Supplementary material to:

Test-retest reliability of a finger-tapping fMRI task in a healthy population

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Test-retest reliability in literature based regions of interest

Table S1 - Intraclass Correlation Coefficients in spherical ROIs with r = 10mm based on ALE[1]

x y z	Region	ICC TIF (95%-CI)	ICC TIFfast (95%-CI)	ICC TAF (95%-CI)	ICC TAFfast (95%-CI)	ICC AllC (95%-CI)
-26 -54 -26	Left cerebellum	.47 (.02, .71)	.39 (-.13, .67)	.44 (-.04, .69)	.52 (.11, .74)	.52 (.12, .74)
-38 -24 56	Left M1	.72 (.49, .85)	.59 (.24, .78)	.53 (.13, .74)	.53 (.13, .74)	.58 (.22, .77)
-26 4 60	Left PMd	.65 (.35, .81)	.19 (-.49, .56)	.55 (.16, .75)	.46 (.00, .70)	.46 (.02, .71)
-26 4 2	Left putamen	.42 (-.07, .69)	.57 (.21, .77)	.54 (.15, .75)	.67 (.39, .82)	.62 (.30, .79)
-32 -24 62	Left S1	.71 (.47, .84)	.71 (.46, .84)	.70 (.44, .84)	.78 (.59, .88)	.74 (.53, .86)
-30 -56 64	Left SPL	.59 (.25, .78)	.22 (-.43, .58)	.57 (.21, .77)	.37 (-.17, .66)	.65 (.36, .81)
-12 -20 10	Left Thalamus	.42 (-.07, .68)	.40 (-.10, .67)	.04 (-.77, .48)	.41 (-.09, .68)	.33 (-.23, .64)
0 -2 54	Bilateral SMA	.44 (-.02, .70)	.69 (.43, .83)	.44 (-.04, .69)	.44 (-.04, .69)	.51 (.09, .73)
26 -54 -26	Right cerebellum	.31 (-.28, .62)	.56 (.19, .76)	.43 (-.05, .69)	.69 (.43, .83)	.62 (.30, .79)
38 -24 56	Right M1	.57 (.22, .77)	.91 (.83, .95)	.68 (.42, .83)	.80 (.62, .89)	.85 (.72, .92)
26 4 60	Right PMd	.48 (.04, .72)	.41 (-.09, .68)	.21 (-.46, .57)	.58 (.23, .77)	.64 (.34, .81)
26 4 2	Right putamen	.32 (-.26, .63)	.54 (.16, .75)	.43 (-.05, .69)	.43 (-.04, .69)	.60 (.27, .78)
32 -24 62	Right S1	.52 (.11, .74)	.88 (.78, .93)	.46 (.02, .71)	.84 (.70, .91)	.84 (.71, .92)
30 -56 64	Right SPL	.35 (-.20, .64)	.49 (.06, .72)	.51 (.11, .74)	.30 (-.28, .62)	.65 (.36, .81)
12 -20 10	Right Thalamus	.24 (-.40, .59)	.50 (.08, .73)	.19 (-.48, .56)	.20 (-.47, .57)	.47 (.02, .71)

ROI: region of interest; ALE: activation likelihood estimation; ICC: intraclass correlation coefficient; TIF: paced thumb-index finger tapping; TAF: paced thumb alternating finger opposition; TIF/TAFfast: unpaced condition with movement as fast as possible;
M1: primary motor cortex; PMd: dorsal premotor cortex; S1: primary sensory cortex; SPL: superior parietal lobule; SMA: supplementary motor area. M1 and S1 ROIs share 40% of their volume.
Color-coding for ICC-values: red: 0 - .39 (poor); yellow: .40 - .59 (fair); light green: .60 - .75(good); dark green: >.75 (excellent)

Test-retest reliability in anatomical atlas based regions of interest

Table S2 - Intraclass Correlation Coefficients in anatomical ROIs based on aal-atlas[2]

Region	ICC TIF (95%-CI)	ICC TIFfast (95%-CI)	ICC TAF (95%-CI)	ICC TAFfast (95%-CI)	ICC AllC (95%-CI)
Left cerebellum IV-VI	.55 (.18, .76)	.66 (.37, .81)	.45 (-.01, .70)	.62 (.31, .80)	.72 (.48, .85)
Left M1	.64 (.34, .81)	.52 (.12, .74)	.24 (-.40, .59)	.57 (.20, .76)	.48 (.05, .72)
Left putamen	.44 (-.02, .70)	.58 (.22, .77)	.73 (.51, .85)	.66 (.38, .82)	.64 (.34, .81)
Left S1	.60 (.26, .78)	.67 (.40, .82)	.45 (-.01, .70)	.57 (.21, .77)	.66 (.37, .82)
Left SMA	.48 (.05, .72)	.66 (.38, .82)	.22 (-.44, .58)	.45 (-.01, .70)	.68 (.41, .83)
Left SPL	.59 (.24, .78)	.47 (.02, .71)	.39 (-.13, .67)	.31 (-.27, .63)	.46 (.00, .71)
Left thalamus	.38 (-.14, .66)	.54 (.15, .75)	.09 (-.68, .50)	.56 (.18, .76)	.53 (.14, .75)
Right cerebellum IV-VI	.69 (.43, .83)	.60 (.27, .78)	.40 (-.10, .68)	.60 (.26, .78)	.73 (.50, .85)
Right M1	.52 (.12, .74)	.77 (.57, .87)	.08 (-.70, .50)	.72 (.48, .85)	.77 (.57, .87)
Right putamen	.46 (.00, .71)	.53 (.14, .75)	.31 (-.26, .63)	.38 (-.14, .66)	.58 (.23, .77)
Right S1	.47 (.02, .71)	.81 (.65, .90)	.41 (-.08, .68)	.60 (.27, .78)	.76 (.57, .87)
Right SMA	.55 (.17, .76)	.74 (.53, .86)	.43 (-.05, .69)	.57 (.21, .77)	.78 (.60, .88)
Right SPL	.48 (.04, .72)	.60 (.26, .78)	.30 (-.28, .62)	.40 (-.10, .68)	.59 (.24, .77)
Right thalamus	.51 (.10, .74)	.55 (.18, .76)	.17 (-.52, .55)	.23 (-.43, .58)	.50 (.09, .73)

