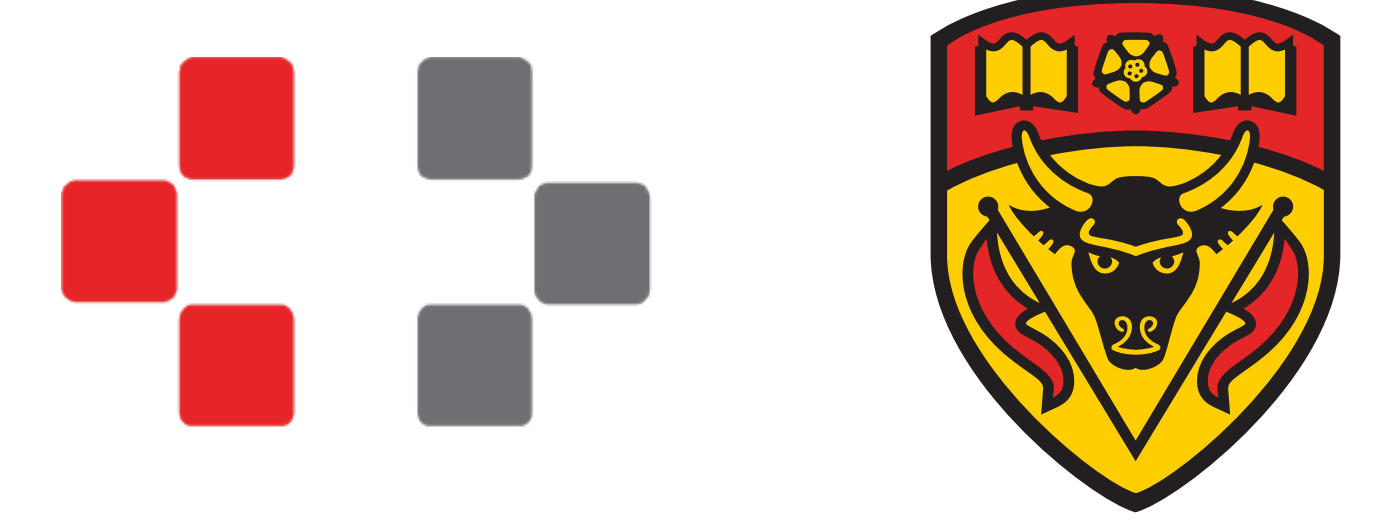


Impairments in Visuomotor Adaptation in the First Six Months of Stroke Recovery

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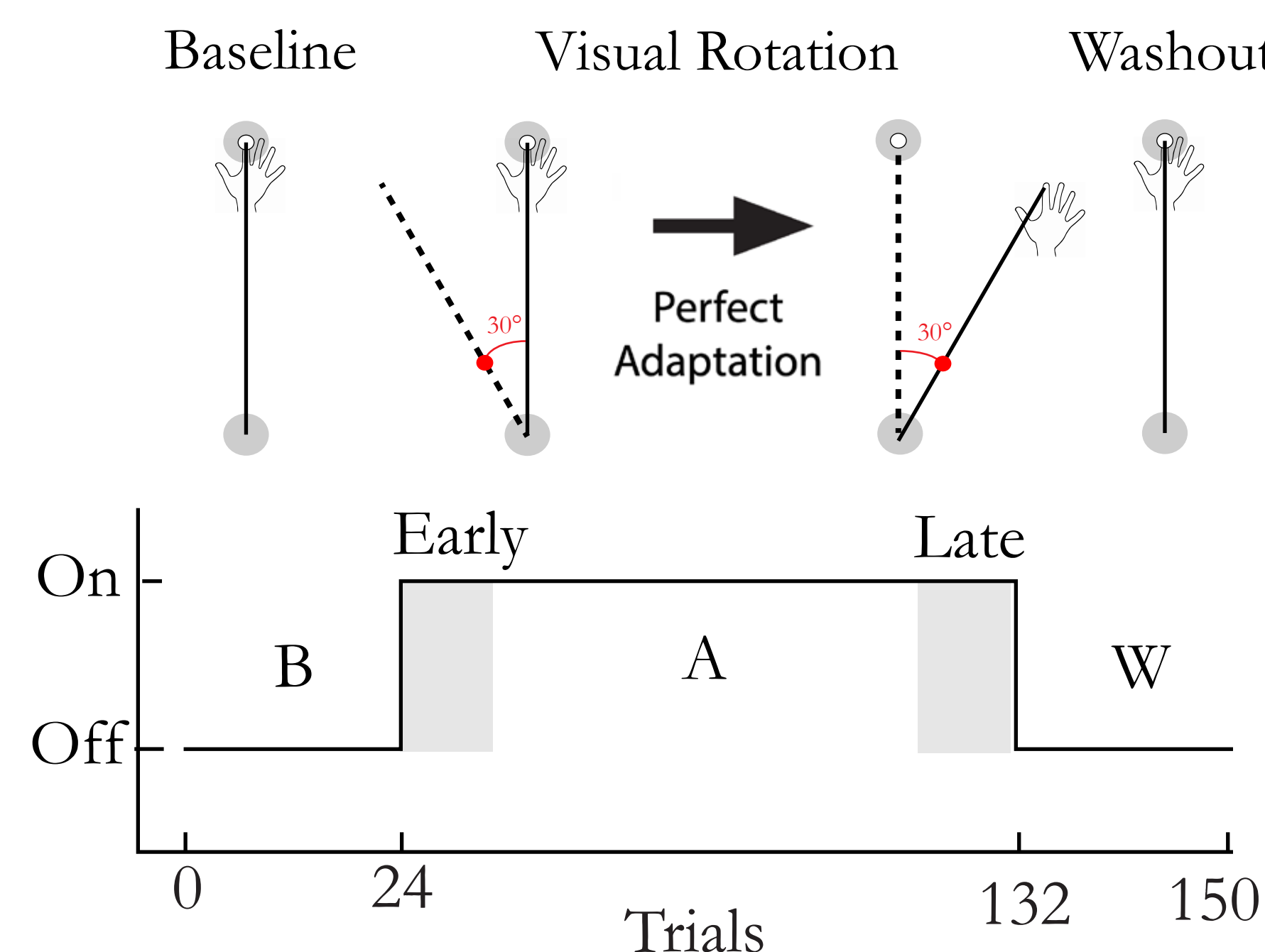
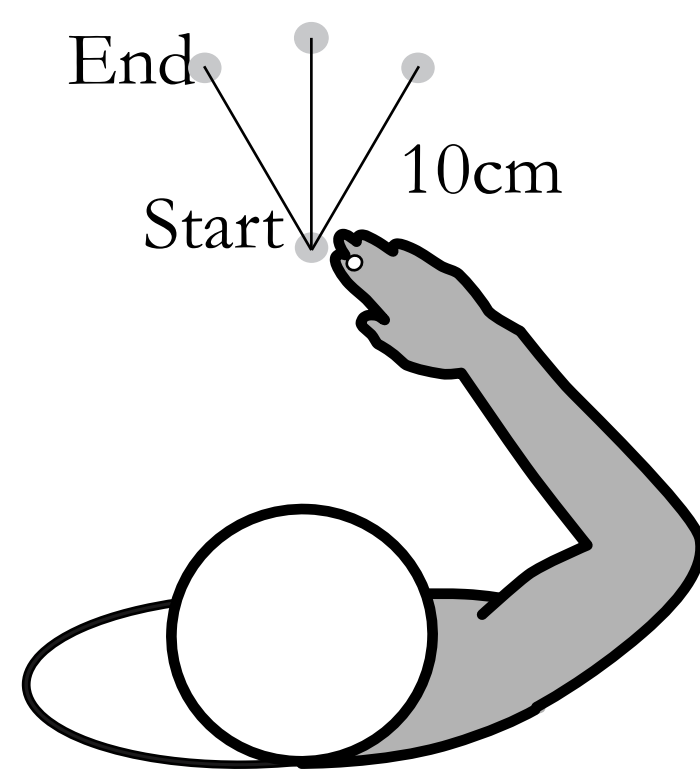


Introduction

Stroke is one of the most common causes of adult disability worldwide. Motor learning is used in rehabilitation to support recovery by promoting neuroplasticity through intensive, goal-directed practice. While promising, its effectiveness is mixed, and there is room to improve how it is applied. Although most survivors begin therapy early in recovery, we know little about how motor learning changes during recovery. Many studies focus on chronic stroke or single time points, missing key changes in early recovery. Our research tracks motor learning during this period to guide when and how therapy should be delivered.

