ONLINE SUPPLEMENT

TITLE: Robotic identification of kinaesthetic deficits following stroke

COVER TITLE: Robotics for kinaesthesia post-stroke

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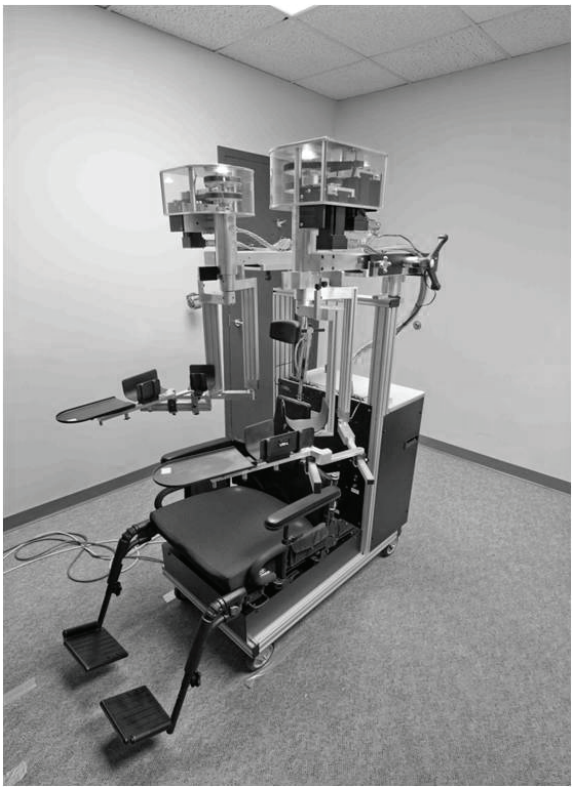
FIGS/TABLES:

Supplemental Figure I: Picture of the KINARM robotic exoskeleton

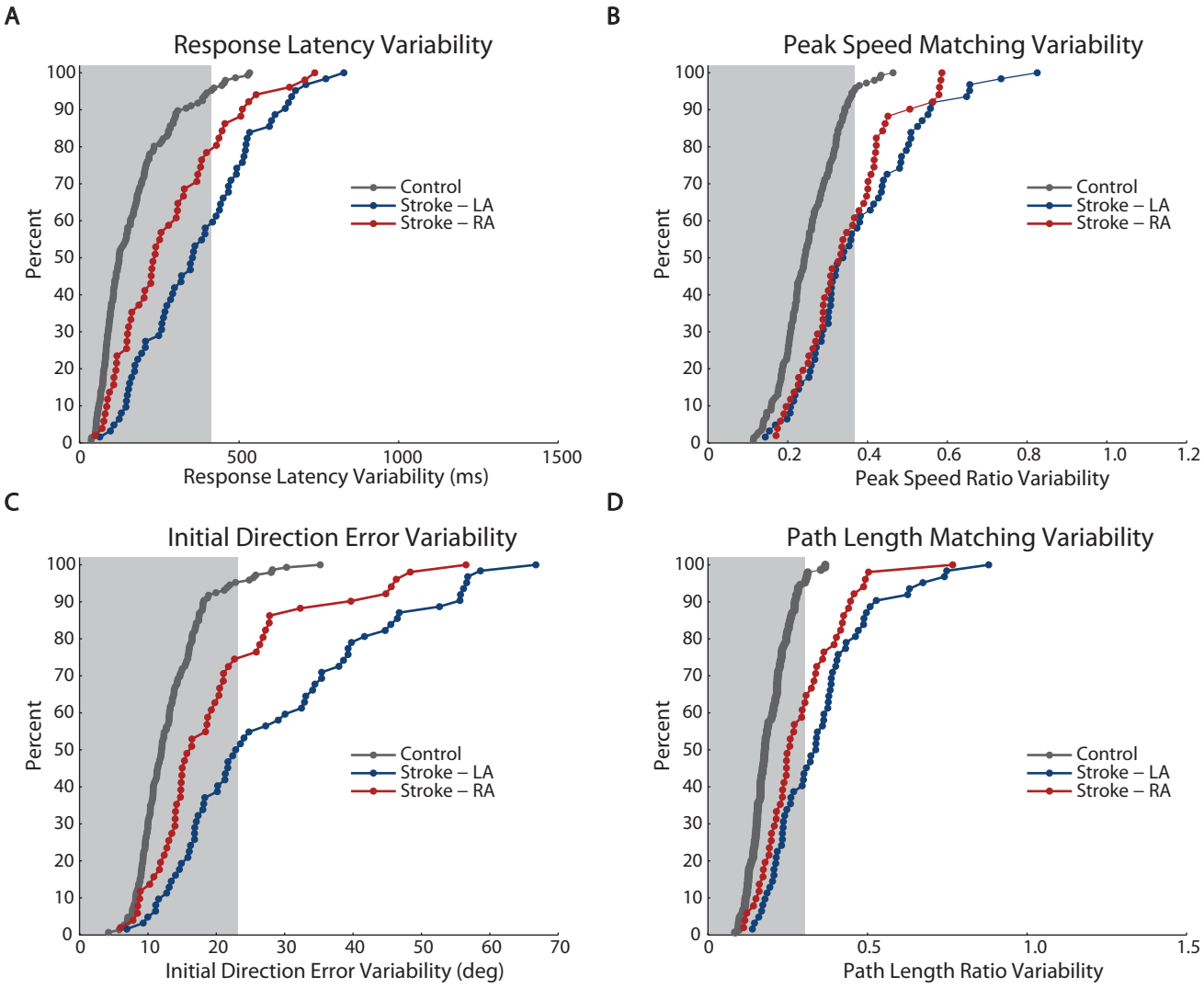
Supplemental Figure II: Group data demonstrating variability of behaviour of subjects with stroke across all four kinaesthetic parameters.