ROI: region of interest; ICC: intraclass correlation coefficient; TIF: paced thumb-index finger tapping; TAF: paced thumb alternating finger opposition; TIF/TAFfast: unpaced condition with movement as fast as possible;
M1: primary motor cortex; S1: primary sensory cortex; SMA: supplementary motor area; SPL: superior parietal lobule.
Color-coding for ICC-values: red: 0 - .39 (poor); yellow: .40 - .59 (fair); light green: .60 - .75(good); dark green: >.75 (excellent)

Test-retest reliability in regions of interest based on conjunction analysis of activations

Table S3 - Intraclass Correlation Coefficients in ROIs based on conjunction analyses at threshold $p_{FWE} < .05$

TIF			TAFfast		
x y z (n voxels)	Regions	ICC (95%-CI)	x y z (n voxel)	Regions	ICC (95%-CI)
-35 -24 53 (626)	Left M1, premotor cortex, S1	.67 (.39, .82)	-35 -24 53 (4451)	Left M1, S1, SII, SPL, IPL, bilateral SMA, premotor cortex	.35 (-.21, .64)
-3 -4 55 (109)	Bilateral SMA	.50 (.08, .73)			
20 -48 -22 (480)	Right cerebellum	.54 (.16, .75)	20 -50 -22 (2355)	Bilateral cerebellum IV – VI, left VIII, IX, Fastigii ncl., interposed Ncl.	.66 (.37, .81)
-29 -50 -30 (31)	Left cerebellum	.23 (-.42, .58)			
-49 -24 19 (15)	Left SII	.29 (-.31, .61)	58 -18 29 (1156)	Right M1, SI, SII, SMG, IPL	.54 (.16, .75)
-45 1 9 (10)	Left anterior insula	.64 (.33, .80)	-57 1 35 (777)	Left IFG pars opercularis, anterior Insula, premotor cortex	.55 (.18, .76)
			44 3 5 (671)	Right IFG pars opercularis, anterior Insula	.52 (.12, .74)
TIFfast			40 -12 61 (360)	Right premotor cortex	.64 (.33, .80)
x y z (n voxel)	Regions	ICC (95%-CI)	18 -20 21 (46)	Right thalamus	.40 (-.10, .67)
-35 -24 55 (2019)	Left M1, premotor cortex, SI, SII	.55 (.18, .76)	-27 -12 9 (33)	Left putamen	.29 (-.30, .62)
24 -50 -26 (1342)	Right cerebellum IV-VI, vermis	.55 (.17, .76)			
44 11 1 (484)	Right IFG pars opercularis, anterior Insula	.64 (.34, .81)			

-45 1 7 (388)	Left IFG pars opercularis, anterior Insula	.70 (.45, .84)
-7 -12 51 (228)	Left SMA	.68 (.42, .83)
54 -24 27 (161)	Right rolandic operculum, SMG	.71 (.46, .84)
-59 7 29 (101)	Left IFG pars opercularis	.38 (-.14, .66)
-29 -52 -26 (73)	Left cerebellum VI	.32 (-.26, .63)
-31 -8 -2 (48)	Left putamen	.18 (-.52, .55)
4 -2 67 (17)	Right SMA	.71 (.46, .84)
-7 5 41 (16)	Left MCC	.41 (-.09, .68)
-15 -20 7 (13)	Left thalamus	.65 (.36, .81)
TAF		
x y z (n voxels)	Regions	ICC (95%-CI)
-35 -24 53 (2412)	Left M1, premotor, S1, IPL	.46 (.00, .71)
20 -48 -22 (696)	Right cerebellum IV – VI, vermis	.47 (.02, .71)
40 -38 53 (381)	Right S1	.62 (.30, .79)
-3 -2 53 (341)	Bilateral SMA	.50 (.08, .73)
-27 -54 -24 (197)	Left cerebellum V, VI	.42 (-.06, .69)
-59 7 29 (65)	Left IFG pars opercularis	.31 (-.27, .63)
52 -20 35 (47)	Right S1, IPL	.53 (.13, .74)
30 -6 61 (44)	Right premotor cortex	.13 (-.59, .53)
-41 -2 13 (43)	Left anterior Insula	.56 (.19, .76)
58 9 23 (38)	Right IFG pars opercularis	.31 (-.28, .62)
-25 -2 13 (21)	Left putamen	.58 (.22, .77)
-17 -10 21 (11)	Left thalamus	.44 (-.04, .69)
-15 -20 5 (10)	Left thalamus	.61 (.28, .79)
-31 -10 1 (7)	Left putamen	.21 (-.46, .57)
2 17 35 (7)	Right MCC	.70 (.45, .84)
AllC		
-35 -24 53 (4293)	Left M1, premotor cortex, S1, SII, IPL, bilateral SMA	.45 (-.01, .70)
22 -48 -22 (2074)	Bilateral cerebellum IV – V, vermis	.57 (.20, .76)
58 -18 29 (796)	Right SMG, S1, SII, IPL	.67 (.39, .82)
-59 7 27 (736)	Left IFG pars opercularis, anterior Insula	.66 (.37, .81)
40 5 5 (597)	Right IFG pars opercularis, anterior Insula	.59 (.24, .77)
-31 -10 1 (190)	Left Putamen	.58 (.22, .77)
40 -12 59 (102)	Right M1	.61 (.28, .79)
54 1 43 (36)	Right M1, premotor cortex	.74 (.52, .86)
-17 -20 7 (17)	Left thalamus	.43 (-.06, .69)
-17 -10 19 (10)	Left thalamus	.71 (.46, .84)

ROI: region of interest; ICC: intraclass correlation coefficient; TIF: paced thumb-index finger tapping; TAF: paced thumb alternating finger opposition; TIF/TAFfast: unpaced condition with movement as fast as possible;
M1: primary motor cortex; S1: primary sensory cortex; SII: secondary sensory cortex; SMA: supplementary motor area; IFG: inferior frontal gyrus; IPL: inferior parietal lobule; SPL: superior parietal lobule; SMG: supramarginal gyrus; MCC: middle cingulate cortex.
Color-coding for ICC-values: red: 0 - .39 (poor); yellow: .40 - .59 (fair); light green: .60 - .75(good); dark green: >.75 (excellent)