Methods

Healthy controls and participants with stroke performed a task with their dominant or non-dominant arm (controls) or affected arm (stroke) in a Kinarm exoskeleton robot. In the visual adaptation task, we applied a 30° counter-clockwise rotation to the feedback cursor.



Subjects performed Baseline (B), Adaptation (A; 30° counter clockwise rotation), and Washout (W) phases in each session.

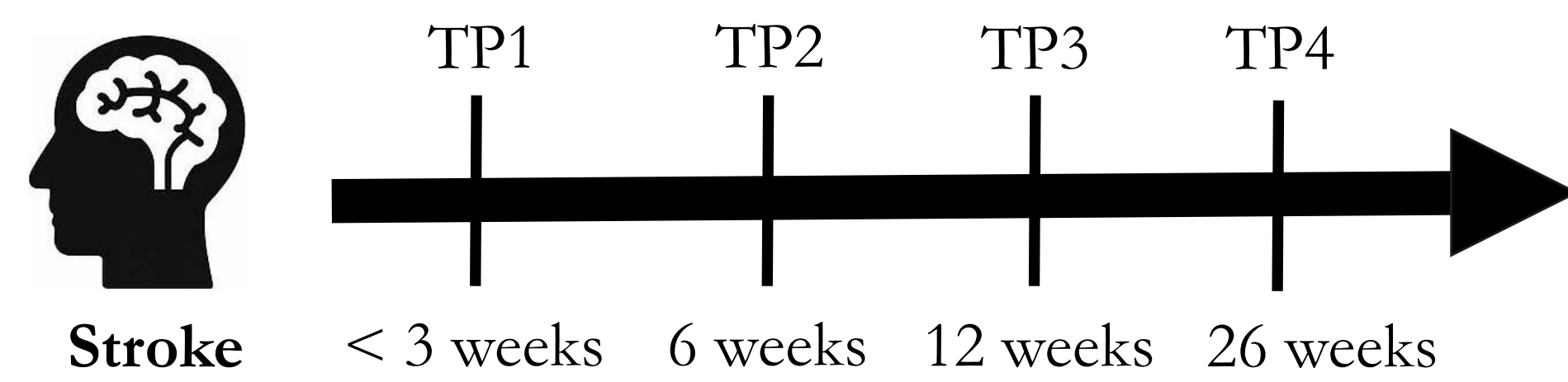


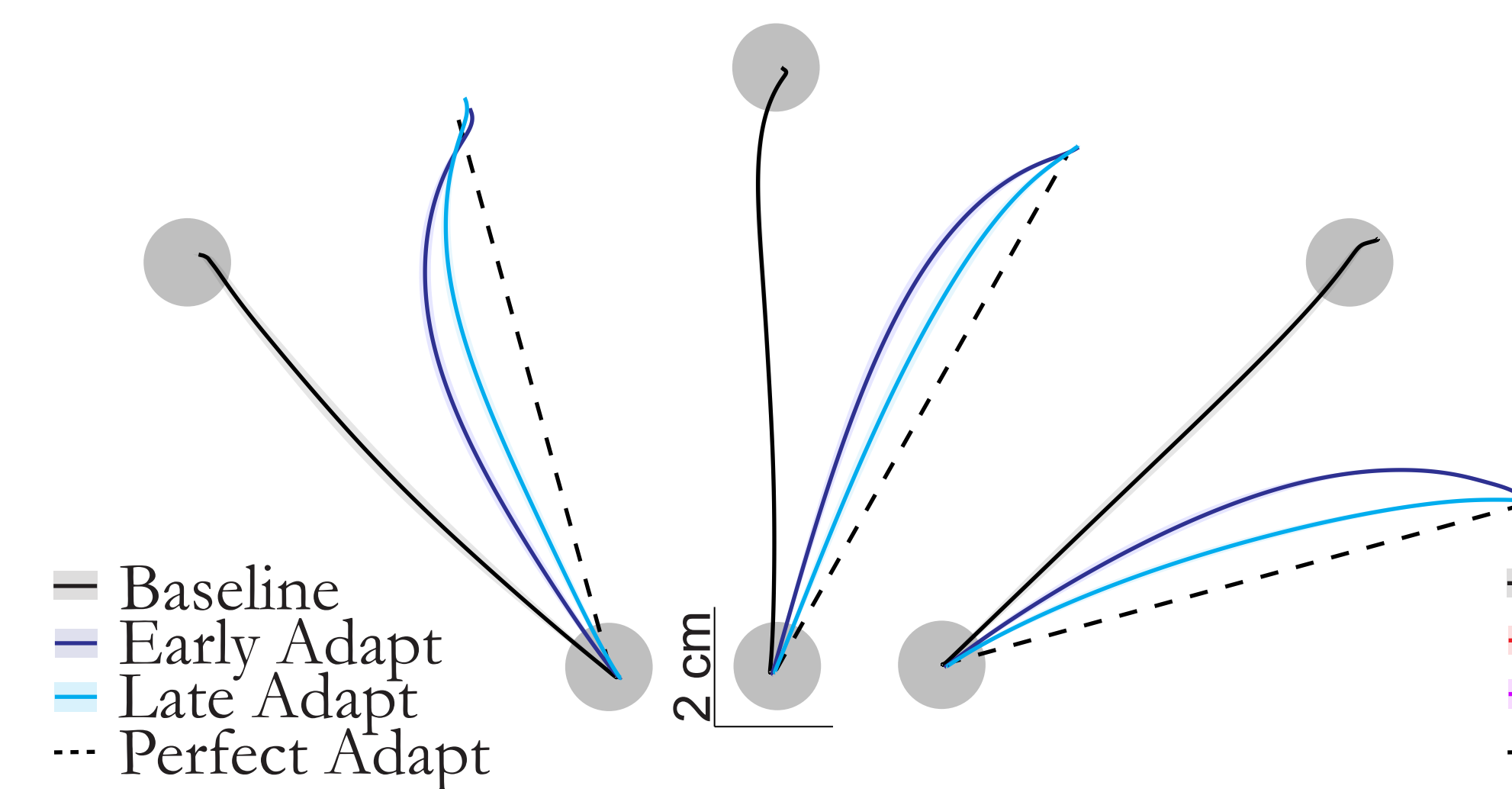
Table 1. Demographics

Demographics	Control	TP1	TP2	TP3	TP4
N	133	46	24	23	17
Age (Mean[Range])	48 [18-97]	60 [30-84]	63 [34-83]	66 [34-83]	66 [40-83]
Sex (F:M)	79:54	14:32	9:15	5:18	4:13
Handedness (L:R:A)	12:121:0	8:37:1	2:22:0	2:21:0	1:16:0
Affected Side (D:ND:A)	N/A	17:28:1	10:14:0	11:12:0	9:8:0
MoCA (/30)	28 [19-30]	25 [12-30]	N/A	N/A	N/A
MRC (/45)	45 [41-45]	36 [11-45]	41 [31-45]	42 [32-45]	41 [18-45]
FMA (/66)	N/A	57 [16-66]	61 [41-66]	63 [50-66]	63 [37-66]
FIM (/126)	N/A	110[78-126]	120[110-126]	119[108-126]	118[106-126]
CMSA (/7)	N/A	6 [2-7]	7 [5-7]	7 [6-7]	6 [1-7]
MAS (/4)	N/A	1 [0-3]	0 [0-1]	1 [0-2]	0 [0-1+]
TLT (/3)	N/A	0 [0-3]	0 [0-1]	0 [0-1]	0 [0]

