioural findings:**
- (i) Reaction time: Slower across all conditions ($F_{1, 29} = 9.30, p = .005$); (ii) Accuracy: Less accurate in both Go and Nogo trials ($F_{1, 29} = 5.70, p = .024$)

**ERP findings:**
- (i) Peak N2 amplitudes: Higher across all valence conditions in both Go ($F_{1, 33} = 6.25, p = .018$) and Nogo trials ($F_{1, 33} = 5.92, p = .023$) (Figure 3A) and Nogo trials ($F_{1, 33} = 5.92, p = .023$) (Figure 3B).
- (ii) Peak P3 amplitude: Lower across all valence conditions in both Go ($F_{1, 33} = 4.22, p = .048$) and Nogo trials ($F_{1, 33} = 5.38, p = .027$).
- (iii) P3 latency: Slower across all valence conditions in both Go ($F_{1, 33} = 4.68, p = .038$) and Nogo trials ($F_{1, 33} = 6.01, p = .019$) and Nogo trials ($F_{1, 33} = 4.68, p = .038$).

Figure 1: Participants were tested using a visual affective Go/Nogo task. Affectively-valenced (negative, neutral and positive) words presented as target and distractor cues whilst ERPs were recorded.

Figure 2: ERP waveform comparison of PwP and controls. Valence in (A) Go-trials and (B) Nogo-trials

CONCLUSION  
Although emotional valence did not impact ERPs in this study cohort, differences in amplitude and latency of N2 and P3 were observed in PwP attempting the affective Go/Nogo task. These could serve as potential biomarkers for both Parkinson’s disease progression and diagnosis. The results also indicate new directions for future work, such as characterising contributions of Parkinson’s disease comorbid conditions like impulsivity and depression, and further development of the task for fine-grained diagnostic utility.

REFERENCES  

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