

Gait analysis may distinguish Progressive Supranuclear Palsy and Parkinson Disease since the earliest stages

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Table S1. Univariate statistical analysis for comparing single and dual tasks in PD and PSP patients

PD			PSP		
Features	Single task Dual task [Mean $\pm$ Dev. Std.]	p-value	Features	Single task Dual task [Mean $\pm$ Dev. Std.]	p-value
Duration of the cycle [^]	1.10 $\pm$ 0.11 1.16 $\pm$ 0.14	< 0.0001 ***	Duration of the cycle [^]	1.29 $\pm$ 0.23 1.42 $\pm$ 0.28	0.003 *
Duration of the stance [^]	0.67 $\pm$ 0.08 0.72 $\pm$ 0.09	< 0.0001 ***	Duration of the stance [^]	0.82 $\pm$ 0.16 0.94 $\pm$ 0.22	0.001 **
Duration of the swing	0.37 $\pm$ 0.10 0.26 $\pm$ 0.08	< 0.0001 ***	Duration of the swing	0.27 $\pm$ 0.08 0.26 $\pm$ 0.05	0.856
Variability of swing's duration	0.07 $\pm$ 0.06 0.13 $\pm$ 0.04	< 0.0001 ***	Variability of swing's duration	0.17 $\pm$ 0.13 0.16 $\pm$ 0.04	0.573
Phase of stance [^]	60.27 $\pm$ 1.97 61.95 $\pm$ 2.20	< 0.0001 ***	Phase of stance	62.84 $\pm$ 2.79 65.64 $\pm$ 3.51	0.001 **
Phase of swing [^]	39.54 $\pm$ 1.70 38.54 $\pm$ 3.62	0.011 *	Phase of swing	37.01 $\pm$ 2.89 34.36 $\pm$ 3.51	0.002 *
Phase of single support [^]	39.45 $\pm$ 2.12 38.08 $\pm$ 2.54	< 0.0001 ***	Phase of single support	37.05 $\pm$ 2.95 34.36 $\pm$ 3.51	0.003 *
Phase of double support	10.82 $\pm$ 2.95 12.64 $\pm$ 3.10	< 0.0001 ***	Phase of double support	15.05 $\pm$ 6.58 17.47 $\pm$ 5.02	0.048 *
Mean velocity	1.04 $\pm$ 0.16 0.89 $\pm$ 0.19	< 0.0001 ***	Mean velocity	0.68 $\pm$ 0.26 0.52 $\pm$ 0.23	0.001 **
Mean velocity (%height)	62.07 $\pm$ 10.31 53.58 $\pm$ 10.95	< 0.0001 ***	Mean velocity (%height) [^]	41.69 $\pm$ 15.00 31.79 $\pm$ 13.53	< 0.0001 ***
Cadence [^]	109.61 $\pm$ 11.52	< 0.0001 ***	Cadence [^]	95.80 $\pm$ 17.27	0.004 **

	104.63 ± 12.30			87.99 ± 17.51	
Length of cycle^	1.13 ± 0.14 1.02 ± 0.17	<0.0001***	Length of cycle	0.84 ± 0.21 0.69 ± 0.22	<0.0001***
Length of cycle (%height)^	67.77 ± 8.82 61.47 ± 10.79	<0.0001***	Length of cycle (%height)	51.70 ± 12.54 42.59 ± 12.95	<0.0001***
Length of the step	0.46 ± 0.15 0.33 ± 0.10	<0.0001***	Length of the step	0.25 ± 0.13 0.24 ± 0.17	0.033*
Variability of the length of step	0.27 ± 0.42 0.24 ± 0.20	0.059	Variability of the length of step	0.31 ± 0.51 0.21 ± 0.30	0.709
Width of the step	0.10 ± 0.07 0.11 ± 0.10	0.675	Width of the step	0.11 ± 0.04 0.12 ± 0.06	0.021*

*significance level at 0.05, **significance level at 0.01, ***significance level at 0.001. ^normally distributed according to the Kolmogorov Smirnov test; paired sample t-test applied. A Wilcoxon test was used to analyze non-normally distributed paired sample data.

