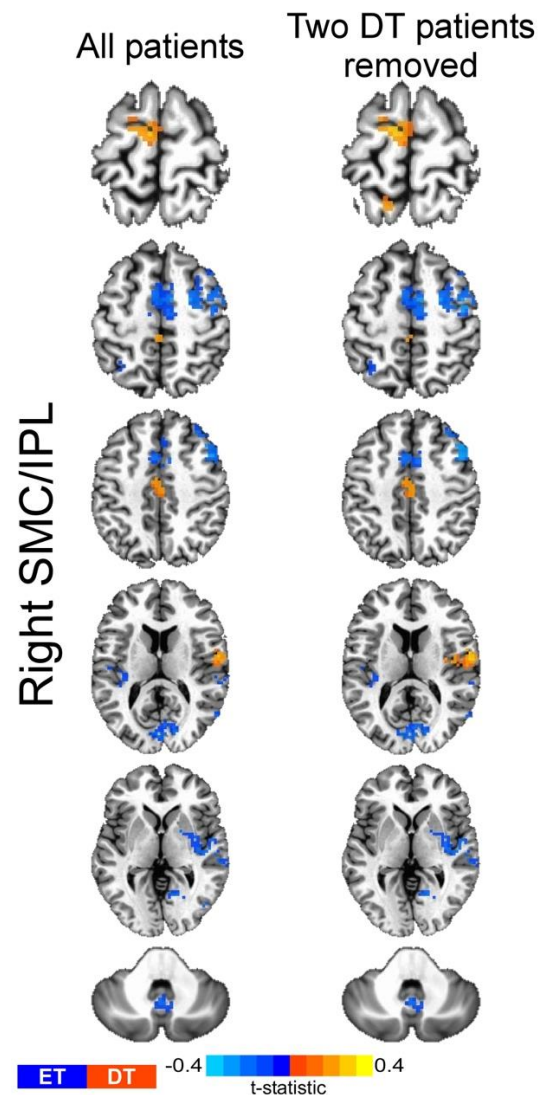**Supplementary Figure 1. Mean and standard deviation of peak force power and frequency.** Average group values for mean and standard deviation (SD) of peak force power and frequency for control (red), dystonic tremor (DT: blue), and essential tremor (ET: grey) groups in the low (left panel), high (middle panel), and high minus low (right panel) visual feedback tasks. Error bars represent standard error of the mean. Asterisks denote a significant increase in mean peak force frequency in ET compared to control and DT groups ($P<0.05$ FDR-corrected).

Supplementary Figure 2. DT versus ET right SMC/IPL FC$_\Delta$ with and without two DT subjects. Axial slice representation of whole-brain *t*-statistical maps of the mean difference in right SMC/IPL FC$_\Delta$ for the dystonic tremor (DT) versus essential tremor (ET) comparison. The left panel represents all patients included in the original analysis as depicted in Figure 6A. The right panel represents all patients except for two DT patients who exibited higher head motion than other patients (although it is important to note that head motion of these two patients was still within acceptable range). Positive (red-orange) clusters denote significantly increased FC$_\Delta$ with the seed ROI in the DT group compared to ET group, whereas negative (blue) clusters denote significantly reduced FC$_\Delta$ with the seed ROI in the DT group compared to ET group (*P*<0.05 FWER-corrected).