Age Groups

Sample characteristics and performance

Table S4	Younger half (n = 16)		Older half (n = 15)	
	Baseline (Mean ± SD)	Follow-Up (Mean ± SD)	Baseline (Mean ± SD)	Follow-Up (Mean ± SD)
Age (years)	25.7 ± 4.2		46.3 ± 8.5	
Sex (n, % female)	10 (62.5)		6 (40)	
Education (years)	15.6 ± 3.2		16.8 ± 3.5	
TIFfast performance (Taps/second)	3.74 ± .90	3.83 ± .83	3.70 ± 1.43	3.88 ± 1.13
TAFfast performance (Taps/second)	2.91 ± .72	3.02 ± .68	3.11 ± 1.12	3.08 ± 1.06
TIF: Paced thumb-index finger tapping; TAF: paced thumb alternating finger opposition; TIF/TAFfast: unpaced condition with movement as fast as possible				

Dice similarity coefficients

Table S5 - Dice Similarity Coefficients (DSC)										
Condition	TIF		TIFfast		TAF		TAFfast		AllC	
Age group	young	old	young	old	young	old	young	old	young	old
Threshold p=.05	.347	.557	.567	.617	.573	.707	.685	.692	.740	.716
Threshold p=.001	.293	.571	.558	.580	.430	.641	.626	.662	.644	.665
Threshold p_{FWE}=.05	.081	0*	.462	.512	.145	.282	.385	.463	.444	.491
TIF: Paced thumb-index finger tapping; TAF: paced thumb alternating finger opposition; TIF/TAFfast: unpaced condition with movement as fast as possible; AllC: Contrast of all tapping conditions vs. all rest conditions; young: younger half of the study sample (n=16); old: older half of the study sample (n=15); 0*: no overlapping activation between sessions										

Intraclass correlation coefficients

Table S6 – Average ICC values per condition and age group

	TIF			TIFfast			TAF			TAFfast			AllC			mean of 5 conditions		
Age group	young	old	stat	young	old	stat	young	old	stat	young	old	stat	young	old	stat	young	old	stat
Literature	.40	.60	p=.017	.46	.66	p=.013	.47	.41	p=.49	.41	.67	p<.001	.54	.66	p=.10	.45	.60	p<.001
Anatomical	.39	.65	p=.002	.53	.75	p<.001	.37	.18	p=.020	.34	.70	p<.001	.60	.65	p=.41	.45	.59	p<.001
Conjunction	.43	.60	p=.20	.48	.62	p=.12	.45	.46	p=.93	.39	.58	p=.06	.60	.60	p=.97	.47	.57	p=.023

TIF: Paced thumb-index finger tapping; TAF: paced thumb alternating finger opposition; TIF/TAFfast: unpaced condition with movement as fast as possible; AllC: Contrast of all tapping conditions vs. all rest conditions; young: younger half of the study sample (n=16); old: older half of the study sample (n=15); stat: significance of the two-sample t-test comparing the older and younger half of the sample.

Figure S1: Depiction of the literature-based ROI-set. ROIs were created by drawing spheres with 10mm radius centered on peaks reported in an activation likelihood estimation[1]. Note the overlap of bilateral M1 and S1 ROIs (40% overlap).

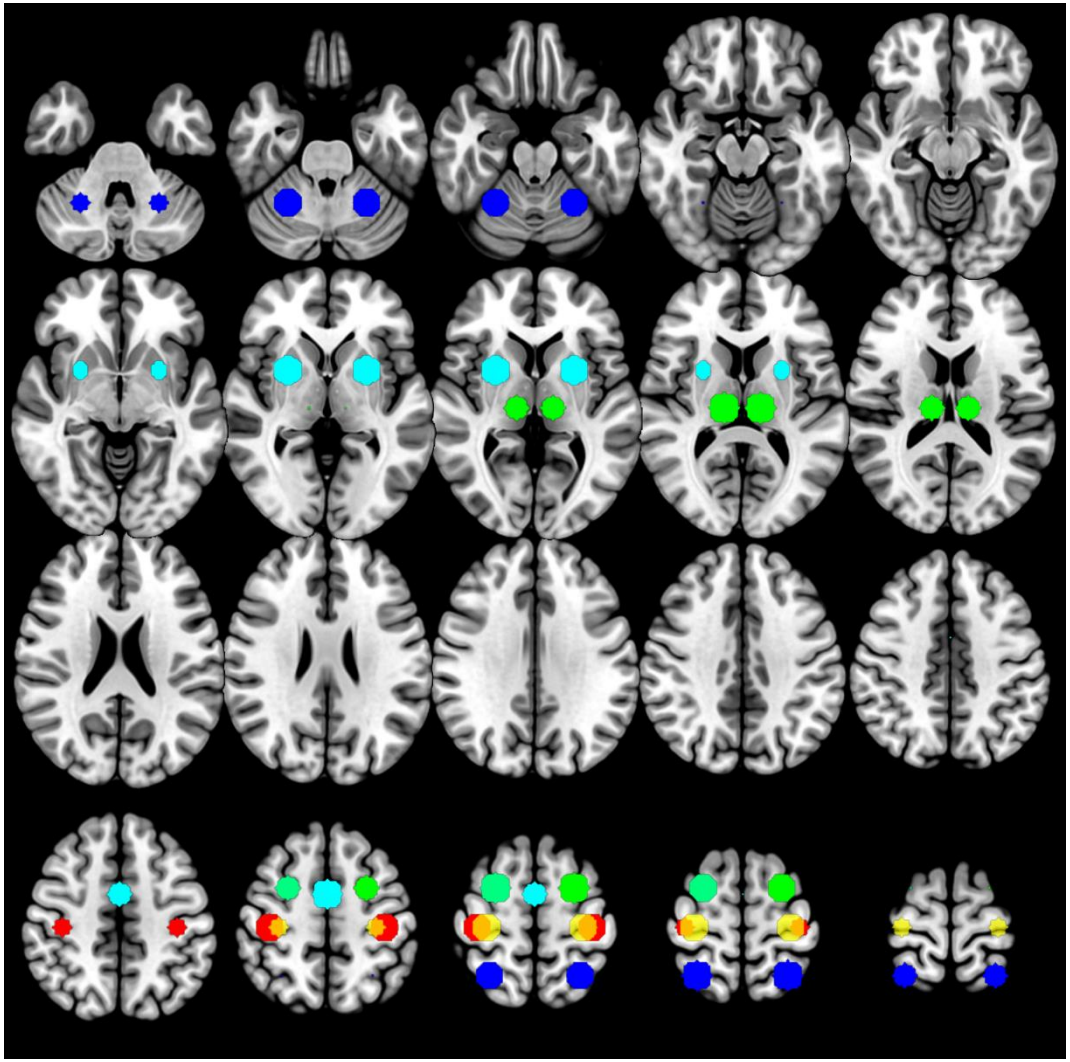


Figure S2: Depiction of the anatomical ROI-set from the AAL-atlas[2].

