Supplementary Material

Supplementary Materials and Methods

Table S1. Psycholinguistic measures for the four word categories (means; SD in parentheses).

	low sound	high sound	p	low action	high action	p
Sound rating	1.33 (0.29)	4.92 (0.62)	**$<10^{-113}$**	2.92 (1.67)	3.34 (2.03)	0.12
Action rating	3.19 (1.64)	3.4 (1.64)	0.37	1.73 (0.49)	4.86 (0.45)	**$<10^{-103}$**
Visual rating	4.21 (0.54)	4.07 (0.81)	0.15	4.16 (0.82)	4.13 (0.52)	0.77
Familiarity rating	5.52 (0.39)	5.47 (0.41)	0.41	5.45 (0.42)	5.55 (0.37)	0.08
Letters	6.23 (1.61)	6.36 (2.0)	0.61	6.27 (1.98)	6.32 (1.63)	0.84
Syllables	2.21 (0.77)	2.29 (0.71)	0.44	2.22 (0.71)	2.28 (0.76)	0.56
Lemma freq.	5.33 (6.33)	5.56 (10.35)	0.85	4.74 (6.34)	6.14 (10.3)	0.26
Bigram freq.	254220.81 (136859.15)	231922.15 (122883.01)	0.24	254413.24 (139511.49)	231729.73 (119826.78)	0.23
Trigram freq.	145830.18 (85313.42)	132754.69 (76696.95)	0.27	146068.82 (84690.3)	132516.05 (77342.95)	0.25
Orthographic neighbors	7.41 (6.7)	6.09 (5.86)	0.15	7.05 (6.83)	6.44 (5.77)	0.5

Ratings were obtained from a total of 163 subjects who did not participate in the fMRI experiment. All other psycholinguistic measures were extracted from the *dlexDB* database (Heister et al., 2011; http://dlexdb.de/). Lemma, bigram and trigram frequencies and number of orthographic neighbors are given per one million words.

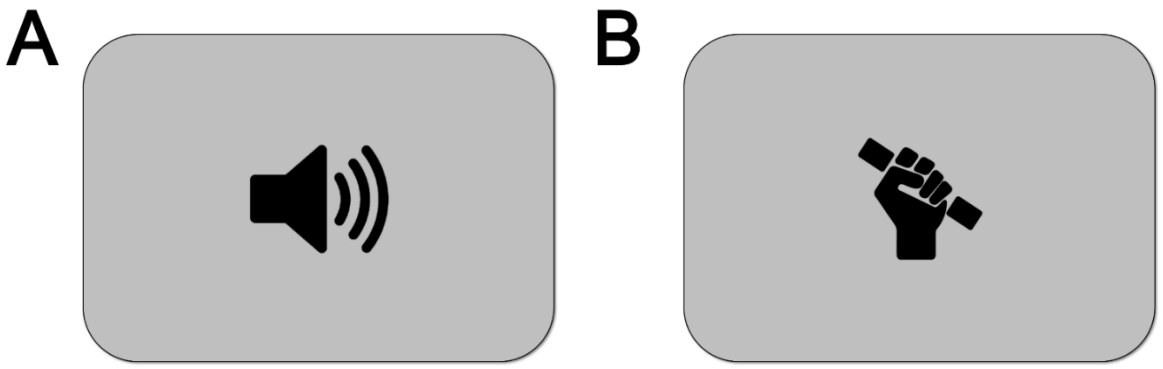

Figure S1. Cues presented at the beginning of mini-blocks for the sound judgment task (A) or action judgment task (B).