Region(s)	Effect	Hemisphere	Size (mm^3)	Peak t-statistic	MNI CoM			Mean BOLDΔ		
					x	y	z	Control	DT	ET
cuneus	control > ET	ipsilateral	891	3.02	3	88	5	0.5 (0.47)	0.3 (0.44)	0.17 (0.42)
cerebellum (I-IV)	control > ET	ipsilateral	837	4.35	6	45	19	0.25 (0.58)	0.04 (0.56)	0.03 (0.53)
superior parietal lobule	control > ET	ipsilateral	675	3.75	10	47	59	0.34 (0.23)	0.34 (0.34)	0.15 (0.21)
inferior occipital gyrus	control > ET	ipsilateral	378	3.7	26	89	12	0.59 (0.49)	0.22 (0.68)	0.19 (0.36)
middle temporal gyrus	control > ET	ipsilateral	351	3.44	54	47	5	0.36 (0.33)	0.12 (0.41)	0.14 (0.33)
inferior parietal lobule	control > ET	ipsilateral	270	3.42	33	43	59	0.28 (0.18)	0.42 (0.32)	0.13 (0.2)
middle frontal gyrus	control > ET	ipsilateral	243	3.2	44	12	39	0.49 (0.23)	0.17 (0.3)	0.002 (0.26)
cerebellum (VI)	control > ET	ipsilateral	216	4.07	34	44	27	0.57 (0.33)	0.23 (0.37)	0.02 (0.3)
lingual gyrus	control > ET	contralateral	432	3.62	11	90	8	0.4 (0.35)	0.36 (0.49)	0.21 (0.37)
cerebellum (VIIIb)	control > ET	contralateral	297	3.38	22	54	46	0.34 (0.24)	0.17 (0.29)	0.04 (0.2)
middle frontal gyrus	control > DT	ipsilateral	1,161	4.42	38	24	31	0.51 (0.34)	0.01 (0.33)	0.36 (0.38)
cerebellum (I-IV)	control > DT	ipsilateral	243	3.83	6	50	26	0.34 (0.28)	0.03 (0.24)	0.16 (0.21)
cingulate gyrus*, medial frontal gyrus	control > DT	contralateral	243	3.9	11	39	20	0.15 (0.21)	0.29 (0.24)	0.1 (0.25)
insula	DT > ET	ipsilateral	864	3.72	40	19	21	0.05 (0.3)	0.22 (0.33)	0.3 (0.34)
sensorimotor cortex*, inferior parietal lobule	DT > ET	ipsilateral	837	3.33	45	39	60	0.19 (0.29)	0.38 (0.36)	0.16 (0.3)
cingulate gyrus*, mesial premotor cortex	DT > ET	ipsilateral	675	3.93	5	8	46	0.36 (0.31)	0.48 (0.4)	0.01 (0.24)
inferior parietal lobule	DT > ET	ipsilateral	378	3.46	51	40	30	0.03 (0.28)	0.14 (0.26)	0.34 (0.3)
middle frontal gyrus	ET > DT	ipsilateral	243	-3.79	43	27	30	0.51 (0.3)	0.01 (0.27)	0.67 (0.33)
lingual gyrus	DT > ET	contralateral	459	3.79	15	88	16	0.61 (0.78)	0.96 (0.94)	0.39 (1.06)

Supplementary Table 1. BOLD$_\Delta$ between-group effects. Between-group BOLD$_\Delta$ effects decomposed by significant regional cluster(s), direction of the effect, cluster hemisphere relative to the effector limb, cluster size (mm^3), peak cluster t-statistic, peak cluster center-of-mass (CoM) MNI coordinates, and group mean (±SD) BOLD$_\Delta$ score. All clusters are significant at *P* < 0.005 (*P* < 0.05 FWER-corrected). Region of peak *t*-statistic is noted with an asterisk for multi-cluster combinations.

Left SMC/IPL FCΔ

Cluster No.	Hemisphere	Region(s)	Size (mm3)	Effect
DT versus Control				
1	bilateral	cuneus	9,072	control > DT
2	bilateral	superior parietal lobule*, cingulate gyrus	6,750	control > DT
3	bilateral	sensorimotor cortex*, supplementary motor area , mesial premotor cortex, cingulate gyrus	6,480	control > DT
4	ipsilateral	lingual gyrus* middle occipital gyrus, cerebellum (VI, crus I, vermis, interposed, dentate)	6,399	control > DT
5	bilateral	cuneus*, superior parietal lobule, cingulate gyrus	3,645	control > DT
6	ipsilateral	middle frontal gyrus*, lateral premotor cortex, sensorimotor cortex	3,042	control > DT
7	contralateral	lingual gyrus	2,754	control > DT
8	ipsilateral	superior parietal lobule*, inferior parietal lobule	1,971	control > DT
9	ipsilateral	inferior parietal lobule	1,539	control > DT
10	contralateral	middle temporal gyrus*, middle occipital gyrus	1,242	control > DT
11	ipsilateral	middle occipital gyrus*, middle temporal gyrus	1,161	control > DT
12	ipsilateral	insula*, putamen, globus pallidus	1,080	control > DT
13	contralateral	cerebellum (VIIIa*, VIIIb)	783	control > DT
14	contralateral	middle frontal gyrus	756	DT > control
15	ipsilateral	superior frontal gyrus	702	control > DT
ET versus control				
1	contralateral	superior temporal gyrus	1,350	control > ET
2	contralateral	lateral premotor cortex	1,026	ET > control
3	contralateral	middle frontal gyrus	783	control > ET
4	contralateral	superior parietal lobule	729	control > ET
5	contralateral	sensorimotor cortex*, mesial premotor cortex	702	control > ET