Table S2. Univariate statistical analysis for comparing single and dual tasks in newly diagnosed PD and early PSP patients

Newly diagnosed PD			Early PSP		
Features	Single task Dual task [Mean $\pm$ Dev. Std.]	p-value	Features	Single task Dual task [Mean $\pm$ Dev. Std.]	p-value
Duration of the cycle	1.12 $\pm$ 0.13 1.17 $\pm$ 0.11	0.003**	Duration of the cycle^	1.34 $\pm$ 0.24 1.45 $\pm$ 0.24	0.033*
Duration of the stance	0.68 $\pm$ 0.10 0.73 $\pm$ 0.09	0.001**	Duration of the stance^	0.85 $\pm$ 0.17 0.95 $\pm$ 0.19	0.015*
Duration of the swing^	0.44 $\pm$ 0.04 0.44 $\pm$ 0.03	0.555	Duration of the swing^	0.49 $\pm$ 0.07 0.49 $\pm$ 0.07	0.926
Variability of swing's duration	0.03 $\pm$ 0.02 0.04 $\pm$ 0.02	0.737	Variability of swing's duration	0.12 $\pm$ 0.26 0.06 $\pm$ 0.02	0.347
Phase of stance^	60.48 $\pm$ 1.82 61.93 $\pm$ 1.76	<0.0001***	Phase of stance^	63.13 $\pm$ 2.38 65.62 $\pm$ 3.29	0.006**
Phase of swing^	39.52 $\pm$ 1.82 38.07 $\pm$ 1.76	<0.0001***	Phase of swing^	36.78 $\pm$ 2.30 34.38 $\pm$ 3.29	0.007**
Phase of single support^	39.49 $\pm$ 1.80 38.09 $\pm$ 1.76	<0.0001***	Phase of single support^	36.88 $\pm$ 2.38 34.35 $\pm$ 3.32	0.006**
Phase of double support	11.33 $\pm$ 3.38 12.04 $\pm$ 1.75	0.004**	Phase of double support^	13.05 $\pm$ 2.24 16.11 $\pm$ 3.82	0.004**
Mean velocity	1.04 $\pm$ 0.18 0.91 $\pm$ 0.16	<0.0001***	Mean velocity	0.73 $\pm$ 0.29 0.58 $\pm$ 0.26	0.004**
Mean velocity (%height)^	62.38 $\pm$ 11.66 55.24 $\pm$ 9.29	<0.0001***	Mean velocity (%height)	44.31 $\pm$ 16.89 35.34 $\pm$ 15.52	0.004**
Cadence^	108.65 $\pm$ 11.45 103.52 $\pm$ 9.90	<0.0001***	Cadence^	92.47 $\pm$ 16.93 85.68 $\pm$ 15.38	0.035*

Length of cycle^	1.14 ± 0.14 1.06 ± 0.12	<0.0001***	Length of cycle^	0.92 ± 0.20 0.78 ± 0.22	<0.0001***
Length of cycle (%height)^	68.54 ± 8.04 63.75 ± 7.09	<0.0001***	Length of cycle (%height)^	56.17 ± 11.66 47.99 ± 13.38	<0.0001***
Length of the step	0.53 ± 0.12 0.50 ± 0.10	0.007**	Length of the step^	0.43 ± 0.13 0.37 ± 0.14	<0.0001***
Variability of the length of step	0.21 ± 0.42 0.20 ± 0.34	0.456	Variability of the length of step	0.25 ± 0.71 0.30 ± 0.77	0.002**
Width of the step	0.11 ± 0.10 0.10 ± 0.08	0.479	Width of the step^	0.08 ± 0.02 0.10 ± 0.03	0.041*

*significance at 0.05, **significance at 0.01, ***significance at 0.001. ^normally distributed according to the Shapiro Wilk test; paired sample t-test applied. A Wilcoxon test was used to analyze non-normally distributed paired sample data.