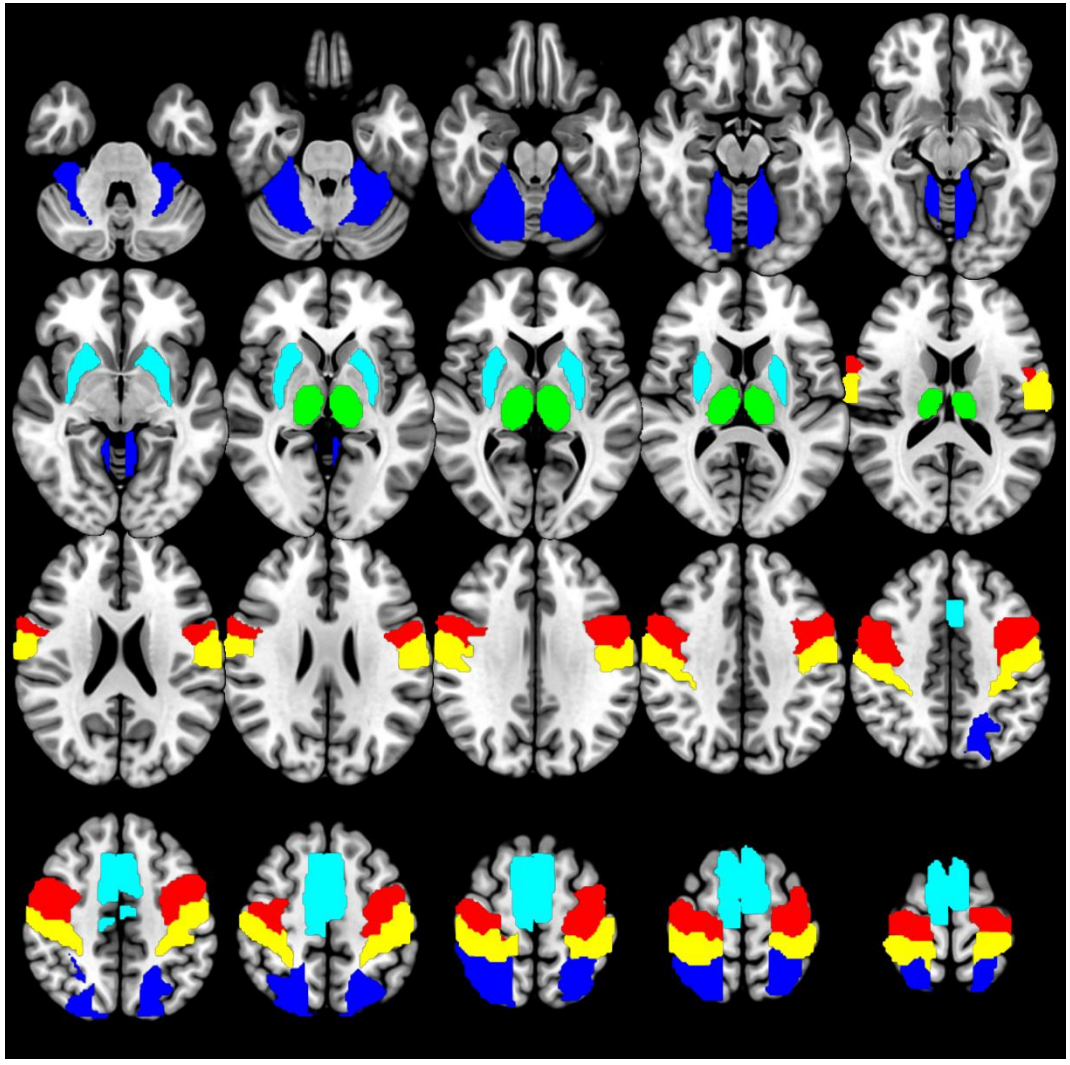


Figure S3: Depiction of ROIs derived from conjunction analysis of paced Thumb – Index Finger tapping vs. Listen contrast (TIF) at threshold $p_{FWE} < .05$.