Supplemental Table I: Number of stroke patients who fail the Kinaesthesia Task and Parameters by Lesion Location

Supplemental Table II: Number of subjects who fail the Kinaesthesia Task and Individual Parameters based on Vascular Territory of Stroke



Supplemental Figure I: Picture of the KINARM robotic exoskeleton



Supplemental Figure II: Cumulative sum histograms depicting variability for each of the 4 kinaesthetic parameters (Fig. 3A and B, Fig. 4A and B). Grey areas on each plot indicate the normative range (95% CI). We observed that stroke subjects displayed significantly increased variability across all 4 parameters as compared to controls.

Table SI. Number of stroke patients who fail the Kinaesthesia Task and Parameters by Lesion Location

	Kinaesthetic Parameter								
	IDE	IDEv	PLR	PLRv	RL	RLv	PSR	PSRv	Kinaesthesia Task
Cortical									
LA (17)	71% (12)	41% (7)	29% (5)	47% (8)	47% (8)	35% (6)	41% (7)	35% (6)	65% (11)
RA (18)	39% (7)	11% (2)	33% (6)	33% (6)	11% (2)	17% (3)	28% (5)	33% (6)	44% (8)
Cortical + Subcortical									
LA (19)	74% (14)	63% (12)	53% (10)	74% (14)	47% (9)	47% (9)	32% (6)	53% (10)	84% (16)
RA (9)	56% (5)	33% (3)	22% (2)	22% (2)	33% (3)	22% (2)	11% (1)	11% (1)	33% (3)
Subcortical									
LA (17)	59% (10)	47% (8)	41% (7)	53% (9)	47% (8)	41% (7)	29% (5)	41% (7)	65% (11)
RA (19)	53% (10)	32% (6)	32% (6)	37% (7)	21% (4)	21% (4)	37% (7)	58% (11)	58% (11)
Cerebellar									
LA (2)	50% (1)	0% (0)	50% (1)	0% (0)	50% (1)	50% (1)	0% (0)	100% (2)	50% (1)
RA (0)	---	---	---	---	---	---	---	---	---
Brainstem + Cerebellar									
LA (1)	100% (1)	100% (1)	100% (1)	0% (0)	0% (0)	100% (1)	100% (1)	0% (0)	100% (1)
RA (0)	---	---	---	---	---	---	---	---	---
Brainstem									
LA (3)	100% (3)	33% (1)	33% (1)	66% (2)	33% (1)	33% (1)	33% (1)	33% (1)	66% (2)
RA (4)	50% (2)	25% (1)	25% (1)	75% (3)	0% (0)	25% (1)	0% (0)	50% (2)	50% (2)
Other*									
LA (4)	75% (3)	75% (3)	50% (2)	75% (3)	75% (3)	50% (2)	25% (1)	25% (1)	75% (3)
RA (0)	---	---	---	---	---	---	---	---	---