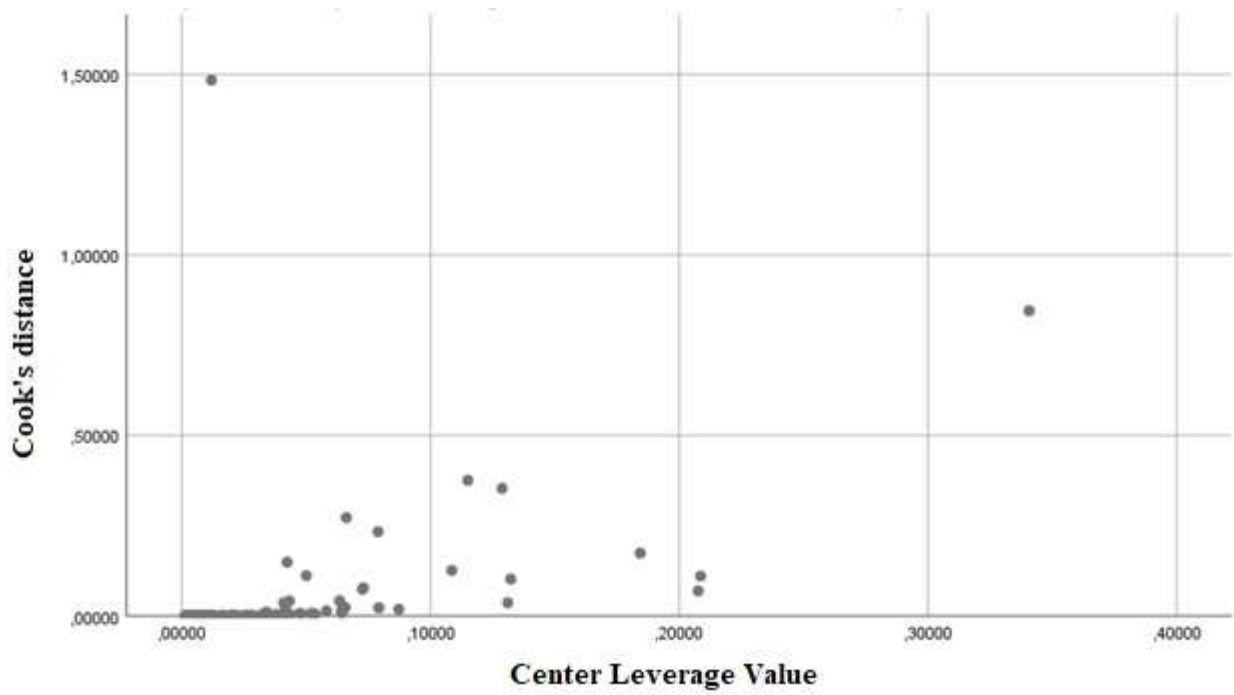


Figure S1. Cook's distance versus center leverage value for the GAIT model in PD vs PSP patients. Two outliers were removed.