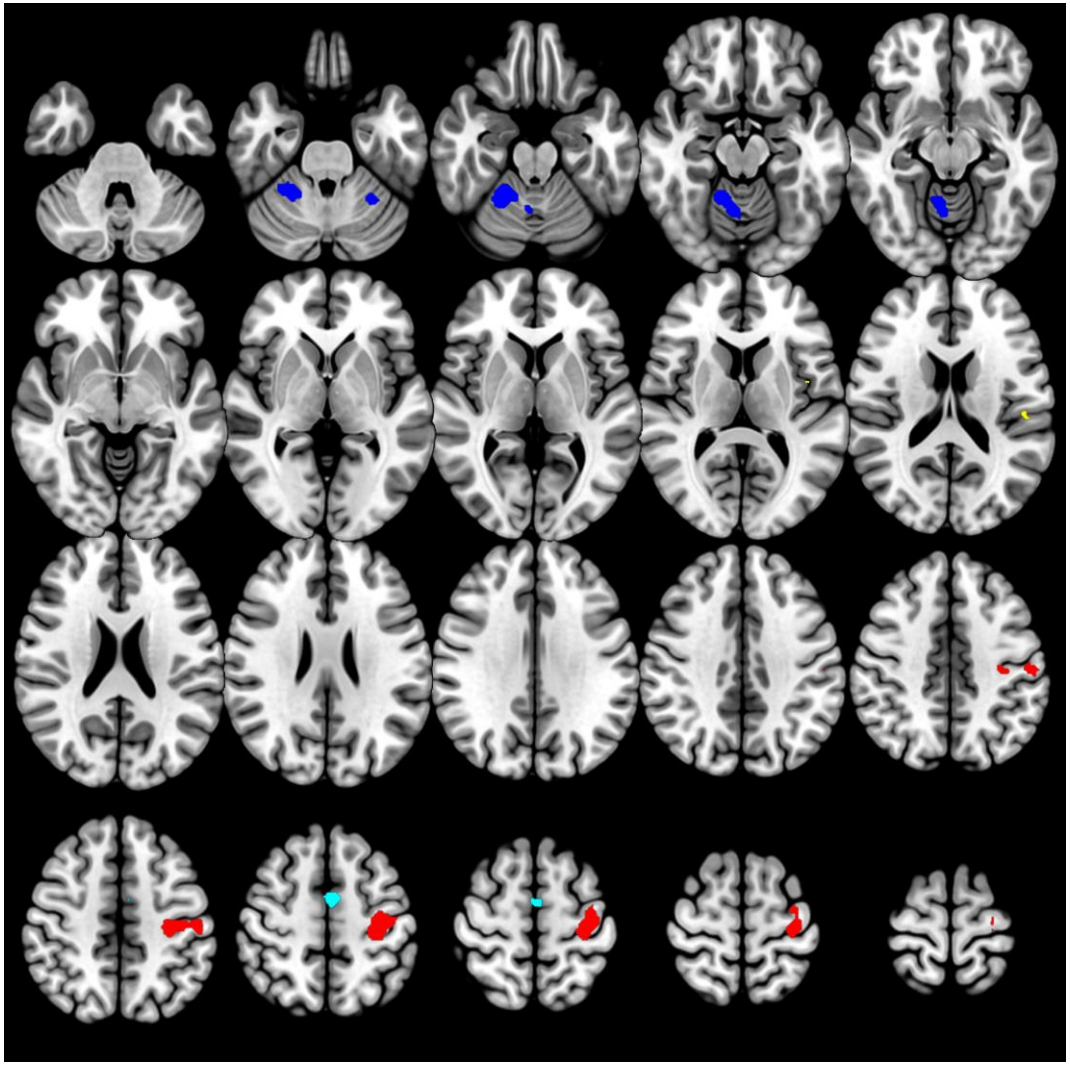


Figure S4: Depiction of ROIs derived from conjunction analysis of unpaced Thumb – Index Finger tapping vs. Rest contrast (TIFfast) at threshold $p_{FWE} < .05$.

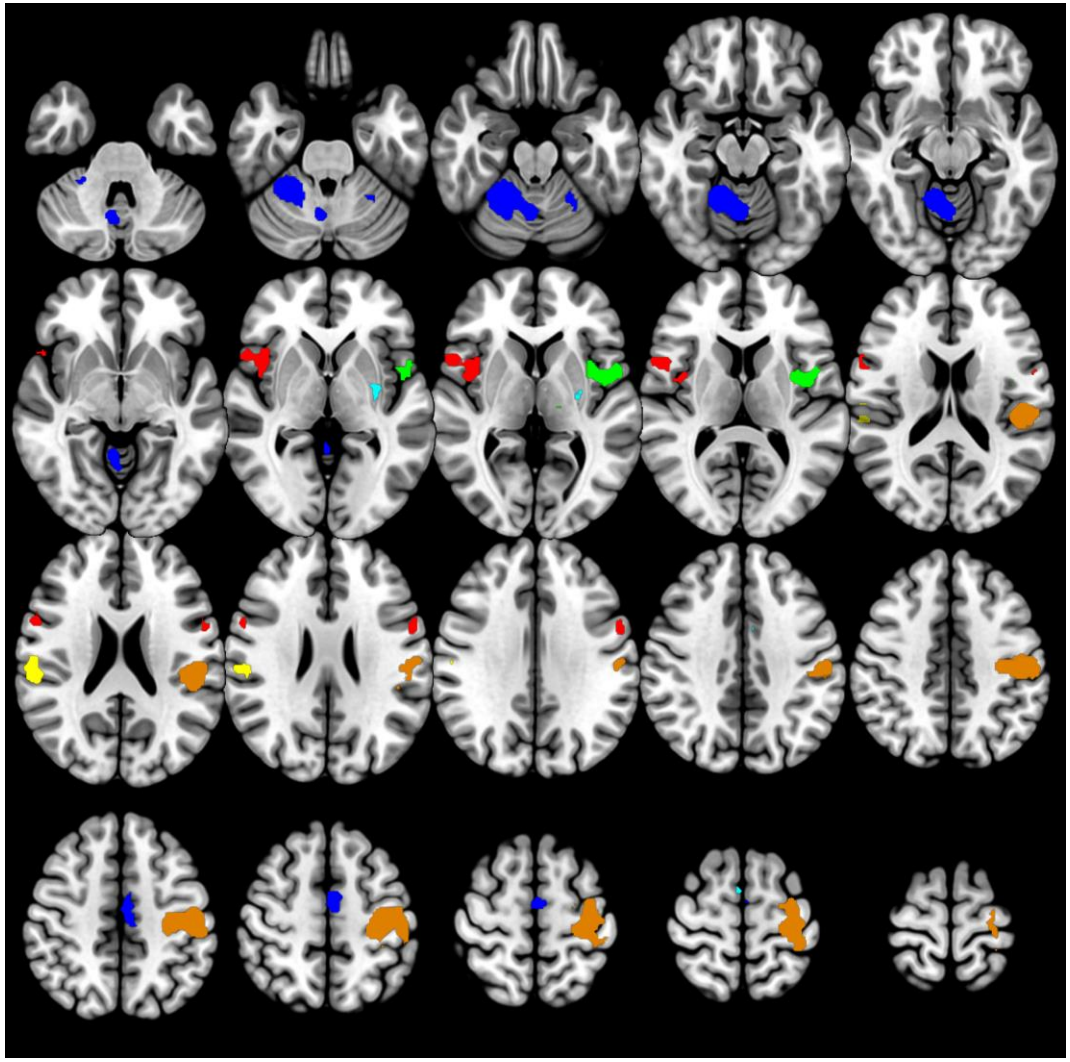


Figure S5: Depiction of ROIs derived from conjunction analysis of paced Thumb – Alternating Finger opposition vs. Listen contrast (TAF) at threshold $p_{FWE} < .05$.

