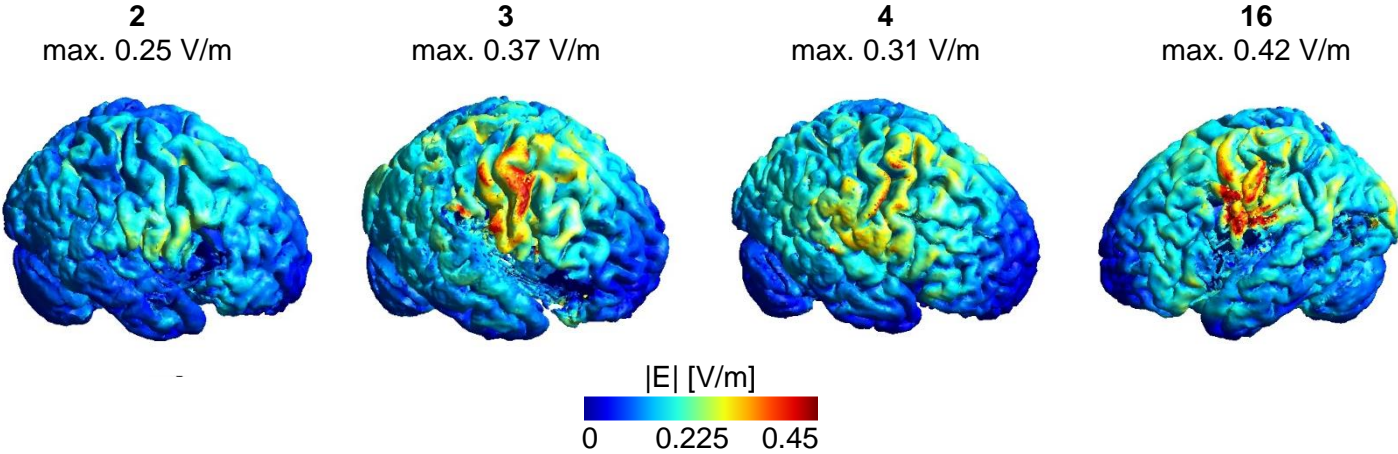
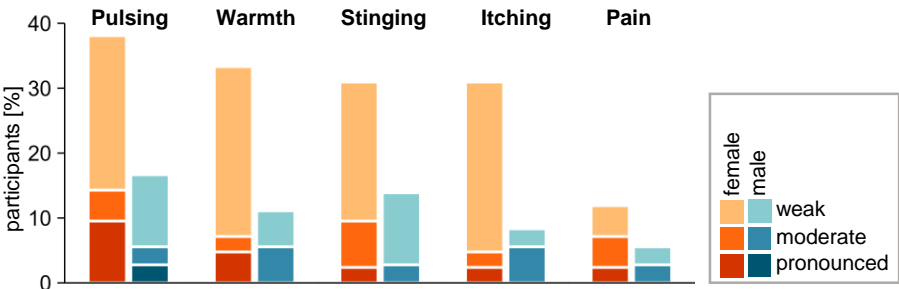


Supplementary Material



Supplementary Figure 1: Electric fields of tACS vary in strength and focality. Electric fields were simulated in SimNIBS for the four participants who received active (TGP) tACS and a head MRI. The participant ID and maximal electric field strength (99th percentile) are given. The lesioned (and thus stimulated) hemisphere is shown.



Supplementary Figure 2: Skin sensations are more frequent among young female than young male participants.