Right SMC/IPL FCΔ

Cluster No.	Hemisphere	Region(s)	Size (mm3)	Effect
DT versus Control				
1	bilateral	superior* and inferior parietal lobules, sensorimotor cortex, superior and middle temporal gyri, inferior frontal gyrus, putamen, middle occipital gyrus, cuneus, lingual gyrus, fusiform gyrus, cerebellum (V, VI, VIIb, VIIIa, VIIIb crus I, vermis, dentate)		
2	bilateral	mesial premotor cortex*, supplementary motor area, cingulate gyrus	9,855	control > DT
3	ipsilateral	lateral premotor cortex*, sensorimotor cortex	8,532	control > DT
4	bilateral	cuneus*, superior parietal lobule, cingulate gyrus	4,185	control > DT
5	contralateral	sensorimotor cortex*, lateral premotor cortex	2,511	control > DT
6	contralateral	putamen*, globus pallidus, insula	1,890	control > DT

7	ipsilateral	cerebellum (VIIIa*, VIIIb, VIIb, crus II)	1,647	control > DT
8	contralateral	inferior* and superior parietal lobules	1,080	control > DT
9	bilateral	cingulate gyrus	918	control > DT
10	ipsilateral	middle frontal gyrus	810	control > DT
11	bilateral	superior parietal lobule	729	control > DT

ET versus control

1	ipsilateral	superior temporal gyrus*, middle temporal gyrus	5,049	control > ET
2	contralateral	sensorimotor cortex	3,348	control > ET
3	ipsilateral	transverse temporal gyrus*, inferior parietal lobule	3,267	control > ET
4	bilateral	lingual gyrus*, cuneus	1,593	control > ET
5	bilateral	sensorimotor cortex*, mesial premotor cortex	1,350	control > ET
6	ipsilateral	superior parietal lobule	1026	control > ET
7	ipsilateral	superior parietal lobule	972	control > ET
8	contralateral	lateral premotor cortex	837	control > ET
9	ipsilateral	inferior parietal lobule	783	control > ET
10	contralateral	putamen* , globus pallidus	675	control > ET

Supplementary Table 2. Patient versus control SMC/IPL FC$_\Delta$ effects. Significant patient (DT, ET) versus control FC$_\Delta$ effects for left (top panel) and right (bottom panel) SMC/IPL ROIs. Regional clusters are decomposed by hemisphere relative to the seed ROI, cluster size (mm^3), and direction of the effect. All clusters are significant at *P*<0.005 (*P*<0.05 FWER-corrected). Region of peak *t*-statistic is noted with an asterisk for multi-cluster combinations.

	Cluster No.	Hemisphere	Region(s)	Size (mm³)	Effect
Left GPi FCΔ					
DT versus Control					
	1	bilateral	cerebellum (IX*, vermis, VIIIa)	1,647	control > DT
	2	bilateral	precuneus	1,539	control > DT
	3	contralateral	superior frontal gyrus	1,377	control > DT
	4	ipsilateral	inferior parietal lobule	1,350	DT > control
	5	bilateral	cingulate gyrus	864	control > DT
	6	ipsilateral	insula	783	control > DT
	7	ipsilateral	inferior parietal lobule	756	control > DT
	8	contralateral	superior parietal lobule	729	control > DT
ET versus control					
	1	contralateral	lateral premotor cortex	756	control > ET
	2	ipsilateral	inferior parietal lobule	729	control > ET
Right GPi FCΔ					
DT versus Control					
	1	ipsilateral	insula*, putamen	3,510	control > DT
	2	ipsilateral	lateral premotor cortex	2,889	control > DT
	3	ipsilateral	precuneus	2,430	control > DT
	4	bilateral	cerebellum (vermis*, VIIb, VIIIa, VIIIb)	2,439	control > DT
	5	ipsilateral	middle frontal gyrus	2,295	control > DT
	6	ipsilateral	cerebellum (V*, VI, I-IV)	2,160	control > DT
	7	bilateral	cingulate gyrus	2,079	control > DT
	8	bilateral	cingulate gyrus*, supplementary motor area	1,971	control > DT
	9	bilateral	precuneus*, cuneus	1,431	control > DT
	10	ipsilateral	inferior parietal lobule	1,215	control > DT
	11	contralateral	lingual gyrus	918	control > DT
	12	bilateral	thalamus	864	control > DT
	13	ipsilateral	sensorimotor cortex*, inferior parietal lobule	864	control > DT
	14	contralateral	medial frontal gyrus	765	control > DT
ET versus control					
	1	ipsilateral	supplementary motor area	837	control > ET
	2	ipsilateral	lateral premotor cortex	783	control > ET

Supplementary Table 3. Patient versus control GPi FC$_\Delta$ effects. Significant patient (DT, ET) versus control FC$_\Delta$ effects for left (top panel) and right (bottom panel) GPi ROIs. Regional clusters are decomposed by hemisphere relative to the seed ROI, cluster size (mm³), and direction of the effect. All clusters are significant at $P<0.005$ ($P<0.05$ FWER-corrected). Region of peak t-statistic is noted with an asterisk for multi-cluster combinations.