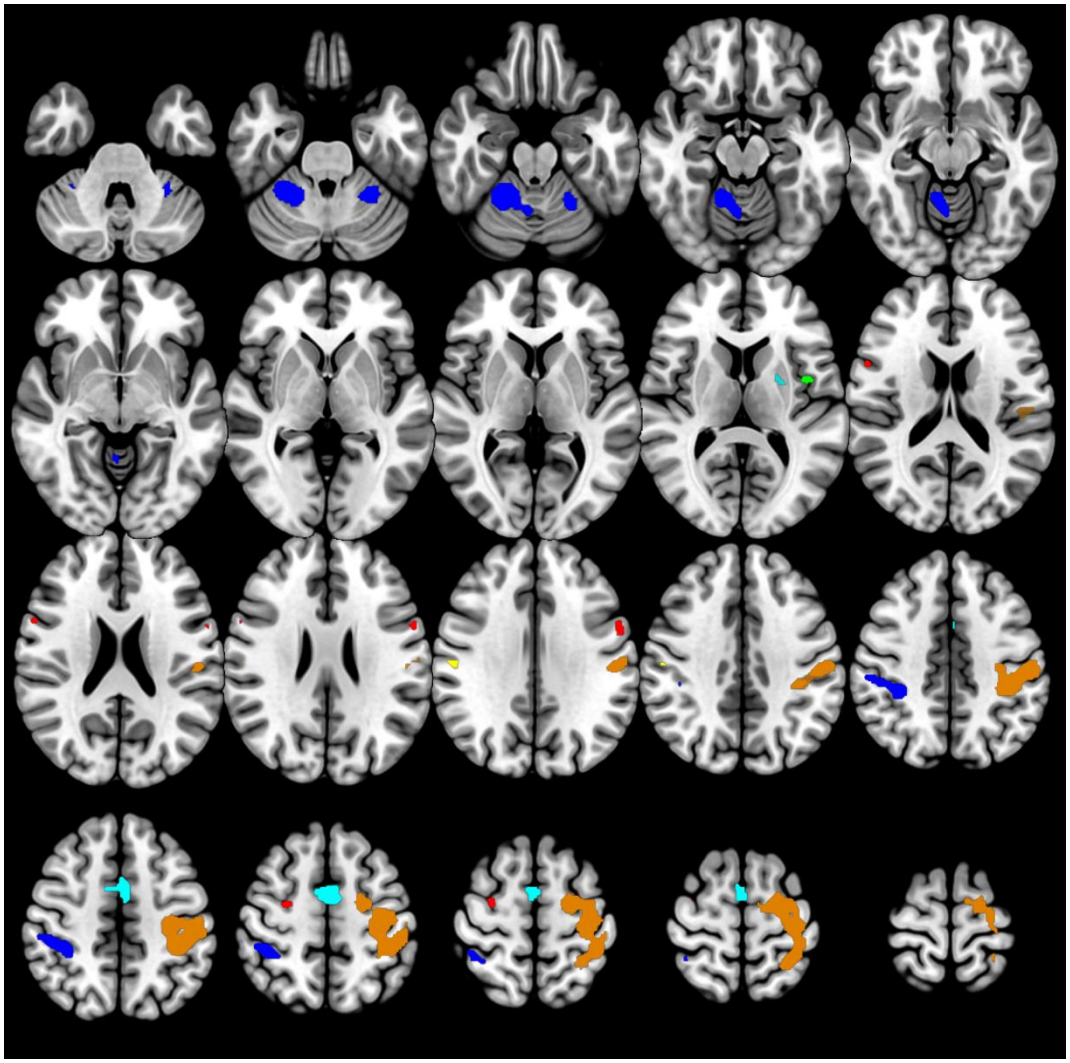


Figure S6: Depiction of ROIs derived from conjunction analysis of unpaced Thumb – Alternating Finger opposition vs. Rest contrast (TAFfast) at threshold $p_{FWE} < .05$.

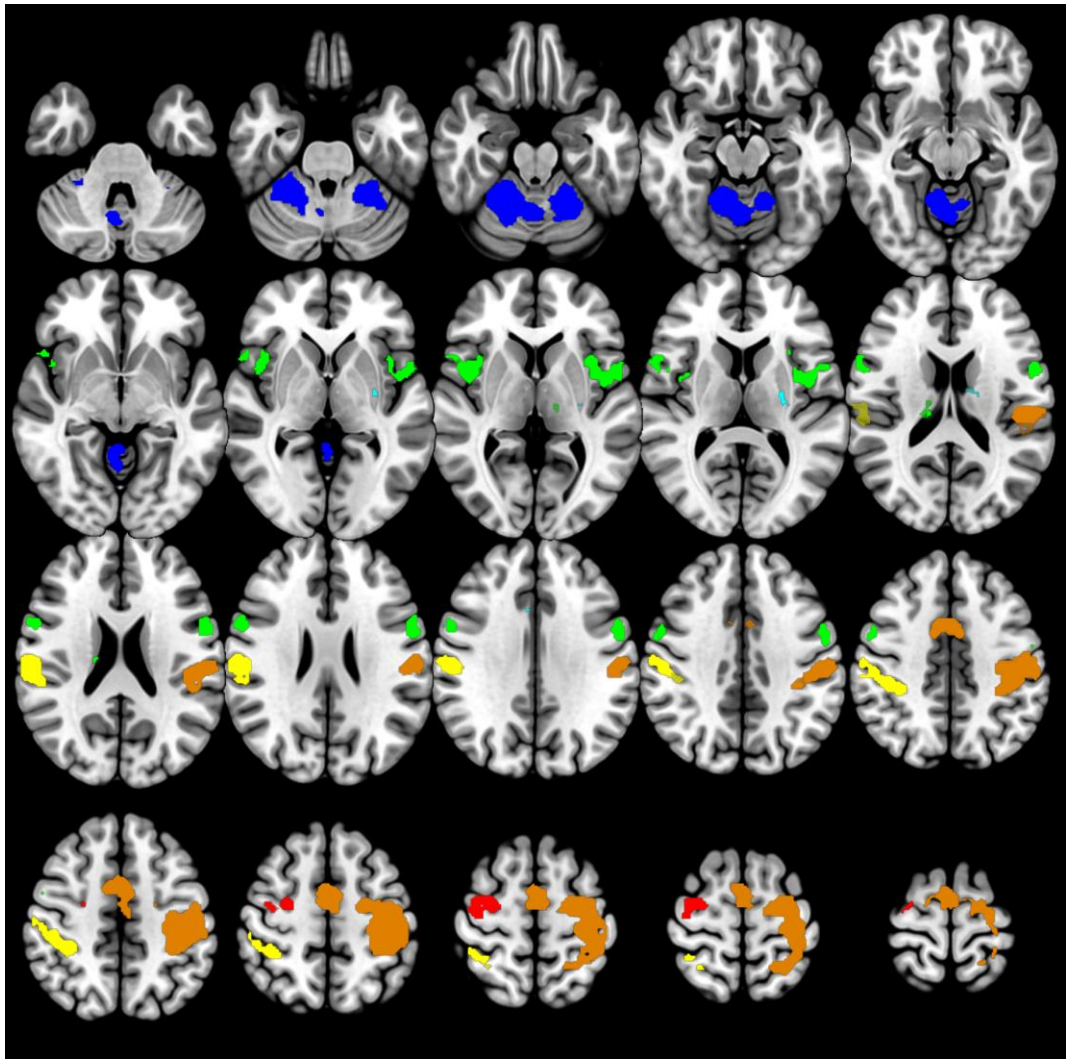


Figure S7: Depiction of ROIs derived from conjunction analysis of all tapping conditions vs. all rest conditions contrast (AllC) at threshold $p_{FWE} < .05$.