Participant ID	Age	Sex	Lesion side	TAS [months]	Lesion location	Imaging	EHI	mRS	NIHSS	UEFM	ARAT	Grip Strength	Pinch Strength	NHPT [pegs/s]	BBT [blocks/min]
1	72	M	R	101	MI, CS	none	100	1	0	59	56	0.47	0.68	0.23	45
2	59	M	R	102	MI	study MRI	100	1	0	63	57	0.85	0.67	0.39	47
3	70	M	R	13	MI	study MRI	100	0	0	51	57	1.00	0.83	0.30	52
4	46	M	R	6	MI, CR	study MRI	80	0	0	63	57	0.80	0.87	0.38	60
5	70	M	R	14	MI	study MRI ¹	100	1	1	64	57	1.04	0.98	0.43	56
6	72	F	R	15	CR, PRE	study MRI ¹	100	1	0	58	57	0.80	1.02	0.39	59
7	40	M	L	6	BG, PLIC	study MRI	100	1	1	53	57	0.78	0.65	0.28	49
8	67	M	L	49	MI	none	100	1	0	61	57	1.11	1.08	0.32	53
9	61	M	L	18	MI, PI	clinical CT	40	1	2	61	57	1.46	1.00	0.30	49
10	71	M	L	106	MI, BG	clinical MRI	100	1	2	58	57	0.95	1.09	0.28	48
11	63	M	L	118	MO	clinical MRI	100	0	0	64	57	1.03	1.47	0.50	62
12	78	M	L	30	Pons	clinical MRI	100	1	0	59	57	0.91	0.80	0.38	46
13	83	M	L	93	Pons	study MRI	100	2	2	53	57	1.04	1.04	0.29	59
14	79	M	R	12	PLIC	none	100	2	0	56	57	0.83	0.85	0.30	57
15	64	F	L	22	BG, PLIC	clinical MRI	100	3	5	38	55	0.67	0.85	0.26	38
16	53	M	L	102	MI	study MRI ¹	-60	1	2	64	57	1.03	0.96	0.41	60
17	58	M	L	16	MI	study MRI	80	2	2	61	57	0.89	0.89	0.35	48
18	54	M	R	12	MI	clinical MRI	64	1	3	63	57	0.87	0.83	0.56	75
19	69	M	L	20	PRE,POST	study MRI	100	0	0	62	57	1.08	1.31	0.50	72
20	75	F	L	28	MI, IC, FO	clinical CT	80	2	2	55	57	0.67	1.87	0.29	49
median 	68	3 F	8 R	21			100	1	0.5	60	57	0.90	0.93	0.33	52.5
count		17 M	12 L												

Supplementary Table 1: Clinical and demographic data of stroke survivors.

Abbreviations: TAS = time after stroke. Lesion location: L = left, R = right, BG = basal ganglia, CS = centrum semiovale, CR = corona radiata, FO = frontal operculum, IC = insular cortex, MI = middle cerebral artery infarct, MO = medulla oblongata, PI = posterior cerebral artery infarct, PLIC = posterior limb of the internal capsule, PRE = precentral gyrus; POST = postcentral gyrus; sex: F = female, M = male; clinical tests: EHI = Edinburgh Handedness Inventory, mRS = modified Rankin Scale, NIHSS = National Institutes of Health Stroke Scale, UEFM = Upper Extremity Fugl-Meyer Assessment, ARAT = Action Research Arm Test, NHPT = Nine Hole Peg Test, BBT = Box and Block Test. Grip strength values are presented as ratios between the affected and unaffected arm. ¹MRI data from a previous study in our lab.

		Sperman's correlation		Kendall correlation	
		rho	p	tau	p
Young cohort	Over-all score	0.16	0.16	0.12	0.16
	Itching	0.09	0.45	0.07	0.44
	Pulsing	0.20	0.09	0.16	0.08
	Stinging	0.05	0.65	0.04	0.68
	Warmth	0.09	0.43	0.07	0.42
	Pain	0.12	0.30	0.10	0.28
Stroke cohort	Over-all score	0.14	0.54	0.10	0.56
	Itching	0.15	0.54	0.13	0.51
	Pulsing	0.11	0.65	0.08	0.66
	Stinging	-0.22	0.35	-0.18	0.34
	Warmth	-0.09	0.72	-0.07	0.71
	Pain	0.17	0.46	0.15	0.45

Supplementary Table 2: The intensity of reported skin sensations is not significantly associated with behavior. Young cohort: Correlation coefficients of sensation intensities and *peak acceleration improvement*, as tACS significantly modulated *peak acceleration*. Stroke cohort: Correlation coefficients of sensation intensities and *motor skill acquisition*, as *motor skill acquisition* was significantly modulated by tACS. All p-values are uncorrected.