Abbreviations: LA, Left Affected; RA, Right Affected; IDE, Initial Direction Error; IDEv, Initial Direction Error Variability; PLR, Path Length Ratio; PLRv, Path Length Ratio Variability; RL, Response Latency; RLv, Response Latency Variability; PSR, Peak Speed Ratio; PSRv, Peak Speed Ratio Variability. *Four subjects did not fall into the above lesion location categories and were categorized as "Other". For two, initial acute imaging (performed within the first 24 hours of stroke) was inconclusive and while the treating stroke neurologist confirmed the clinical diagnosis of stroke, they did not obtain a follow-up scan. Further, one subject experienced a posterior spinal artery stroke at spinal level C1 and one was diagnosed with a sinus thrombosis.

Table SII. Number of subjects who fail the Kinaesthesia Task and Individual Parameters based on Vascular Territory of Stroke

	Kinaesthetic Parameter								
	IDE	IDEv	PLR	PLRv	RL	RLv	PSR	PSRv	Kinaesthesia Task
ACA									
LA (2)	50% (1)	0% (0)	0% (0)	0% (0)	50% (1)	0% (0)	50% (1)	0% (0)	0% (0)
RA (3)	66% (2)	33% (1)	33% (1)	66% (2)	0% (0)	33% (1)	33% (1)	66% (2)	66% (2)
MCA									
LA (41)	68% (28)	51% (21)	44% (18)	63% (26)	51% (21)	44% (18)	31% (13)	49% (20)	76% (31)
RA (35)	40% (14)	17% (6)	26% (10)	26% (10)	23% (8)	20% (7)	3% (1)	37% (13)	49% (17)
PCA									
LA (8)	63% (5)	50% (4)	50% (4)	38% (3)	25% (2)	25% (2)	63% (5)	13% (1)	63% (5)
RA (4)	75% (3)	50% (2)	25% (1)	25% (1)	25% (1)	0% (0)	0% (0)	25% (1)	25% (1)
ICA									
LA (2)	50% (1)	50% (1)	0% (0)	50% (1)	100% (2)	100% (2)	0% (0)	50% (1)	50% (1)
RA (0)	---	---	---	---	---	---	---	---	---
BA									
LA (2)	100% (2)	0% (0)	0% (0)	50% (1)	0% (0)	0% (0)	0% (0)	50% (1)	50% (1)
RA (3)	100% (3)	66% (2)	33% (1)	100% (3)	0% (0)	66% (3)	0% (0)	100% (3)	100% (3)
PICA									
LA (3)	66% (2)	33% (1)	66% (2)	0% (0)	33% (1)	66% (2)	33% (1)	66% (2)	66% (2)
RA (0)	---	---	---	---	---	---	---	---	---
PA									
LA (0)	---	---	---	---	---	---	---	---	---
RA (3)	33% (1)	33% (1)	66% (2)	66% (2)	0% (0)	0% (0)	33% (1)	33% (1)	33% (1)
VA									
LA (1)	100% (1)	100% (1)	0% (0)	100% (1)	100% (1)	100% (1)	0% (0)	0% (0)	100% (1)
RA (2)	50% (1)	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)	0% (0)
Other*									
LA (4)	100% (4)	100% (4)	50% (2)	100% (4)	50% (2)	50% (2)	25% (1)	75% (3)	100% (4)
RA (0)	---	---	---	---	---	---	---	---	---

Abbreviations: ACA, Anterior Cerebral Artery; MCA, Middle Cerebral Artery; PCA, Posterior Cerebral Artery; ICA, Internal Carotid Artery; BA, Basilar Artery; PICA, Posterior Inferior Cerebellar Artery; PA, Pontine Artery; VA, Vertebral Artery; LA, Left Affected; RA, Right Affected; IDE, Initial Direction Error; IDEv, Initial Direction Error Variability; PLR, Path Length Ratio; PLRv, Path Length Ratio Variability; RL, Response Latency; RLv, Response Latency Variability; PSR, Peak Speed Ratio; PSRv, Peak Speed Ratio Variability. *Four subjects did not fall into the above lesion location categories and were categorized as "Other". For two, initial acute imaging (performed within the first 24 hours of stroke) was inconclusive and while the treating stroke neurologist confirmed the clinical diagnosis of stroke, they did not obtain a follow-up scan. Further, one subject experienced a posterior spinal artery stroke at spinal level C1 and one was diagnosed with a sinus thrombosis.