

Supplementary

Table S1. Channel-to-ROI mapping (ordered by ROI): MNI coordinates, AAL anatomical labels, Brodmann areas, and region of interest assignments for all 44 fNIRS channels.

Channel	x	y	z	AAL	BA	ROI	n
CH38	38	-20	72	Parietal_Inf_R	BA40	Right IPL	1
CH41	48	-14	63	Parietal_Inf_R	BA40	Right IPL	1
CH40	41	-32	70	Parietal_Inf_R	BA39/40	Right IPL	1
CH43	54	-24	61	Parietal_Inf_R	BA40	Right IPL	1
CH01	10	60	39	Frontal_Sup_R	BA9/10	Right SFGdor	2
CH03	17	65	30	Frontal_Sup_R	BA10	Right SFGdor	2
CH06	14	69	25	Frontal_Sup_R	BA10	Right SFGdor	2
CH44	56	-3	53	Postcentral_R	BA6	Right PoCG	3
CH39	39	3	64	Postcentral_R	BA6	Right PoCG	3
CH42	45	15	57	Postcentral_R	BA6	Right PoCG	3
CH14	-55	-27	57	Parietal_Inf_L	BA40	Left IPL	4
CH15	-58	-49	51	Parietal_Inf_L	BA40	Left IPL	4
CH18	-61	-21	49	Parietal_Inf_L	BA40	Left IPL	4
CH19	-63	-45	45	Parietal_Inf_L	BA39/40	Left IPL	4
CH02	-10	59	40	Frontal_Sup_L	BA9/10	Left SFGdor	5
CH04	1	61	32	Frontal_Sup_L	BA10	Left SFGdor	5
CH05	-15	62	33	Frontal_Sup_L	BA10	Left SFGdor	5
CH07	-11	67	26	Frontal_Sup_L	BA10	Left SFGdor	5
CH08	-25	65	21	Frontal_Sup_L	BA10	Left SFGdor	5
CH25	-56	28	23	Frontal_Inf_Tri_L	BA44/45	Left IFG	6
CH29	-49	44	16	Frontal_Inf_Tri_L	BA46	Left IFG	6
CH34	-56	34	0	Frontal_Inf_Tri_L	BA47	Left IFG	6
CH12	-45	20	52	Frontal_Mid_L	BA8	Left MFG	7
CH16	-44	29	43	Frontal_Mid_L	BA8	Left MFG	7
CH20	-40	42	35	Frontal_Mid_L	BA9	Left MFG	7
CH30	-60	14	7	Temporal_Mid_L	BA22	Left MTG	8
CH31	-69	-20	9	Temporal_Mid_L	BA22	Left MTG	8
CH32	-68	-50	2	Temporal_Mid_L	BA21	Left MTG	8
CH33	-60	-68	-5	Temporal_Mid_L	BA21	Left MTG	8
CH35	-67	-6	-10	Temporal_Mid_L	BA21/22	Left MTG	8
CH36	-70	-38	-9	Temporal_Mid_L	BA21	Left MTG	8
CH37	-63	-61	-12	Temporal_Mid_L	BA21	Left MTG	8
CH24	-62	-61	24	SupraMarginal_L	BA39	Left SMG	9
CH22	-65	-13	37	SupraMarginal_L	BA40	Left SMG	9
CH23	-67	-41	34	SupraMarginal_L	BA40	Left SMG	9
CH27	-69	-35	21	SupraMarginal_L	BA40	Left SMG	9
CH28	-66	-57	11	SupraMarginal_L	BA39	Left SMG	9
CH10	-46	-15	63	Postcentral_L	BA3	Left PoCG	10
CH11	-49	-30	65	Postcentral_L	BA3	Left PoCG	10
CH17	-56	4	45	Postcentral_L	BA6	Left PoCG	10

Channel	x	y	z	AAL	BA	ROI	n
CH21	-58	14	29	Postcentral_L	BA6	Left PoCG	10
CH26	-66	-3	22	Postcentral_L	BA6	Left PoCG	10
CH09	-41	12	59	Postcentral_L	BA6	Left PoCG	10
CH13	-51	-5	56	Postcentral_L	BA6	Left PoCG	10

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Table S2: fNIRS preprocessing pipeline and data quality metrics.

Step	Parameter	Value	Reference
Channel quality screening	SNR threshold (hmrR_PruneChannels)	SNRthresh = 2; channels with SNR < 2 flagged and excluded	Homer3 (Huppert et al., 2009)
Motion artifact detection	hmrR_MotionArtifactByChannel	tMotion = 0.5 s, tMask = 1.0 s, STDEVthresh = 50, AMPthresh = 5	Homer3 defaults; consistent with prior overt-speech fNIRS studies
Motion correction — Step 1	Cubic spline interpolation	Applied to artifact-flagged segments; replaces contaminated time points with smooth interpolated curve	Scholkmann et al., <i>Physiol Meas</i> , 2010
Motion correction — Step 2	Correlation-Based Signal Improvement (CBSI)	Corrects segments where HbO–HbR correlation is positive (indicative of motion contamination)	Cui et al., <i>NeuroImage</i> , 2010
Temporal filtering	Bandpass filter (4th-order Butterworth)	0.01–0.1 Hz; removes cardiac (~1 Hz), respiratory Standard fNIRS (~0.3 Hz), and Mayer wave practice (~0.1 Hz) noise	
Baseline correction	Pre-reading resting period	30-s window immediately preceding each reading trial	—