Supplementary Results

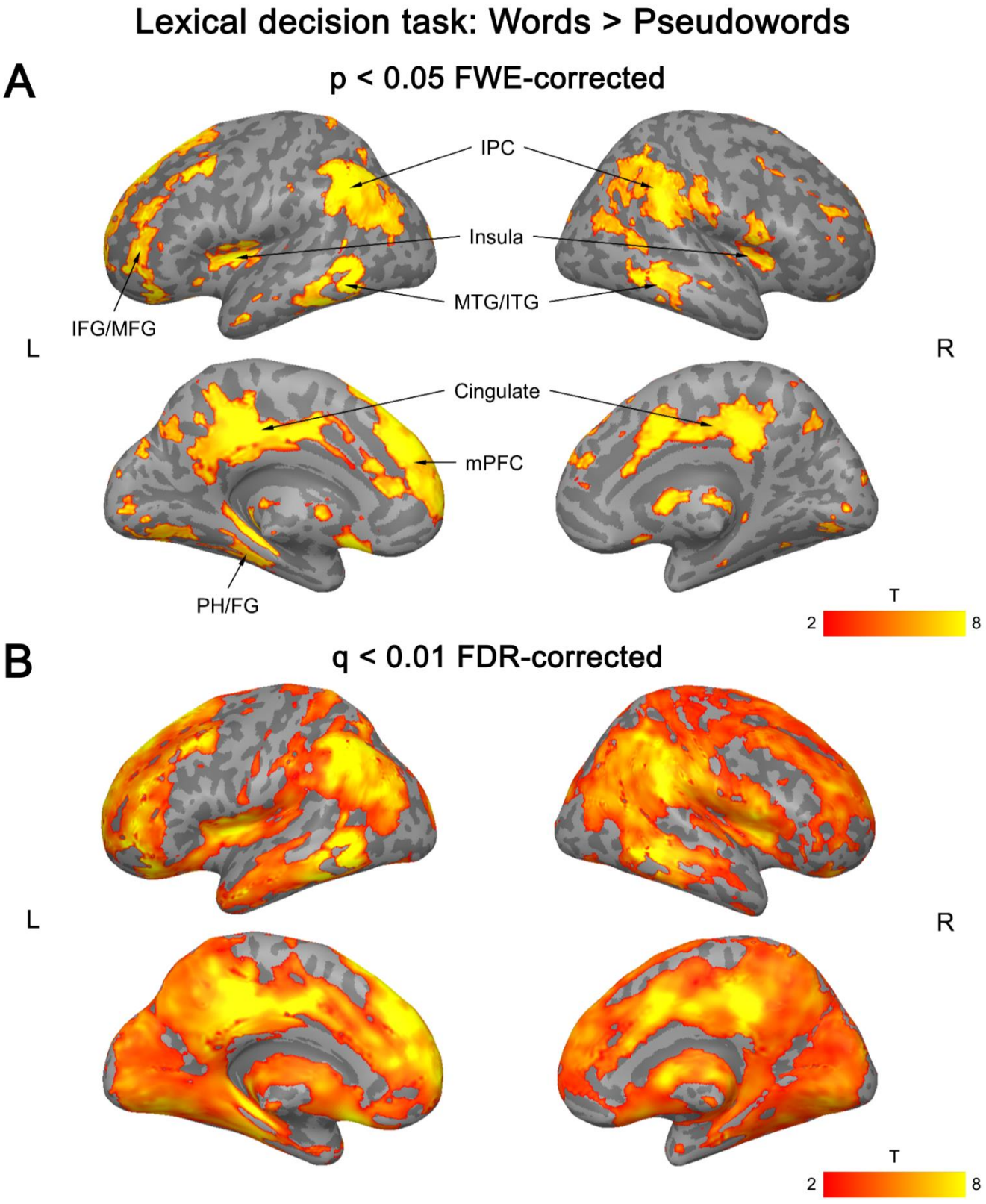

Figure S2. The "general" conceptual system (cf. Binder et al., 2009). Activation for words > pseudowords in the lexical decision task, at two different thresholds: (A) voxel-wise $p < 0.05$ family wise error (FWE) corrected; (B) voxel-wise $q < 0.01$ false discovery rate (FDR) corrected. FG = fusiform gyrus; IFG = inferior frontal gyrus; IPC = inferior parietal cortex; ITG = inferior temporal gyrus; MFG = middle frontal gyrus; MTG = middle temporal gyrus; mPFC = medial prefrontal cortex; PH = parahippocampal gyrus.

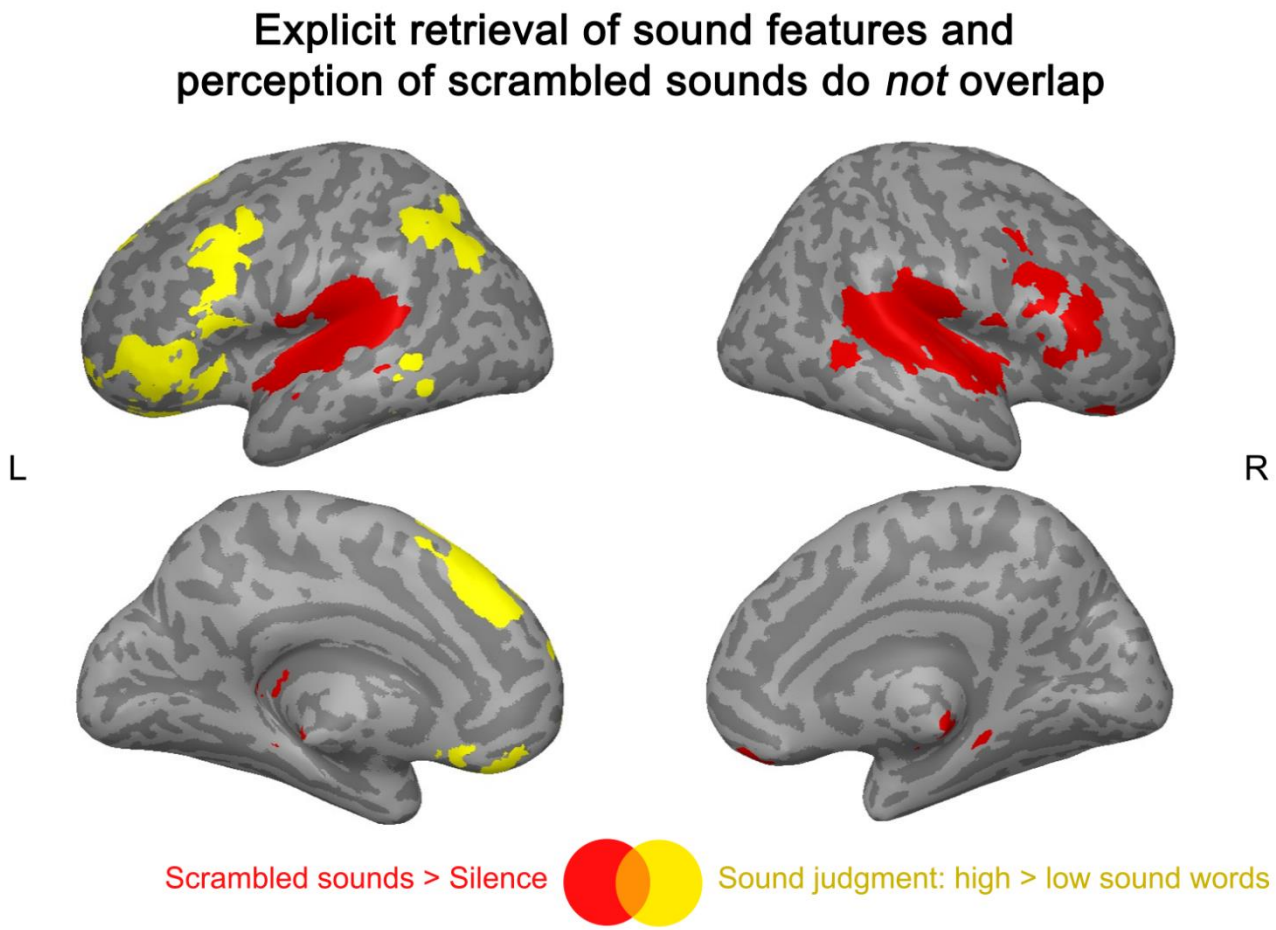

Figure S3. Activation for the explicit retrieval of sound features (yellow) does *not* overlap with activation for listening to scrambled sounds (red).

