

Supplementary Table 1 Topographical mapping of optogenetic stimulation of CSNs or layer 5 pyramidal neurons induced joint movement, Related to Figure 4

Steps during skilled reaching	Joint Movements	CSNs optogenetic stimulation	Thy1-ChR2-YFP optogenetic stimulation	CSNs regional ablation
Digits to midline	Elbow flexion	Anterior-medial (A-M) CFA	Both RFA & CFA	Slightly impaired in CFA
Digits semi-flexed	Slight digits flexion	No	No	No effect
Aim & Advance	Elbow extension & adduction	Posterior-lateral (P-L) & A-M CFA	Both RFA & CFA	Impaired in CFA
Digits extended	Digits extension	No	CFA	No effect
Pronation	Elbow abduction	No	No	Impaired in both RFA and CFA
	Wrist rotational movement	No	No	
Grasp	Digits closure	RFA	RFA	Impaired in RFA
Supination I	Wrist supination	RFA	RFA	Impaired in RFA
Supination II & Retrieval	Wrist supination	RFA	RFA	Impaired in RFA
	Shoulder extension & Elbow flexion	A-M & P-L CFA	Both RFA& CFA	Impaired in CFA (slow)
Release	Digits extension	No	CFA	No effect