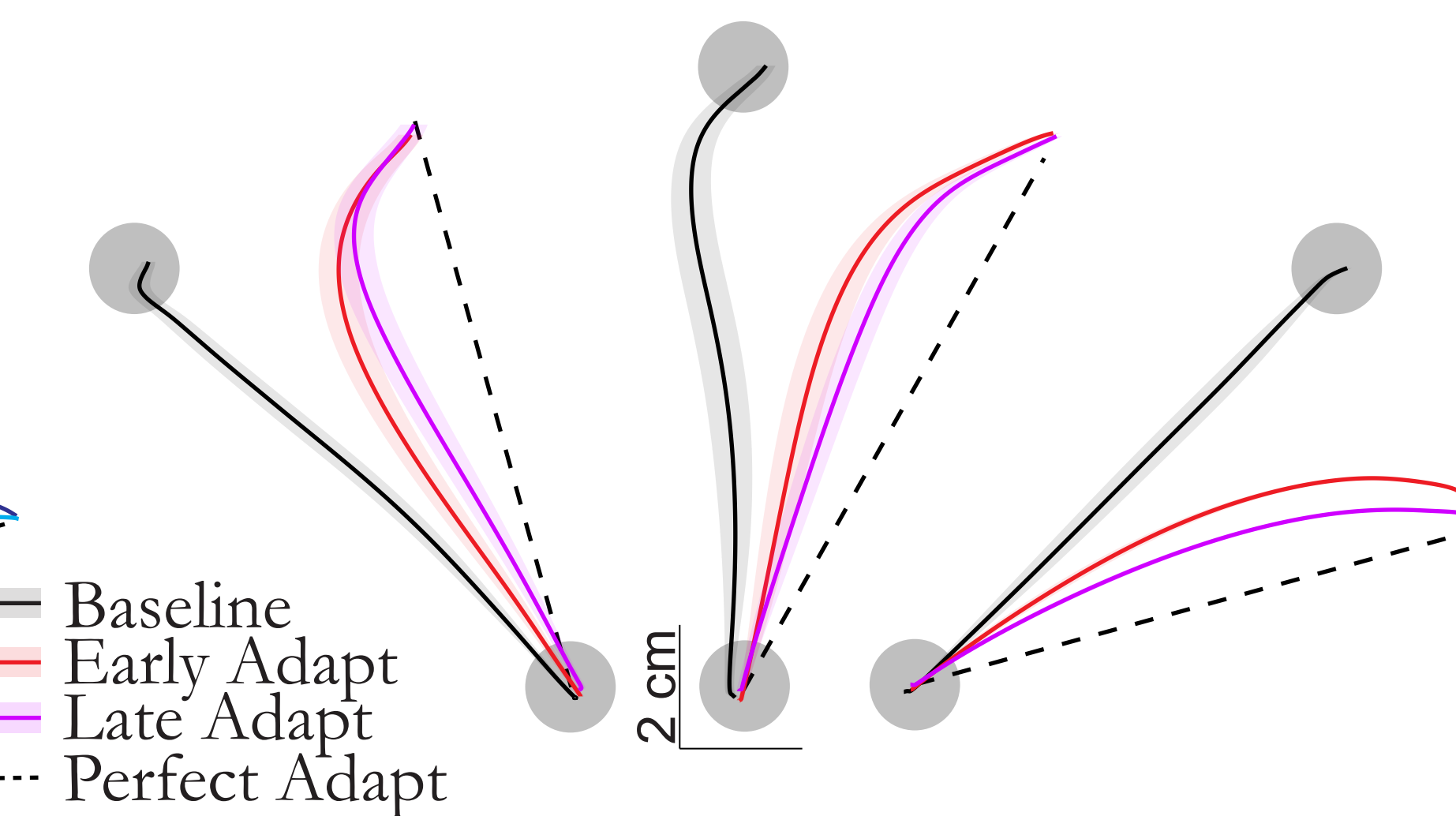
*N; Total Number of Individuals in Sample, TP; Timepoint, F; Female, M; Male, L; Left, R; Right, A; Ambidextrous, D; Dominant, ND; Non-dominant