Activation Tables

The following tables show activations thresholded at q < 0.05 FDR-corrected (extent > 20 voxels). Up to 10 peaks per cluster are reported with T > 3.31 (p < 0.001 uncorrected) and more than 8 mm apart. Coordinates are in MNI space. Anatomical labels were determined using the SPM Anatomy toolbox (Version 2.2c; Eickhoff et al., 2005), the Harvard-Oxford atlas distributed with FSL (http://www.fmrib.ox.ac.uk/fsl/), and the human motor area template (http://lrnlab.org/; Mayka et al., 2006).

AG = angular gyrus; ACC = anterior cingulate cortex; MCC = middle cingulate cortex; PCC = posterior cingulate cortex; FG = fusiform gyrus; IFG = inferior frontal gyrus; IPL = inferior parietal lobule; IPS = inferior parietal sulcus; ITG = inferior temporal gyrus; LTO = lateral temporal-occipital junction; MTG = middle temporal gyrus; MFG = middle frontal gyrus; PFC = prefrontal cortex; dmPFC = dorsomedial PFC; vmPFC = ventromedial PFC; PMC = premotor cortex; PMd = dorsal PMC; PMv = ventral PMC; S1 = primary somatosensory cortex; S2 = secondary somatosensory cortex; SFG = superior frontal gyrus; SMA = supplementary motor area; SMG = supramarginal gyrus; SPL = superior parietal lobe; STG = superior temporal gyrus; a (prefix) = anterior; p (prefix) = posterior.

Table S2. Motor localizer: Hand movements > Rest.

Region	Cluster size (mm^3)	x	y	z	T
L/R M1, PMC, S1/S2, aSMG/IPS	234 719				
L M1 (4p)		-34	-24	55	21.53
R M1 (4p)		36	-22	55	19.87
L M1		-37	-17	65	19.53
L M1 (4p)		-32	-32	55	17.11
L SMA		-7	-7	52	15.99
L S1		-50	-20	55	15.31
R S1		50	-20	58	13.88
L S2 (OP1)		-44	-27	20	11.63
L parietal operculum		-47	-34	22	11.53
L thalamus (prefrontal)		-14	-20	8	11.19
L/R cerebellum	98 438				
L cerebellum (VI)		-20	-50	-22	18.53
R cerebellum (VI)		20	-50	-22	17.30
R cerebellum (VI)		26	-47	-28	16.82
R cerebellum (V)		6	-60	-12	16.00
R cerebellum (VIIIb)		16	-60	-52	14.84
L cerebellum (VIIIb)		-20	-57	-50	13.17
L cerebellum (V)		-4	-62	-18	12.16
R cerebellum (VIIIa)		8	-64	-32	11.99
L cerebellum (VIIIa)		-7	-64	-35	8.19
R frontal pole / MFG	6141				
R MFG		38	40	20	4.63
R frontal pole		33	46	-2	4.52
R frontal pole		26	43	-8	3.87
R frontal pole		23	46	-10	3.58
L pMTG/LTO	2500	-47	-62	8	7.23

L MFG	1469	-32	36	30	4.04
L MFG		-30	33	25	4.00
R pMTG/LTO	547	48	-60	5	4.07
R inferior occipital gyrus (V3v)	469	28	-94	-5	3.58
L superior orbital gyrus (Fo3)	453	-17	43	-15	3.81

Table S3. Auditory localizer.

Region	**Cluster size (mm^3)**	**x**	**y**	**z**	**T**
Real sounds > Silence					
L/R early auditory cortices, IFG	302 906				
L A1 (TE 1.0)		-50	-20	5	25.59
R A1 (TE 1.0)		56	-20	5	24.39
R STG (TE 3)		63	-30	10	21.39
R A1 (TE 1.0)		50	-10	0	19.68
R A1 (TE 1.1)		43	-22	8	19.68
R A1 (TE 1.2)		53	-2	-5	18.83
L STG (TE 3)		-67	-24	12	16.73
R STG (TE 3)		60	-10	-5	16.55
L A1 (TE 1.2)		-47	-10	-5	16.25
L STG		-54	-30	8	15.93
L/R dmPFC	5188				
R dmPFC (SFG)		6	6	62	5.67
L dmPFC (SFG)		-2	16	52	5.29
L dmPFC (SFG)		-2	28	48	4.54
L/R brainstem	1969				
R brainstem		6	-32	-38	4.88
R brainstem		18	-34	-38	3.98
L brainstem		-7	-34	-38	3.89
L IPS (hIP3)	1047	-30	-57	40	4.22
L IPS (hIP3)		-32	-64	48	3.64
L MCC	734	-2	3	25	4.95
Scrambled sounds > Silence					
R early auditory cortex	44 922				
R A1 (TE 1.1)		43	-22	10	24.32
R A1 (TE 1.0)		53	-20	5	22.67
R STG (TE 3)		63	-22	10	16.85
R STG/SMG (PF)		66	-30	12	16.67
R STG/SMG (PFcm)		46	-34	12	15.36
L early auditory cortex	31 531				
L A1 (TE 1.0)		-47	-22	8	23.73
L A1 (TE 1.1)		-40	-27	10	22.71
L STG		-47	-10	-5	13.26
L STG (TE 3)		-67	-27	12	10.32
L cerebellum	17 188				
L cerebellum (VII)		-12	-74	-40	7.86
L cerebellum (VIIb)		-24	-67	-50	6.42