Left VIM FCΔ					
Cluster No.		**Hemisphere**	**Region(s)**	**Size (mm3)**	**Direction**
DT versus Control					
	1	bilateral	medial* and superior frontal gyri	1,701	control > DT
	2	ipsilateral	SMC*, inferior parietal lobule	1,431	control > DT
	3	contralateral	parahippocampal gyrus*, lingual gyrus	1,242	control > DT
	4	contralateral	middle* and superior frontal gyri	945	control > DT
	5	ipsilateral	middle frontal gyrus	891	control > DT
	6	contralateral	cerebellum (VIIIa*, VIIb, VIIIb)	810	control > DT
	7	ipsilateral	putamen*, globus pallidus	702	control > DT
ET versus control					
	1	contralateral	middle frontal gyrus	729	control > ET
	2	contralateral	superior temporal gyrus	675	control > ET
Right VIM FCΔ					
Cluster No.		**Hemisphere**	**Region(s)**	**Size (mm3)**	**Direction**
DT versus Control					
	1	ipsilateral	middle* and superior frontal gyri	3,726	control > DT
	2	ipsilateral	SMC*, inferior parietal lobule	3,348	control > DT
	3	contralateral	inferior* and superior parietal lobules, precuneus	2,511	control > DT
	4	bilateral	cingulate gyrus* precuneus	2,322	control > DT
	5	ipsilateral	superior temporal gyrus*, superior marginal gyrus	2,025	control > DT
	6	ipsilateral	lingual gyrus	1,539	control > DT
	7	ipsilateral	putamen	1,188	control > DT
	8	contralateral	middle* and superior frontal gyri	1,161	control > DT
	9	ipsilateral	precuneus, superior parietal lobule	999	control > DT
	10	ipsilateral	cerebellum (VI)	729	DT > control
ET versus control					
	1	contralateral	superior temporal gyrus	2,916	control > ET
	2	ipsilateral	SMC*, inferior parietal lobule	1,539	control > ET
	3	ipsilateral	inferior* and superior parietal lobules	1,269	control > ET
	4	contralateral	superior temporal gyrus	1,242	control > ET
	5	bilateral	cingulate gyrus	1,161	control > ET
	6	bilateral	medial frontal gyrus	1,026	ET > control
	7	ipsilateral	middle* and superior frontal gyri	972	control > ET
	8	bilateral	cingulate gyrus	945	control > ET
	8	ipsilateral	middle frontal gyrus	837	ET > control
	9	ipsilateral	middle frontal gyrus	783	ET > control
	10	contralateral	middle frontal gyrus	675	control > ET

Supplementary Table 4. Patient versus control VIM FC$_\Delta$ effects. Significant patient (DT, ET)

versus control FC$_\Delta$ effects for left (top panel) and right (bottom panel) VM ROIs. Regional clusters are

decomposed by hemisphere relative to the seed ROI, cluster size (mm^3), and direction of the effect. All clusters are significant at $P<0.005$ ($P<0.05$ FWER-corrected). Region of peak t-statistic is noted with an asterisk for multi-cluster combinations.