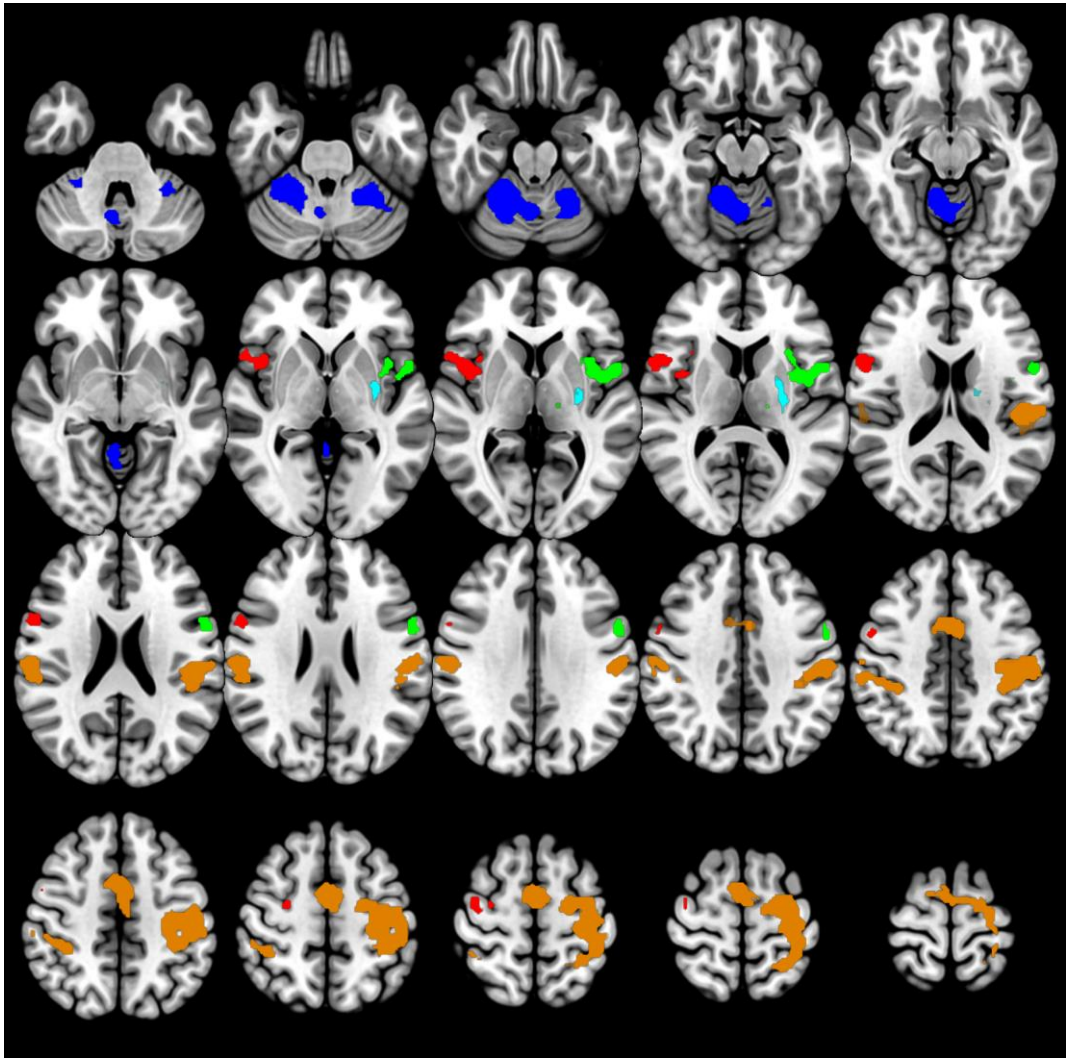


Figure S8: Overlay of ROI-sets. Red: Anatomical atlas ROIs; Yellow: Literature-based ROIs; Green: Example of conjunction analysis based ROIs (AllC) at threshold $p_{FWE} < .05$.