L cerebellum (crus 1)		-10	-77	-30	5.65
L cerebellum (VIIb)		-32	-72	-55	4.99
L cerebellum (VI)		-22	-70	-28	4.73
L cerebellum (crus 1)		-34	-70	-28	4.31
R IFG	15 125				
R aIFG (pars triangularis)		46	36	2	5.84
R aIFG (pars triangularis)		50	33	20	5.28
R aIFG (pars triangularis)		43	26	18	5.11
R aIFG (pars triangularis)		53	26	22	4.94
R pIFG (pars opercularis)		40	8	30	4.19
L/R brainstem	5250				
R brainstem		16	-24	-10	5.85
R brainstem		3	-34	-8	5.63
L brainstem		-4	-32	-10	5.45
R cerebellum	2906				
R cerebellum (crus 2)		10	-80	-35	4.88
R cerebellum (crus 1)		16	-77	-25	4.29
R vmPFC	2703				
R vmPFC (Fo3)		28	33	-12	4.78
R vmPFC (Fp2)		8	53	-18	3.76
R brainstem	844	13	-37	-40	4.61
L brainstem	609	-10	-34	-40	4.54

Table S4. Action judgment task: high > low action words.

Region	**Cluster size (mm^3)**	**x**	**y**	**z**	**T**
L posterior temporal and inferior parietal cortices	63891				
L IPS (hIP2)		-47	-44	48	8.21
L SMG (PFm)		-44	-54	52	6.97
L pITG		-57	-42	-18	6.90
L SMG (PF)		-57	-37	45	6.51
L pMTG/LTO		-57	-54	2	6.08
L SPL (7A)		-37	-60	55	5.98
L pMTG/LTO		-64	-47	-2	5.65
L SMG (PF)		-60	-42	32	5.00
L IPS (hIP3)		-30	-64	42	4.63
L pITG		-62	-30	-20	4.52
R cerebellum	24078				
R cerebellum (crus II)		30	-77	-45	4.53
R cerebellum (crus I)		40	-62	-40	4.52
R cerebellum (crus II)		38	-70	-42	4.47
R cerebellum (lobule VI)		28	-60	-22	4.43
R cerebellum (lobule VI)		26	-70	-28	4.31
R cerebellum (lobule VIIb)		16	-72	-45	4.23
R cerebellum (crus I)		16	-80	-30	4.00
R cerebellum (crus I)		43	-60	-28	3.46
L anterior inferior frontal cortex, vmPFC	20203				
L caudate nucleus		-10	13	0	6.23
L aIFG (pars orbitalis)		-17	26	-20	6.09

L vmPFC (middle orbital gyrus)		-44	50	-2	5.56
L aIFG (pars orbitalis)		-44	43	-15	5.44
L aIFG (pars triangularis)		-47	46	8	4.37
L vmPFC (Fp1)		-17	63	-8	4.13
L vmPFC (Fp1)		-10	63	-15	4.08
L MFG		-44	46	18	4.02
L vmPFC (Fp1)		-10	66	5	3.67
L vmPFC (Fp1)		-30	60	-5	3.51
L dmPFC, SMA, ACC	17672				
L dmPFC (SFG)		-14	6	62	4.49
L dmPFC (SFG)		-4	33	32	4.30
L dmPFC (SFG)		-17	48	40	4.09
L ACC		-7	38	22	4.04
L dmPFC (SFG)		-20	13	65	4.00
L dmPFC (SFG)		-4	30	42	3.89
L ACC		-4	43	10	3.82
L dmPFC (SFG)		-17	33	55	3.81
L SMA		0	0	62	3.70
L dmPFC (SFG)		-12	3	75	3.65
L cingulate cortex	11719				
L PCC		-2	-32	32	5.34
L ACC		-4	-2	30	4.50
L premotor, somatosensory and inferior frontal cortex	11328				
L PMv		-47	3	22	4.48
L pIFG (pars opercularis)		-50	10	8	4.23
L insula		-34	18	-5	3.51
L insula		-30	16	5	3.51
L PMd		-50	6	45	3.44
L PMv		-50	6	35	3.32
L aIFG (pars triangularis)		-60	18	8	3.32
R inferior occipital cortex	5703				
R inferior occipital gyrus		23	-92	-5	3.72
R calcarine gyrus		16	-82	15	3.61
R posterior middle and inferior temporal gyri	5453				
R pMTG/LTO		66	-50	-5	4.12
R pMTG/LTO		48	-57	2	3.80
R pITG		63	-47	-12	3.56
R pITG		60	-57	-10	3.34
R SMG (PF)	4891	53	-37	52	4.36
L middle occipital gyrus	3844	-30	-90	-2	5.13
R basal ganglia	2297				
R pallidum		10	0	-5	5.53
R caudate nucleus		10	13	2	3.59
L cerebellum	2078				
L cerebellum (lobule VIII)		-12	-67	-50	3.50
L cerebellum (lobule VIIb)		-20	-77	-52	3.41
R premotor and somatosensory cortices	1125				

R PMv		63	6	22	3.52
R S1		66	-10	30	3.42
L thalamus	891	-10	-27	-10	3.96
L basal forebrain (Ch 4)	563	-12	-2	-12	3.74
R cerebellar vermis	453	6	-37	-20	3.54
R cerebellum (lobule VI)	453	33	-37	-32	3.44

Table S5. Conjunction: [Action judgment task: high > low action words] ∩ [Motor localizer: Hand movements > Rest].