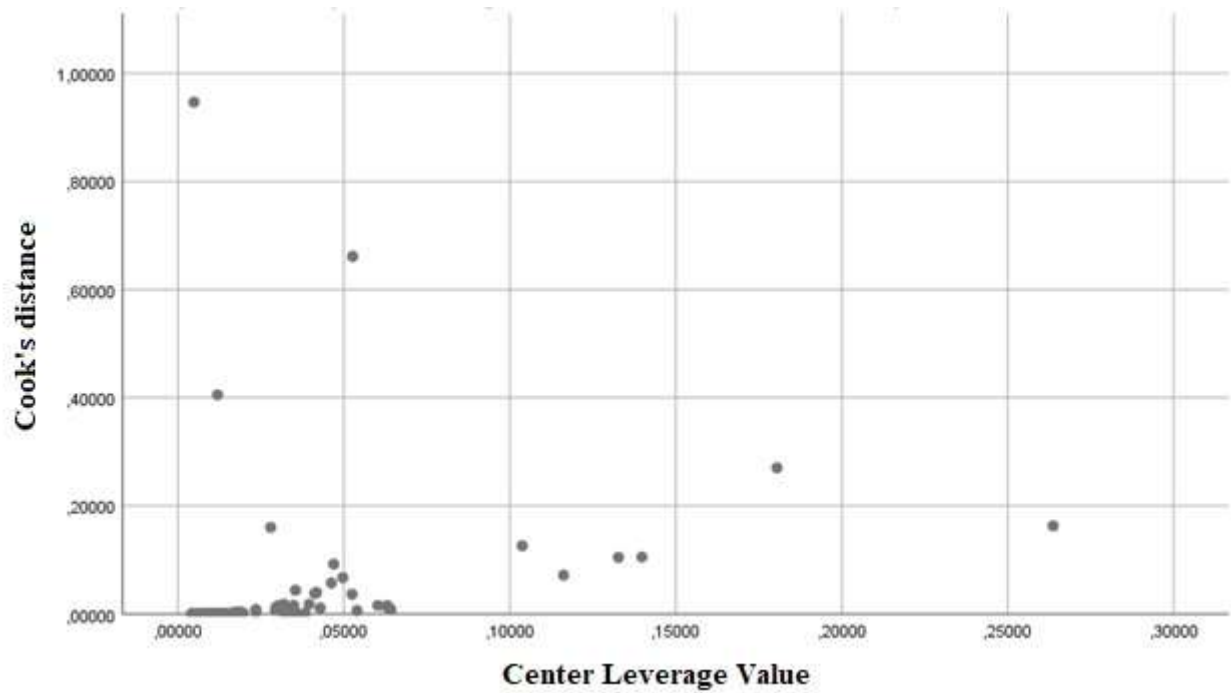


Figure S2. Cook's distance versus center leverage value for the COG model in PD vs PSP patients. Five outliers were removed.