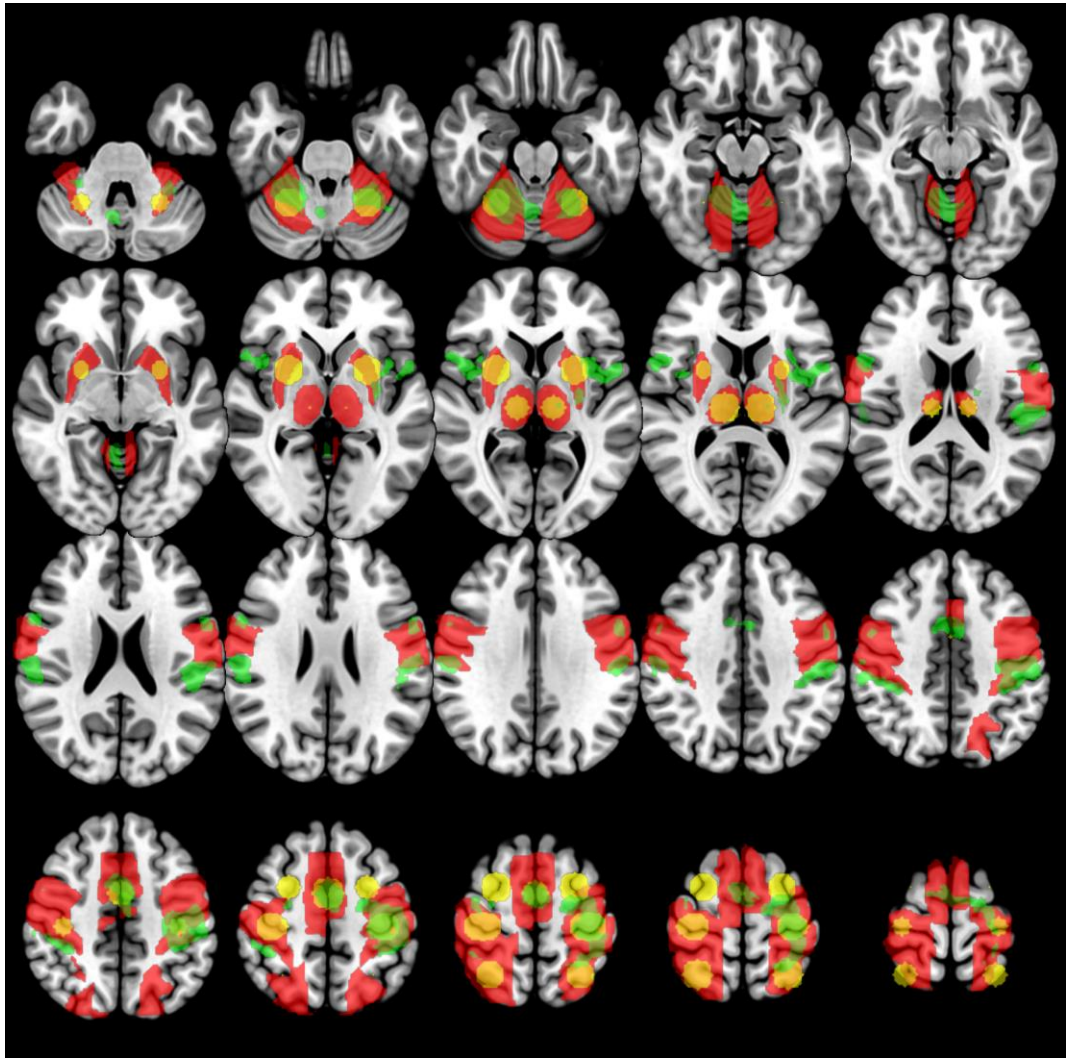
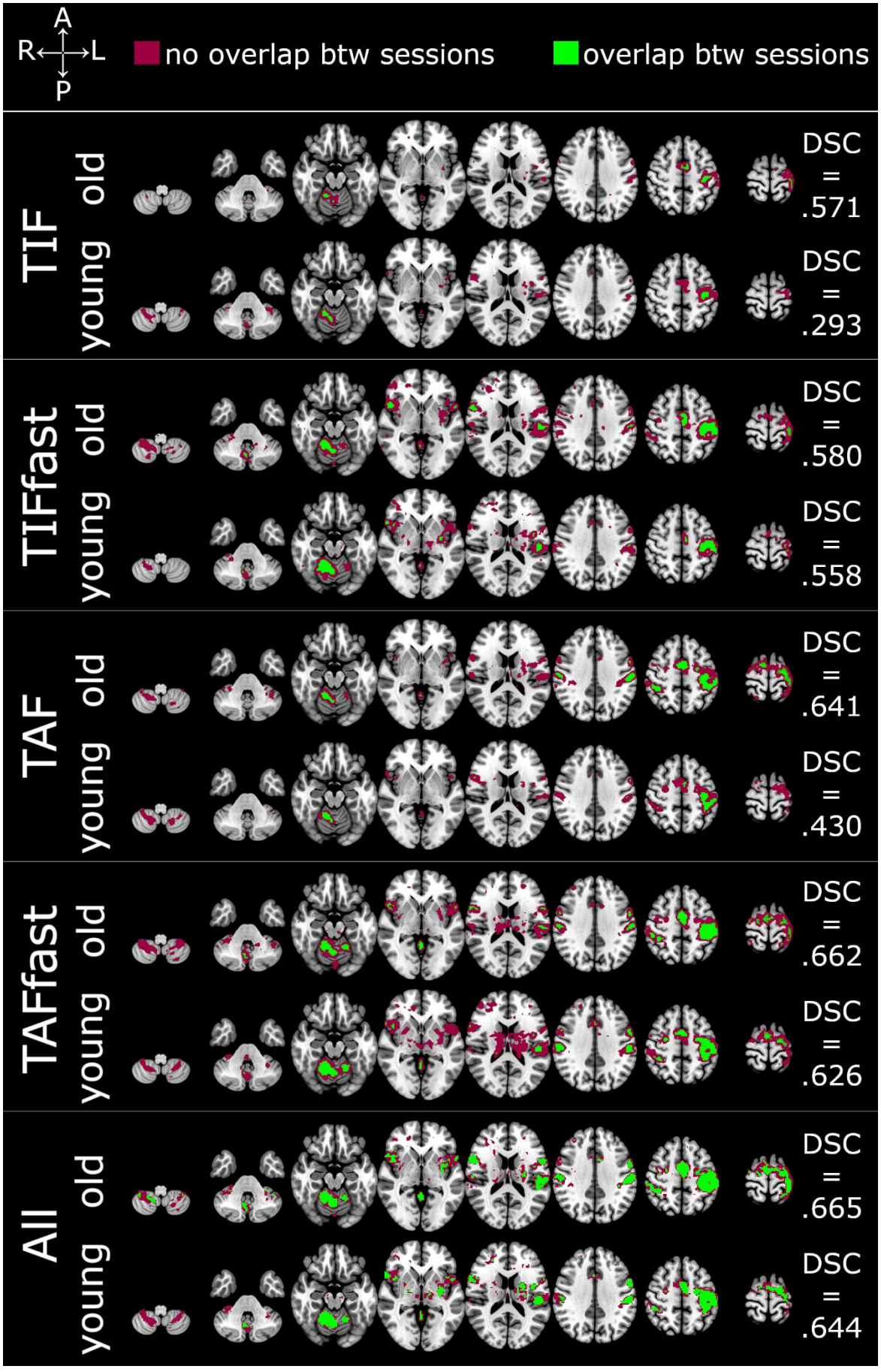


Figure S9: Side-by-side comparison of activation overlap by age group and contrast at threshold of p < .001. TIF: Paced thumb-index finger tapping; TAF: paced thumb alternating finger opposition; TIF/TAFfast: unpaced condition with movement as fast as possible; All: Contrast of all tapping conditions vs. all rest conditions; young: younger hal1f of the study sample (n=16); old: older half of the study sample (n=15); DSC: Dice similarity coefficient.



1. Hardwick, R.M., et al., *A quantitative meta-analysis and review of motor learning in the human brain.* Neuroimage, 2013. **67**: p. 283-97.
2. Tzourio-Mazoyer, N., et al., *Automated anatomical labeling of activations in SPM using a macroscopic anatomical parcellation of the MNI MRI single-subject brain.* Neuroimage, 2002. **15**(1): p. 273-89.