Region	**Cluster size (mm^3)**	**x**	**y**	**z**	**T**
L aSMG/IPS (extending into SPL), somatosensory cortex	11234				
L S2		-42	-42	50	5.73
L SPL (7PC)		-42	-44	55	5.65
L S2		-44	-40	48	5.42
L S2		-50	-40	58	5.22
L SMG (PFt)		-54	-32	45	4.96
L SMG (PF)		-57	-37	32	4.52
L SPL (7PC)		-34	-52	62	4.10
L SMG (PFop)		-50	-22	25	3.42
L PMC	6984				
L PMv		-47	3	20	4.39
L PMv		-50	10	8	4.23
L PMd		-50	3	45	3.40
L PMv		-50	6	35	3.32
R cerebellum	3922				
R cerebellum (lobule VI)		28	-60	-22	4.43
R cerebellum (lobule VI)		26	-67	-25	4.26
R cerebellum (crus I)		40	-60	-28	3.45
R cerebellum (crus I)		46	-57	-30	3.36
R aSMG/IPS, somatosensory cortex	2922				
R S1		50	-34	52	4.14
R S2		50	-37	58	3.94
R S2		40	-34	38	3.34
L/R (pre-)SMA	2719				
L SMA		0	0	62	3.70
L pre-SMA		-10	3	72	3.63
R SMA		3	0	70	3.48
L cerebellum (lobule VI)	2469	-20	-62	-15	3.84
L cerebellum (lobule VI)		-34	-64	-22	3.55
L cerebellum (lobule VI)		-27	-62	-22	3.43
R cerebellum (lobule VIIb)	2172	16	-72	-45	4.23
L pMTG/LTO	1984	-52	-62	5	5.52
L cerebellum (lobule VIIIa)	1406	-12	-67	-50	3.50
L MCC	922	-4	3	32	3.91
L thalamus	844	-10	-27	-10	3.96
R cerebellum (lobule VI)	453	33	-37	-32	3.44
R PMv	438	63	6	22	3.52
R inferior occipital gyrus (V3v)	438	28	-92	-5	3.44
R pMTG/LTO	391	46	-57	5	3.69
L insula	391	-30	16	5	3.51

Table S6. Sound judgment task: high > low sound words.

Region	Cluster size (mm^3)	x	y	z	T
L aIFG, MFG / precentral sulcus, vmPFC	28281				
L frontal pole		-47	46	-12	6.07
L vmPFC (Fo2)		-12	18	-18	5.57
L vmPFC (Fo3)		-20	33	-20	5.12
L MFG		-44	16	40	5.1
L aIFG (pars orbitalis)		-37	36	-18	5.07
L insula		-30	23	-10	4.87
L MFG		-40	10	48	4.69
L aIFG (pars triangularis)		-44	48	5	4.65
L aIFG (pars orbitalis)		-50	23	-10	4.3
L aIFG (pars triangularis)		-50	26	18	4.21
L posterior IPL (AG, pSMG, pIPS)	11547				
L AG (PGa)		-44	-62	50	6.14
L AG (PGa)		-37	-72	48	5.08
L IPS (hIP2)		-47	-44	50	4.87
L AG (PGp)		-50	-70	38	4.14
L dmPFC	11094				
L dmPFC (SFG)		-7	33	38	6.93
L dmPFC (SFG)		-4	30	48	5.7
L dmPFC (SFG)		-12	46	38	4.87
L dmPFC (SFG)		-10	28	58	4.39
L pMTG	1766	-57	-42	-12	4.83
R cerebellum (crus I)	1594	38	-77	-42	3.87
L SFG	594	-12	63	22	3.69

Table S7. Conjunction: [Sound judgment task: high > low sound words] ∩ [Auditory localizer: Real sounds > Silence].

Region	Cluster size (mm^3)	x	y	z	T
L aIFG, insula	6266				
L aIFG (pars triangularis)		-47	43	0	4.73
L aIFG (pars orbitalis)		-40	36	-18	4.60
L insula		-30	23	-5	4.19
L aIFG (pars orbitalis)		-50	20	-10	4.03
L aIFG, MFG / precentral sulcus	5391				
L aIFG (pars orbitalis)		-47	18	32	4.65
L aIFG (pars triangularis)		-50	26	18	4.21
L precentral sulcus		-37	3	38	3.34
L vmPFC	2156				
L vmPFC (Fo1)		-14	33	-20	4.09
L vmPFC (Fo1)		-7	50	-20	4.00
L vmPFC (Fo1)		-14	43	-18	3.55
L vmPFC (Fo1)		-10	33	-22	3.52
L vmPFC (Fo2)		-7	23	-20	3.48
L dmPFC (SFG)	1453	-2	28	48	4.54
L IPS (hIP3)	1047	-30	-57	40	4.22

L IPS (hIP3)		-32	-64	48	3.64
R cerebellum	516				
R cerebellum (crus I)		36	-70	-42	3.60
R cerebellum (crus II)		28	-74	-45	3.35
L pMTG	438	-62	-44	-12	3.93
L pMTG		-57	-47	-12	3.79

Table S8. Interaction: Action judgment task > Sound judgment task for high > low action words (inclusively masked with [Action judgment task: high > low action words]).

Region	**Cluster size (mm^3)**	**x**	**y**	**z**	**T**
L PMv, pIFG, insula	6172				
L pIFG (pars opercularis)		-40	8	25	5.90
L PMv		-37	3	35	5.25
L insula		-34	20	-5	5.07
L insula		-30	18	2	4.76
L pIFG (pars opercularis)		-52	16	-2	4.46
L pIFG (pars opercularis)		-60	18	10	4.03
L pIFG (pars opercularis)		-57	10	22	3.40
L dmPFC	5484				
L dmPFC (SFG)		-4	28	42	6.89
L ACC		-7	40	20	3.69
L dmPFC (SFG)		-10	43	42	3.64
L dmPFC (SFG)		-14	33	58	3.64
R lingual gyrus (V3v)	2375	23	-94	-8	5.57
L middle occipital gyrus (h0c4lp)	2328	-24	-94	-2	5.41
L (pre-)SMA	1391	-14	16	68	3.37
L caudate nucleus	1344	-10	16	0	4.53
L caudate nucleus		-10	3	8	3.51
L ACC	1016	-4	0	30	4.17
L thalamus	516	-12	-27	-10	4.38
L thalamus		-7	-17	-2	3.44
R pallidum	359	8	0	-5	3.60

Table S9. Interaction: Action judgment task > Lexical decision task for high > low action words (inclusively masked with [Action judgment task: high > low action words]).