	Sperman's correlation		Kendall correlation	
	rho	p	tau	p
Age	0.05	0.84	0.10	0.56
Time after Stroke	-0.14	0.57	-0.09	0.54
mRS	0.17	0.47	0.15	0.41
NIHSS	0.07	0.77	0.06	0.75
UEFM	-0.04	0.87	0	1
Nine Hole Peg Test	0.03	0.89	0.01	0.95
Box and Block Test	0.08	0.72	0.04	0.79
Hand grip strength ratio	-0.05	0.84	-0.04	0.82
Key pinch strength ratio	0.07	0.77	0.04	0.82

Supplementary Table 3: Clinical characteristics do not significantly correlate with motor skill acquisition. Correlation coefficients and uncorrected p-values.

Young cohort - movement duration LME		
Fixed effect	Estimate	Standard error
Intercept	219.131	28.474
Condition: TGT	13.838	13.589
Sham	-2.679	13.483
Block	-11.897	1.329
Baseline	0.568	0.036

Young cohort - peak acceleration LME		
Fixed effect	Estimate	Standard error
Intercept	6.677	1.707
Condition TGT	-0.449	0.817
Sham	-2.668	0.831
Block	0.342	0.107
Baseline	0.872	0.054

Supplementary Table 4: Estimates and standard error for fixed effects of LMEs in the young cohort. Left: *movement duration* LME. Right: *peak acceleration* LME. Reference condition = TGP.

Stroke cohort - movement duration LME		
Fixed effect	Estimate	Standard error
Intercept	53.201	73.919
Sham condition	-12.086	38.573
Block	-8.425	4.265
Baseline	0.883	0.062
Sham condition x block	-26.459	6.028

Stroke cohort - peak acceleration LME		
Fixed effect	Estimate	Standard error
Intercept	7.799	1.874
Sham condition	-0.161	0.795
Block	0.131	0.227
Baseline	0.758	0.070

Supplementary Table 5: Estimates and standard error for fixed effects of LMEs in the stroke cohort. Left: *movement duration* LME. Right: *peak acceleration* LME. Reference condition = TGP.

Mistakes	Total	TGP	TGT	Sham	One-way ANOVA
Baseline	3.3 % [0 - 15 %]	3.9 % [0 - 15 %]	2.9 % [0 - 15 %]	3.1 % [0 - 15 %]	F(2,75) = 0.41, p = 0.66
Blocks	5.6 % [0.4 - 18.8 %]	4.8 % [0.4 - 13.3 %]	5.9 % [0.4 - 18.8 %]	6.0 % [0.4 - 18.3 %]	F(2,75) = 0.46, p = 0.63

Outliers	Total	TGP	TGT	Sham	One-way ANOVA
Baseline	1.0 % [0 - 5 %]	0.4 % [0 - 5 %]	1.5 % [0 - 5 %]	1.0 % [0 - 5 %]	F(2,75) = 2.27, p = 0.11
Blocks	1.4 % [0 - 4.2 %]	1.5 % [0.4 - 2.9 %]	1.1 % [0 - 2.5 %]	1.5 % 2.0 [0.4 - 4.2 %]	F(2,75) = 2.4, p = 0.10

Supplementary Table 6: Percentage of mistake trials (top) and outliers (below) in the young cohort. Comparisons among conditions with one-way ANOVAs rendered no significant differences. Displayed are the means [range].

Mistakes	Total	TGP	Sham	Comparison
Baseline	13.8 % [0 - 80 %]	15.5 % [0 - 80 %]	12.0 % [0 - 25 %]	Wilcoxon rank sum test: z = -0.31, p = 0.76
Blocks	5.3 % [0.8 - 13.3 %]	6.9 %, [1.3 - 13.3 %]	3.7 % [0.8 - 7.5 %]	unpaired t-test: t(18) = 2.4, p = 0.03

Outliers	Total	TGP	Sham	Comparison
Baseline	1.3 % [0 - 5 %]	1.0 % [0 - 5 %]	1.5 % [0 - 5 %]	Wilcoxon rank sum test: z = -0.45, p = 0.65
Blocks	1.3% [0.4 - 2.9 %]	1.4 % 2.0 [0.8 - 2.9 %]	1.1 % [0.4 - 2.1 %]	Wilcoxon rank sum test: z = 0.97, p = 0.33

Supplementary Table 7: Percentage of mistake trials (top) and outliers (below) in the young cohort. Mean [range]. The comparisons between groups indicate that stroke survivors made significantly more mistakes when receiving TGP tACS compared to sham.