Stroke Survivors Have Reduced Visuomotor Learning Compared to Healthy Controls

Average of Controls

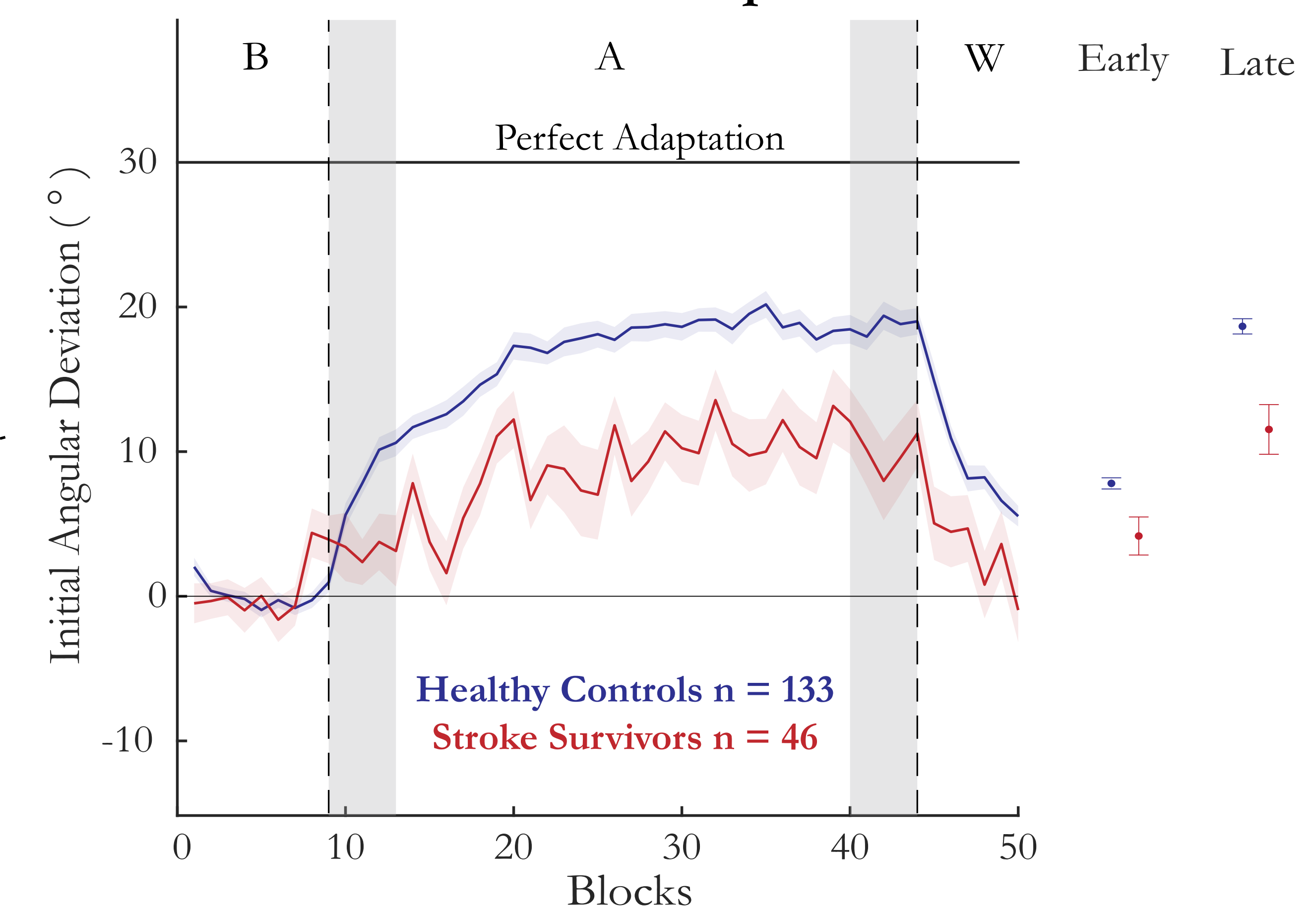


Average of Stroke Survivors



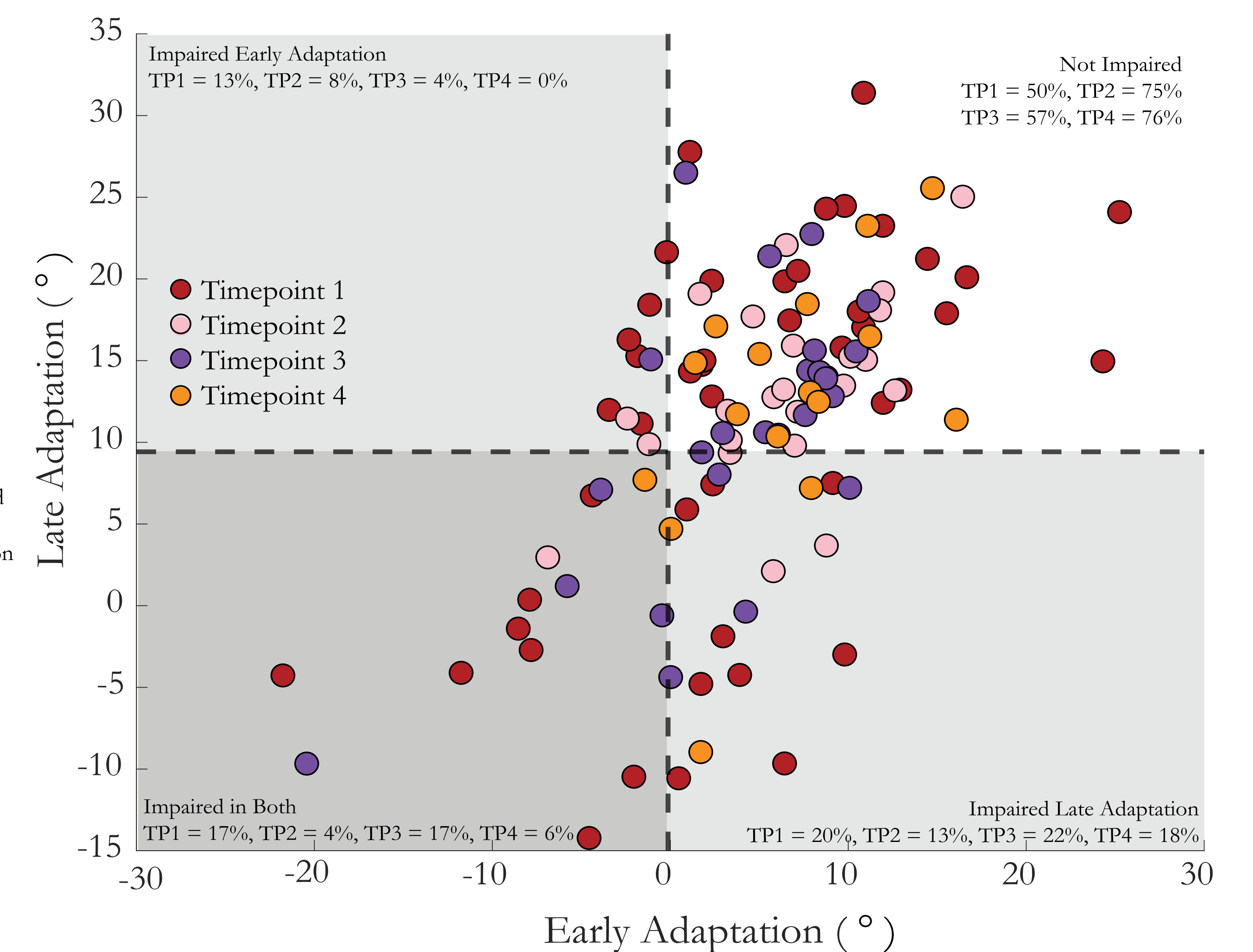
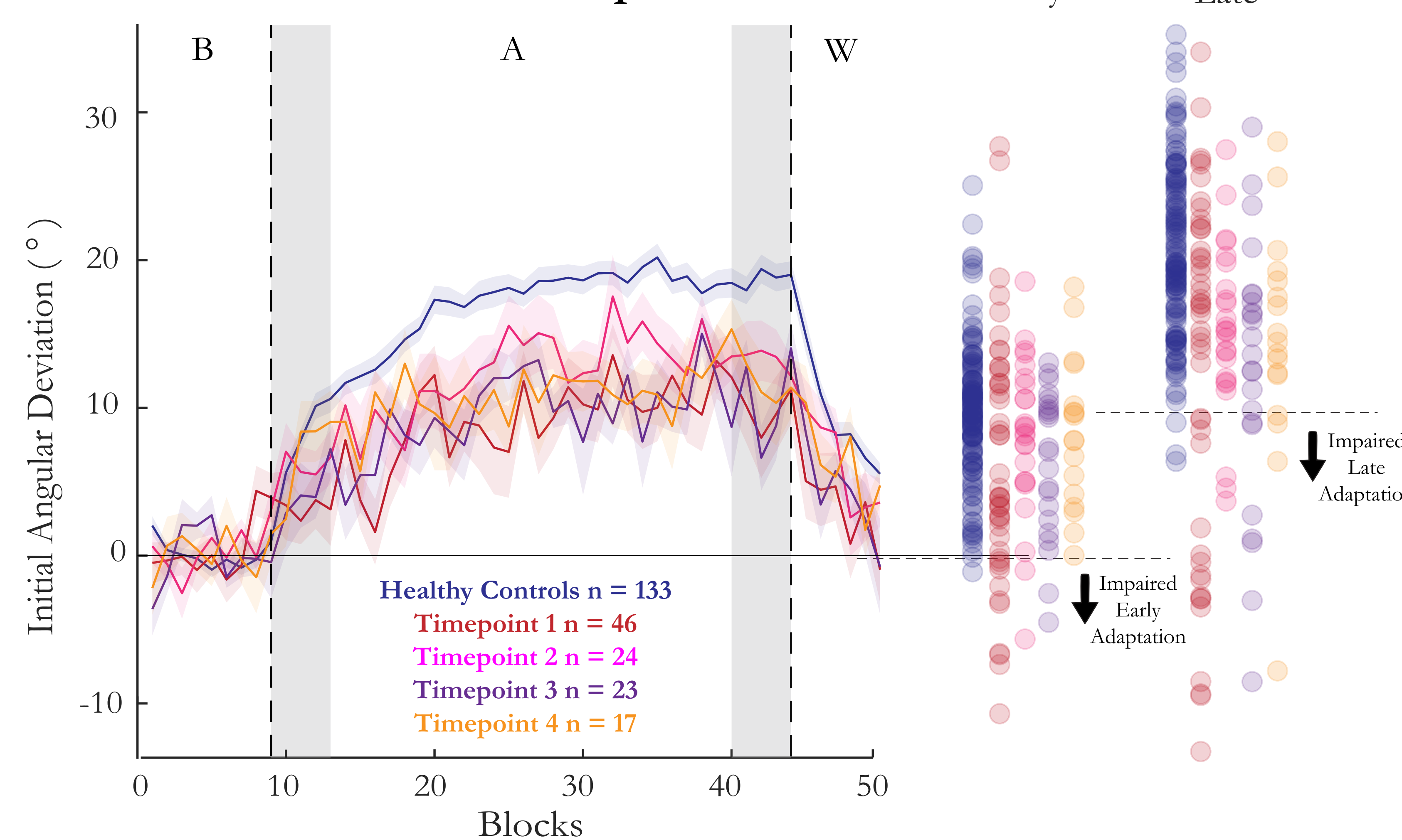
Both groups improved their performance from initial to final adaptation, but participants with stroke face greater challenges in visuomotor learning during the task when compared to controls.

Visuomotor Adaptation



Reduced Levels of Impairment Observed Over Stroke Recovery Period

Visuomotor Adaptation



While there were no significant differences in visuomotor adaptation across all the first six months of recovery, stroke survivors displayed reduced impairment levels over time.

Conclusion

Participants with stroke have impaired visuomotor learning when compared to healthy controls in early recovery (< 3 weeks). Across all four timepoints, stroke survivors do not exhibit any significant changes in average levels of motor learning, but we see a trend of reduced levels of impairment over time.