Region	**Cluster size (mm^3)**	**x**	**y**	**z**	**T**
L SMG/IPS, SPL	8938				
L IPS (hIP2)		-44	-50	50	5.00
L SPL (7A)		-34	-62	55	4.25
L IPS (hIP3)		-30	-64	40	4.13
L pMTG/LTO, pITG	5172				
L pMTG		-52	-40	-10	4.78
L pMTG/LTO		-52	-60	5	4.23
L pITG		-57	-62	-8	3.99
L anterior inferior frontal cortex	2891				
L frontal pole		-42	50	-10	5.30

L MFG		-44	50	5	3.99
L aIFG (pars orbitalis)		-52	38	-10	3.86
R cerebellum	1547				
R cerebellum (crus I)		40	-60	-42	4.46
R cerebellum (crus I)		40	-62	-32	3.72
L caudate nucleus	828	-10	13	0	5.12
L aIFG (pars orbitalis)	719	-17	26	-20	5.12
R pallidum	594	10	0	-5	6.51
L PMv, pIFG	500				
L pIFG (pars opercularis)		-60	18	8	4.11
L pIFG (pars opercularis)		-50	13	0	3.44

Table S10. Conjunction of interactions: [Action judgment task > Sound judgment task for high > low action words] ∩ [Action judgment task > Lexical decision task for high > low action words] (both inclusively masked with [Action judgment task: high > low action words]).

Region	**Cluster size (mm^3)**	**x**	**y**	**z**	**T**
L SMG/IPS, SPL	8625				
L IPS (hIP2)		-44	-50	50	5.00
L SPL (7A)		-34	-62	55	4.25
L SPL (7A)		-30	-64	52	4.24
L IPS (hIP3)		-30	-64	40	4.13
L aSMG (PF)		-60	-40	45	3.49
L pMTG/ITG	3547				
L pMTG		-54	-42	-10	4.73
L pITG		-54	-60	-10	3.81
L anterior inferior frontal cortex	2875				
L frontal pole		-44	50	-8	4.99
L aIFG (pars orbitalis)		-40	46	-12	4.68
L aIFG (pars triangularis)		-44	48	5	3.89
L aIFG (pars orbitalis)		-52	38	-10	3.81
R cerebellum (crus I)	1125	40	-60	-40	4.11
R cerebellum (crus I)		43	-60	-30	3.24
L caudate nucleus	719	-10	16	0	4.53
L vmPFC	688				
L vmPFC (Fo3)		-20	26	-20	4.56
L vmPFC (Fo2)		-17	23	-18	4.27
L pIFG (pars opercularis)	500	-54	16	10	3.54
L pIFG (pars opercularis)		-52	13	8	3.54
L pIFG (pars opercularis)		-60	18	8	3.32
L pMTG/LTO	406	-62	-50	2	3.48

Table S11. Interaction: Sound judgment task > Action judgment task for high > low sound words (inclusively masked with [Sound judgment task: high > low sound words]).

Region	Cluster size (mm^3)	x	y	z	T
L dmPFC (SFG)	1406	-7	33	38	5.91
L aIFG (pars orbitalis)	891	-47	46	-8	5.61
L insula	94	-30	23	-10	4.58

Table S12. Interaction: Sound judgment task > Lexical decision task for high > low sound words (inclusively masked with [Sound judgment task: high > low sound words]).

Region	Cluster size (mm^3)	x	y	z	T
L posterior IPL (AG, pSMG, pIPS)	5953				
L AG (PGa)		-44	-62	50	6.04
L IPS (hIP2)		-50	-44	50	4.10
L dmPFC (SFG)	3281	-4	33	38	5.96
L anterior inferior frontal cortex	2719				
L frontal pole		-47	46	-12	4.98
L aIFG (pars orbitalis)		-37	38	-15	4.63
L frontal pole		-40	56	-5	3.94
L aIFG (pars orbitalis)		-54	33	-8	3.59
L aIFG (pars orbitalis)	734	-40	20	-10	4.28
L aIFG (pars orbitalis)		-30	26	-10	4.27
L MFG / precentral sulcus	672				
L MFG		-42	13	48	4.05
L precentral sulcus		-40	6	40	3.73
L vmPFC (Fo2)	406	-12	18	-18	4.77
L pMTG	328	-57	-40	-12	4.26
L aIFG (pars triangularis)	328	-52	18	8	3.84

Table S13. Conjunction of interactions: [Sound judgment task > Action judgment task for high > low sound words] ∩ [Sound judgment task > Lexical decision task for high > low sound words] (both inclusively masked with [Sound judgment task: high > low sound words]).

Region	Cluster size (mm^3)	x	y	z	T
L dmPFC (SFG)	1406	-7	33	38	5.91
L aIFG (pars orbitalis)	875	-47	46	-10	4.89

Table S14. Multimodal conceptual regions. Conjunction: [Action judgment task: high > low action words] ∩ [Sound judgment task: high > low sound words].