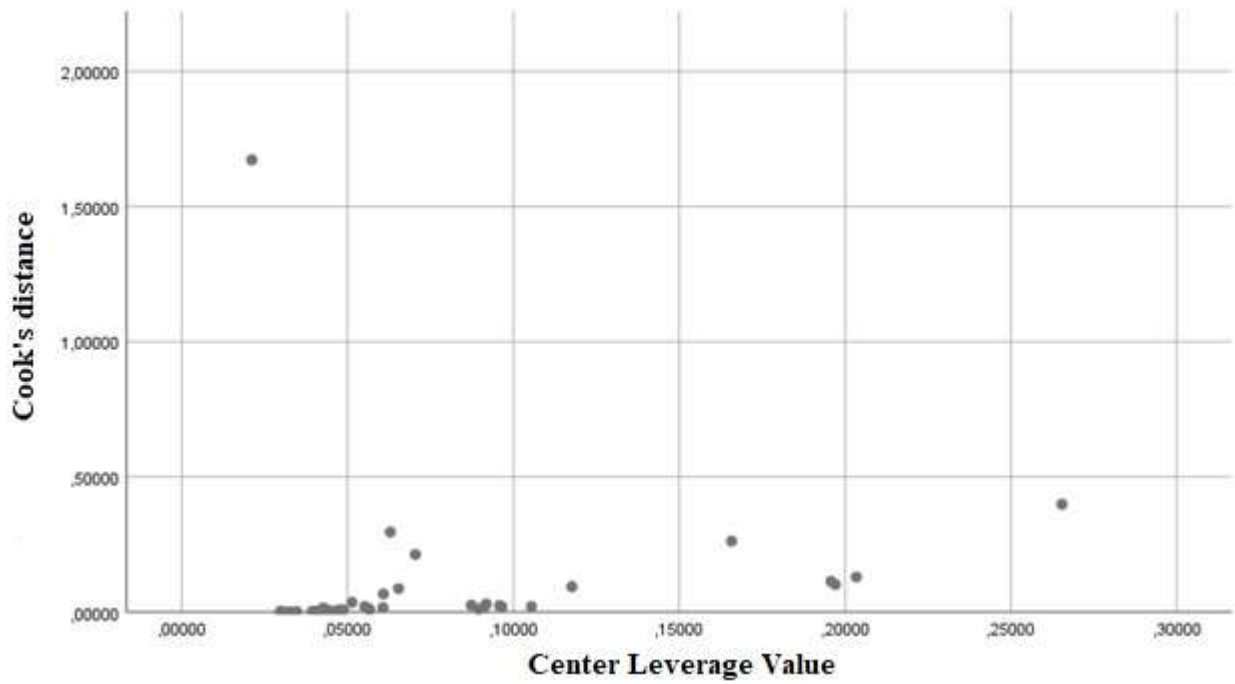


Figure S3. Cook's distance versus center leverage value for the GAIT model in newly diagnosed PD vs early PSP patients. Two outliers were removed.

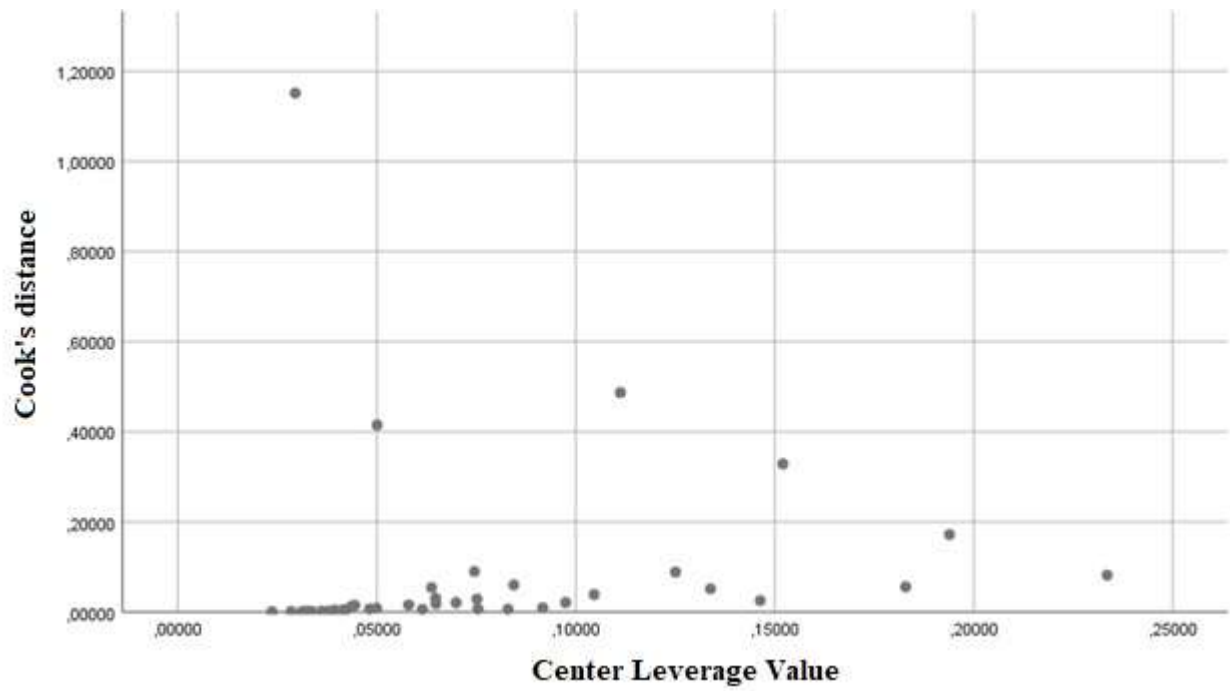


Figure S4. Cook's distance versus center leverage value for the COG model in newly diagnosed PD versus early PSP patients. Three outliers were removed.