	Cluster No.	Hemisphere	Region(s)	Size (mm3)	Effect
Left DN FCΔ					
DT versus Control					
	1	bilateral	cerebellum (I-IV*, V, VI), lingual gyrus	12,717	control > DT
	2	bilateral	cuneus*, cingulate gyrus	4,509	control > DT
	3	bilateral	cerebellum (crus II*, dentate, VIIb, VIIIa, IX, crus I, vermis)	2,943	control > DT
	4	bilateral	mesial premotor cortex	1,944	control > DT
	5	contralateral	sensorimotor cortex*, inferior parietal lobule	1,917	control > DT
	6	contralateral	inferior parietal lobule	1,620	control > DT
	7	bilateral	superior parietal lobule	1,296	control > DT
	8	ipsilateral	superior frontal gyrus	1,134	control > DT
	9	ipsilateral	middle occipital gyrus	756	control > DT
	10	ipsilateral	middle occipital gyrus	729	control > DT
	11	ipsilateral	superior temporal gyrus	729	DT > control
ET versus control					
	1	bilateral	cerebellum (VI*, I-IV, V)	2,700	control > ET
	2	bilateral	cerebellum (vermis*, VIIb, VIIIa, VIIIb, IX, crus II)	2,268	control > ET
	3	contralateral	lateral premotor cortex	756	control > ET
Right DN FCΔ					
DT versus Control					
	1	bilateral	cerebellum (I-IV*, V, VI, vermis), lingual gyrus	11,232	control > DT
	2	ipsilateral	inferior parietal lobule	4,428	control > DT
	3	ipsilateral	sensorimotor cortex*, superior parietal lobule, inferior parietal lobule	3,240	control > DT
	4	bilateral	cuneus*, cingulate gyrus	3,213	control > DT
	5	ipsilateral	middle temporal gyrus*, superior temporal gyrus	2,403	control > DT
	6	ipsilateral	cerebellum (VIIIa*, VIIb, VIIIb, IX)	1,836	control > DT
	7	bilateral	superior parietal lobule	1,269	control > DT
	8	ipsilateral	mesial premotor cortex	1,242	control > DT
	9	contralateral	insula*, lateral premotor cortex	1,188	control > DT
	10	bilateral	superior parietal lobule*, cingulate gyrus	1,188	control > DT
	11	contralateral	cerebellum (crus II*, vermis, VI)	918	control > DT
	12	contralateral	middle occipital lobule*, middle temporal lobule	918	control > DT
	13	bilateral	thalamus*	783	control > DT
ET versus control					
	1	contralateral	cerebellum (V*, I-IV)	2,457	control > ET
	2	ipsilateral	inferior parietal lobule	2,187	control > ET
	3	contralateral	lingual gyrus	1,863	control > ET
	4	ipsilateral	superior parietal lobule*, inferior parietal lobule	1,377	control > ET
	5	bilateral	cerebellum (crus II*, VI, vermis)	1,296	control > ET
	6	contralateral	middle occipital gyrus*, middle temporal gyrus	945	control > ET
	7	contralateral	middle frontal gyrus	891	ET > control
	8	ipsilateral	cuneus	783	control > ET
	9	contralateral	putamen*, insula	729	ET > control

Supplementary Table 5. Patient versus control DN FC$_\Delta$ effects. Significant patient (DT, ET) versus control FC$_\Delta$ effects for left (top panel) and right (bottom panel) DN ROIs. Regional clusters are decomposed by hemisphere relative to the seed ROI, cluster size (mm^3), and direction of the effect. All clusters are significant at *P*<0.005 (*P*<0.05 FWER-corrected). Region of peak *t*-statistic is noted with an asterisk for multi-cluster combinations.

Logistic regression	F-statistics (Wald)			P-values		
Variable	FCΔ	Force	FCΔ+Force	FCΔ	Force	FCΔ+Force
Spectral powerΔ 0-3 Hz	-	1.773	0.223	-	0.183	0.637
Spectral powerΔ 4-12 Hz	-	2.524	0.199	-	0.112	0.656
SD Peak FrequencyΔ	-	1.994	4.83	-	0.158	0.028
Left SMC/IPL FCΔ	5.124	-	4.205	0.024	-	0.04
Right SMC/IPL FCΔ	0.166	-	0.148	0.684	-	0.7
Left GPi FCΔ	1.394	-	2.103	0.238	-	0.147
Right GPi FCΔ	1.773	-	2.605	0.183	-	0.107
Left VIM FCΔ	0.514	-	1.281	0.473	-	0.258
Right VIM FCΔ	0.094	-	0.048	0.76	-	0.826
Left DN FCΔ	1.546	-	1.069	0.214	-	0.301
Right DN FCΔ	0.261	-	0.441	0.61	-	0.507
LOOCV MSE	**0.29**	**0.402**	**0.343**	**0.29**	**0.402**	**0.343**
Forward selection (best variable)	**F-statistics (Wald)**			**P-values**		
Left SMC/IPL FCΔ	8.463	-	-	0.004	-	-
LOOCV MSE	**0.189**	**-**	**-**	**0.189**	**-**	**-**

Supplementary Table 6. Logistic regression model with leave-one-out cross-validation approach. F-statistics of the binary logistic regression model and associated p-values for individual predictors of patient group (dystonic tremor, essential tremor) shown for force variables (spectral power$_\Delta$ 0-3 Hz and 4-12 Hz, standard deviation of peak force frequency$_\Delta$), FC$_\Delta$ variables (average z-scores in the high minus low feedback task for all eight seed regions-of-interest), and combined force and FC$_\Delta$ variables. Forward selection determined that functional connectivity z-scores for the left SMC/IPL seed was the best individual predictor of patient cohort. The mean square error (MSE) values for leave-one-out cross-validation (LOOCV) of the logistic regression and forward selection are shown.