Region	Cluster size (mm^3)	x	y	z	T
L posterior IPL (AG, pSMG, pIPS)	10578				
L SMG (PFm)		-44	-60	50	5.88
L IPS (hIP2)		-47	-44	50	4.87
L IPS (hIP3)		-32	-64	42	4.58
L aIFG, vmPFC	8484				
L aIFG (pars orbitalis)		-44	43	-15	5.44
L vmPFC (middle orbital gyrus)		-47	48	-5	5.26
L vmPFC (Fo2)		-14	20	-20	4.76
L vmPFC (Fo3)		-20	30	-20	4.73
L dmPFC	3859				
L dmPFC (SFG)		-4	33	32	4.30
L dmPFC (SFG)		-4	30	42	3.89
L dmPFC (SFG)		-14	48	40	3.77
L ACC		-7	38	25	3.57
L dmPFC (SFG)		-14	33	52	3.40
L dmPFC (SFG)		-14	38	50	3.39
L pMTG	1766	-57	-42	-12	4.83
R cerebellum (crus I/II)	1594	38	-77	-42	3.87
L aIFG (pars triangularis)	672	-52	16	8	3.52

Subject-specific fROI Analysis

The following tables show the results of the subject-specific functional region of interest (fROI) analysis. A 4-way repeated-measures ANOVA with the factors REGION (all fROIs), TASK (lexical decision, sound judgment, action judgment), SOUND (high, low), and ACTION (high, low) revealed a significant 4-way interaction (F(32,543)=2.074, p=.01). We resolved this interaction using step-down ANOVAs within each fROI (post-hoc comparisons were Bonferroni-Holm corrected). Bold font highlights significant effects, italic font highlights trends (p < 0.1 / did not survive correction). SF = sound feature; AF = action feature; L = lexical decision; S = sound judgment; A = action judgment.

Table S15. Motor fROIs (identified using the conjunction [Action judgment: high > low action words] ∩ [Motor localizer: hand movements > rest]).

Region	Full ANOVA	Lexical decision	Sound judgment	Action judgment
Left aSMG/IPS	**TASK x ACTION (F(2,78)=3.886, p=.025)**	ACTION (F(1,39)=.046, p=.831)	ACTION (F(1,39)=.406, p=.528)	**ACTION (F(1,39)=11.070, p=.002)** Task-specificity: **A vs. S for high > low AF (t(39)=2.228, p=.032); A vs. L for high > low AF (t(39)=2.595, p=.013)**
Left pMTG/LTO	**TASK x ACTION (F(2,78)=3.190, p=.049)**	ACTION (F(1,39)=.606, p=.441)	ACTION (F(1,39)=.092, p=.764)	**ACTION (F(1,39)=6.617, p=.014)** Task-specificity: *A vs. S for high > low AF (t(39)=2.178, p=.035); A vs. L for high > low AF (t(39)=1.954, p=.058)*
Left PMv	**TASK x ACTION (F(2,78)=4.842, p=.024)**	ACTION (F(1,39)=.184, p=.670)	*ACTION (F(1,39)=5.629, p=.023)*	*ACTION (F(1,39)=3.191, p=.082)* Task-specificity: **[A vs. S for high > low AF (t(39)=2.440, p=.019)];** [A vs. L for high > low AF (t(39)=1.565, p=.126)]
Right PMv	*TASK x ACTION (F(2,78)=2.498, p=.097)*	ACTION (F(1,39)=.784, p=.381)	ACTION (F(1,39)=.298, p=.588)	*ACTION (F(1,39)=3.593, p=.065)* Task-specificity: *A vs. S for high > low AF (t(39)=2.102, p=.042);* A vs. L for high > low AF (t(39)=1.379, p=.176)

Table S16. Auditory fROIs (identified using the conjunction [Sound judgment: high > low sound words] ∩ [Auditory localizer: real sounds > silence]).

Region	Full ANOVA	Lexical decision	Sound judgment	Action judgment
Left aIFG	**TASK x SOUND x ACTION (F(2,78)=3.642, p=.032)**	SOUND (F(1,39)=.112, p=.740); ACTION (F(1,39)=.253, p=.618); SOUND x ACTION (F(1,39)=1.503, p=.228)	**SOUND x ACTION (F(1,39)=13.242, p<.001)** **[high SF, low AF] vs. [high SF, high AF] (t(39)=3.934, p<.001); [high SF, low AF] vs. [low SF, low AF] (t(39)=4.184, p<.001);** [high SF, high AF] vs. [low SF, high AF] (t(39)=-.625, p=.536); [low SF, high AF] vs. [low SF, low AF] (t(39)=.613, p=.543) Task-specificity: **S vs. A for high > low SF (t(39)=2.377, p=.022); S vs. L for high > low SF (t(39)=2.256, p=.03)**	SOUND (F(1,39)=.229, p=.635); ACTION (F(1,39)=.917, p=.344); SOUND x ACTION (F(1,39)=2.392, p=.13)
Left MFG	**TASK x SOUND (F(2,78)=6.750, p=0.003);** TASK x SOUND x ACTION (F(2,78)=2.332, p=0.105)	SOUND (F(1,39)=.204, p=.654)	**SOUND (F(1,39)=17.764, p<.001)** Task-specificity: **S vs. A for high > low SF (t(39)=2.378, p=.025); S vs. L for high > low SF (t(39)=3.344, p=.002)**	SOUND (F(1,39)=.794, p=.378)
Left precentral sulcus	**TASK x SOUND x ACTION (F(2,78)=4.476, p=.020)**	SOUND (F(1,39)=.064, p=.802); ACTION (F(1,39)=.089, p=.767); SOUND x ACTION (F(1,39)=.014, p=.905)	**SOUND x ACTION (F(1,39)=11.002, p=.002)** **[high SF, low AF] vs. [high SF, high AF] (t(39)=3.659, p<.001); [high SF, low AF] vs. [low SF, low AF] (t(39)=3.523, p=.001);** [high SF, high AF] vs. [low SF, high AF] (t(39)=-.220, p=.827); [low SF, high AF] vs. [low SF, low AF] (t(39)=.892, p=.378) Task-specificity: *S vs. A for high > low SF (t(39)=1.720, p=.093); S vs. L for high > low SF (t(39)=2.322, p=.026)*	SOUND (F(1,39)=.249, p=.620); ACTION (F(1,39)=.821, p=.370); SOUND x ACTION (F(1,39)=.004, p=.952)
Left dmPFC	*TASK x SOUND x ACTION (F(2,78)=3.259, p=.053);* **TASK x SOUND (F(2,78)=7.224, p=.002); TASK x ACTION (F(2,78)=4.891, p=.01)**	SOUND (F(1,39)=.288, p=.595); ACTION (F(1,39)=.131, p=.719); SOUND x ACTION (F(1,39)=.051, p=.823)	**SOUND x ACTION (F(1,39)=6.988, p=.012)** **[high SF, low AF] vs. [high SF, high AF] (t(39)=3.307, p=.002); [high SF, low AF] vs. [low SF, low AF] (t(39)=3.783, p<.001);**	SOUND (F(1,39)=.068, p=.796); ACTION (F(1,39)=.911, p=.346); SOUND x ACTION (F(1,39)=1.909, p=.175)

