

Comparing single and dual-task gait as predictors of decline in attention in people with Parkinson's disease

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Introduction

- Cognitive function is selectively associated with gait in Parkinson's disease (PD)¹
- Preliminary work shows that gait velocity under single task (ST) conditions predicts change in attention over 18 months, providing emerging evidence for the role of gait as a sensitive marker of cognitive decline in PD²
- However, cross sectional work suggests that under dual task (DT) conditions the gait-cognition relationship strengthens^{3,4}. Dual task testing may therefore have greater utility in identifying the predictors of attentional decline.

Methods

51 participants with idiopathic PD completed assessments for gait and attention within 6 months of diagnosis and 36 months later. Participants walked continuously for two minutes under ST and DT (recall of maximum forward digit span) conditions. Individual cognitive capacity was controlled for by standardising tasks with respect to each individual's baseline digit span score⁴. Step velocity and step length were collected using a 7m instrumented walkway (GaitRite™). Attention (power of attention and fluctuating attention) was measured using the computerized drug research (CDR) computer battery. Partial correlations and multiple linear regression analysis were completed controlling for age and task order.

AIM: To establish whether ST or DT gait best predicts change in attention over 3 years in incident PD.

Participants with worse fluctuating attention over 3 years walked more slowly and had a shorter step length at baseline (ST $p < 0.01$; DT $p = .015$ and ST $p < .01$; DT $p < .01$; respectively). For step length, ST and DT were found to be independent predictors for change in fluctuating attention with minimal differences between conditions (Figure 1). Similar findings were observed for step velocity for both ST and DT conditions.

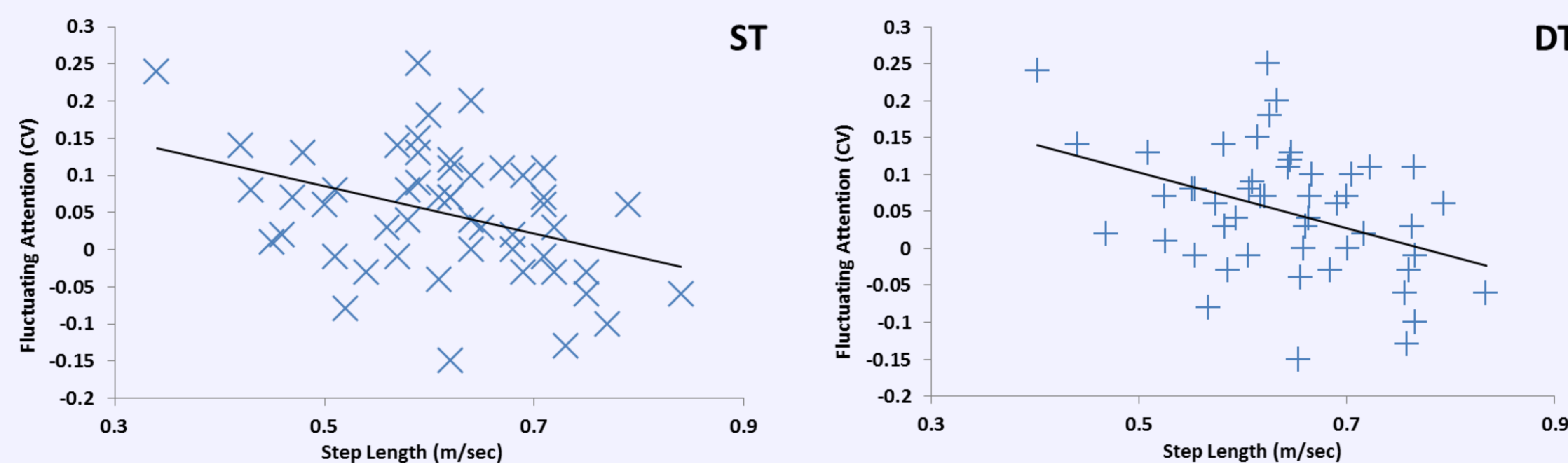


Figure 1. Step length under single task (ST) conditions [A] and under dual task (DT) conditions [B] in association with change in fluctuating attention over three years.

	Step Length (m) ST	Step Length (m) DT	Gait Velocity (m/sec) ST	Gait Velocity (m/sec) DT
β	-.405	-.403	-.385	-.382
R	.482	.471	.467	.449
r^2	.184	.172	.168	.202
P	<.01	<.01	<.01	.015

Table 1. Multiple regression analysis of ST and DT step length and gait velocity as predictors of change in fluctuating attention over 3 years.

Conclusions

- Both ST and DT gait similarly predict cognitive decline in PD over 3 years
- Results contradict with the strength of cross sectional DT findings. Differences may partly reflect our DT testing paradigm which controls for baseline capacity.
- Further work is currently underway in a larger cohort. We are also testing a range of DT tasks to identify the effect of task difficulty on outcome.

References

- ¹Lord, S et al. Front. Aging Neurosci 2014 ;6: 249.
- ²Lord, S. et al. Movement Disorders 2013;28 Suppl 1 :361
- ³Yogev, G. et al. European Journal of Neuroscience 2005; 22
- ⁴Rochester et al. Neuroscience 2014; 265

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