Region	Full ANOVA	Lexical decision	Sound judgment	Action judgment
			[high SF, high AF] vs. [low SF, high AF] (t(39)=.276, p=.791); [low SF, high AF] vs. [low SF, low AF] (t(39)=.712, p=.481) Task-specificity: **S vs. A for high > low SF (t(39)=2.909, p=.006);** **S vs. L for high > low SF (t(39)=3.250, p=.002)**	
Left pIPS	**TASK x SOUND (F(2,78)=9.098; p<.001);** **TASK x ACTION (F(2,78)=5.443; p=.007)**	SOUND (F(1,39)=.395, p=.534); ACTION (F(1,39)=.281, p=.599)	**SOUND (F(1,39)=23.250, p<.0001);** ACTION (F(1,39)=.014, p=.908) Task-specificity: **S vs. A for high > low SF (t(39)=2.558, p=.015);** **S vs. L for high > low SF (t(39)=4.227, p<.0001)**	*SOUND (F(1,39)=5.326, p=.026);* **ACTION (F(1,39)=11.157, p=.002)** Task-specificity: **A vs. S for high > low AF (t(39)=2.719, p=.01);** **A vs. L for high > low AF (t(39)=2.733, p=.009)**
Left pSTG/MTG	**TASK x SOUND (F(2,78)=3.916; p=.025);** **TASK x ACTION (F(2,78)=6.808; p=.002)**	SOUND (F(1,39)=.296, p=.589); ACTION (F(1,39)=1.904, p=.175)	**SOUND (F(1,39)=6.536, p=.015);** ACTION (F(1,39)=1.768, p=.191) [high SF, high AF] vs. [low SF, high AF] (t(39)=-.220, p=.827); [low SF, high AF] vs. [low SF, low AF] (t(39)=.892, p=.378) Task-specificity: **S vs. A for high > low SF (t(39)=2.466, p=.018);** **S vs. L for high > low SF (t(39)=2.280, p=.028)**	SOUND (F(1,39)=.153, p=.698); **ACTION (F(1,39)=8.991, p=.005)** Task-specificity: **A vs. S for high > low AF (t(39)=3.939, p<.001);** *A vs. L for high > low AF (t(39)=1.999, p=.053)*

Table S17. Multimodal fROIs (identified using the conjunction [Action judgment: high > low action words] ∩ [Sound judgment: high > low sound words]).

Region	Full ANOVA	Lexical decision	Sound judgment	Action judgment
Left aIFG	**TASK x SOUND x ACTION (F(2,78)=3.712, p=.034)**	SOUND (F(1,39)=.007, p=.933); ACTION (F(1,39)=.044, p=.834); *SOUND x ACTION (F(1,39)=3.254, p=.079)*	**SOUND x ACTION (F(1,39)=12.458, p=.001)** **[high SF, low AF] vs. [high SF, high AF] (t(39)=3.491, p=.001); [high SF, low AF] vs. [low SF, low AF] (t(39)=4.365, p<.0001);** [high SF, high AF] vs. [low SF, high AF] (t(39)=-.082, p=.935); *[low SF, high AF] vs. [low SF, low AF] (t(39)=1.945, p=.059)* Task-specificity: **S vs. A for high > low SF (t(39)=3.605, p<.001); S vs. L for high > low SF (t(39)=3.271, p=.002)**	SOUND (F(1,39)=1.376, p=.248); **ACTION (F(1,39)=18.876, p<.0001);** SOUND x ACTION (F(1,39)=.521, p=.475) Task-specificity: **A vs. S for high > low AF (t(39)=4.046, p<.001); A vs. L for high > low AF (t(39)=3.537, p=.001)**
Left pIPL	**TASK x SOUND (F(2,78)=8.148; p=.001); TASK x ACTION (F(2,78)=7.478; p=.002)**	SOUND (F(1,39)=.308, p=.582); ACTION (F(1,39)=1.696, p=.2)	**SOUND (F(1,39)=21.818, p<.0001);** ACTION (F(1,39)=.535, p=.469) Task-specificity: **S vs. A for high > low SF (t(39)=2.846, p=.007); S vs. L for high > low SF (t(39)=4.5, p<.0001)**	SOUND (F(1,39)=.370, p=.546); **ACTION (F(1,39)=18.742, p<.001)** Task-specificity: **A vs. S for high > low AF (t(39)=3.132, p=.003); A vs. L for high > low AF (t(39)=3.069, p=.004)**
Left pMTG	**TASK x SOUND (F(2,78)=5.512; p=.006); TASK x ACTION (F(2,78)=6.222; p=.003)**	SOUND (F(1,39)=.187, p=.668); ACTION (F(1,39)=1.185, p=.283)	**SOUND (F(1,39)=11.425, p=.002);** ACTION (F(1,39)=.636, p=.430) Task-specificity: **S vs. A for high > low SF (t(39)=2.730, p=.009); S vs. L for high > low SF (t(39)=3.072, p=.004)**	SOUND (F(1,39)=.035, p=.852); **ACTION (F(1,39)=10.265, p=.003)** Task-specificity: **A vs. S for high > low AF (t(39)=3.411, p<.002); A vs. L for high > low AF (t(39)=2.434, p=.02)**

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