Supplementary Material

"Meta-analytic evidence for a novel hierarchical model of conceptual processing"
(Kuhnke et al., 2023 *Neuroscience and Biobehavioral Reviews*)

Data availability statement

All meta-analytic maps are openly available via the ANIMA database: https://anima.fz-juelich.de/studies/Kuhnke_2023_Conceptual_Processing.

Supplementary Materials and Methods

Table S1. Checklist for neuroimaging meta-analysis following the guidelines by Müller et al. (2018).

The research question is specifically defined	YES, and it includes the following contrasts: ● conceptual processing related to a certain perceptual-motor modality > high-level control condition (e.g. for action: action words > non-action words) ● conceptual processing related to a certain perceptual-motor modality > low-level baseline (e.g. for action: action words > fixation)
The literature search was systematic	YES, it included the following search queries in the following databases: ● **Review articles:** manual reference tracing ● **PubMed**: (((functional magnetic resonance imaging OR fMRI OR positron emission tomography OR PET OR neuroimaging)) AND (semantics OR semantic memory OR concepts OR conceptual OR knowledge)) AND (embodied OR embodiment OR grounded OR sensory OR motor OR perceptual) ● **PubMed**: ((((functional magnetic resonance imaging OR fMRI OR positron emission tomography OR PET OR neuroimaging)) AND (semantics OR semantic memory OR concepts OR conceptual OR knowledge)) AND (embodied OR embodiment OR grounded OR sensory OR perceptual) AND (tactile OR gustatory OR olfactory OR smell OR odor OR haptic OR taste)) ● **PubMed**: (((((functional magnetic resonance imaging OR fMRI OR positron emission tomography OR PET OR neuroimaging)) AND (semantics OR semantic memory OR concepts OR conceptual OR knowledge)) AND (embodied OR embodiment OR grounded OR sensory OR perceptual) AND (tactile OR gustatory OR olfactory OR smell OR odor OR haptic OR taste OR somatosensory OR olfactive OR touch OR touching OR nose OR aroma OR aromatic OR flavour OR flavor OR perfume OR odoriferant OR emotion OR emotional OR emotive OR feeling OR valence OR affective OR social))) ● **Web of Science**: (ALL= neuroimaging conceptual) AND DOCUMENT TYPES: (Article) ● **Web of Science**: (ALL=(fmri OR functional magnetic resonance imaging OR positron emission tomography OR PET) AND ALL=(semantics OR semantic memory OR concepts OR conceptual OR knowledge) AND ALL=(embodied OR embodiment OR grounded OR sensory OR perceptual OR social) NOT ALL=(lesion OR damage OR autism)) ● **Web of Science**: (ALL=(fmri OR functional magnetic resonance imaging OR positron emission tomography OR PET) AND TI=(color OR visual OR haptic OR tactile OR olfaction or smell OR motion) AND ALL=(conceptual OR semantic* OR semantic memory OR conceptual memory)) ● **BrainMap (Sleuth)**: Normal mapping AND experiments - context: emotion ● **BrainMap (Sleuth)**: Experiments- Imaging modality-fMRI AND conditions- stimulus modality: gustatory ● **BrainMap (Sleuth)**: Normal mapping AND stimulus modality: olfactory ● **BrainMap (Sleuth)**: Experiments- Imaging modality-fMRI AND conditions- stimulus modality: auditory

	● **BrainMap (Sleuth):** Normal mapping AND stimulus modality: tactile
Detailed inclusion and exclusion criteria are included	YES, and the criteria were: **Inclusion**: ● **Participants**: healthy human adults; native speakers; right-handed ● **Neuroimaging methods**: fMRI, PET ● **Data analysis**: whole-brain, univariate (voxel-wise) activation analyses ● **Contrasts**: probing conceptual processing related to a certain perceptual–motor modality (action, color, emotion, motion, olfaction/gustation, shape, sound) **Exclusion**: ● **Participants**: non-human subjects; children; patients with neurological or psychiatric disorders; non-native speakers; left-handed subjects ● **Data analyses**: search space was not whole-brain (e.g. region-of-interest analyses; partial brain coverage); analysis was not voxel-wise (e.g. multivariate); non-activation-based (e.g. functional connectivity) analyses ● **Contrasts**: non-conceptual contrasts; contrasts with potential perceptual difference in same modality as targeted conceptual modality; contrasts probing multiple modalities at once; contrasts probing non-included conceptual modalities/features
Sample overlap was taken into account	YES, using the following method: Multiple contrasts from the same sample and study were pooled, i.e. treated as one single experiment (as recommended by Turkeltaub et al., 2012).
All experiments use the same search coverage	YES, the search coverage is the following: Only coordinates from whole-brain analyses were included. ROI analyses and experiments with limited (non-whole-brain) coverage were excluded (as recommended by Müller et al., 2018).
Studies are converted to a common reference space	YES, using the following conversion(s): Coordinates in Talairach space were transformed to MNI space using the Lancaster transform as implemented in *GingerALE* v3.0 (Matlab function *tal2icbm_spm.m*).
Data extraction have been conducted by two investigators (ideal case) or double checked by	YES, the following authors: ● PK, MB, JA, MK, GH checked inclusion/exclusion criteria ● MB, JA extracted coordinates

the same investigator (state how double-checking was performed)	● MB, JA extracted other info: study metadata (e.g. number of subjects, task type, stimulus type, contrast type, reference space) ● PK, MB, JA double-checked the following data: correctness of coordinates (focusing on sign), study metadata
The paper includes a table with at least the references, basic study description (e.g., for fMRI task: stimuli), contrasts and basic sample descriptions (e.g., size, mean age and gender distribution, specific characteristics) of the included studies, source of information (e.g. contact with authors), reference space	YES, and also the following data: See Tables S31-S37 for tables summarizing the relevant information for each included study. Studies have been organized according to modality, method used (fMRI or PET), sample size (number of subjects), task, stimulus modality, contrast(s) included in the analysis, coordinate space used in the original paper for reporting results (Talairach or MNI), number of foci, and contrast type (high- or low-level).
The study protocol was previously registered and all analyses planned beforehand, including the methods and parameters used for inference, correction for multiple testing, etc.	1) Inclusion and exclusion criteria were defined beforehand based on explicit conceptual considerations (see above and in Methods section). 2) Any non-planned analyses are clearly labelled as supplementary or exploratory in the paper. 3) The meta-analysis used the recommended default methods and parameters of the *GingerALE* software (details elaborated in the Materials and Methods section; also see Müller et al., 2018).
The meta-analysis includes diagnostics	YES, the following: ● Robustness check: In addition to our primary analyses (which included all contrasts), we performed a supplementary analysis that excluded low-level contrasts (e.g. for action: action words > fixation; see Methods and Results sections for details).

Supplementary Results

Coordinate Tables

The following tables report significant clusters of the ALE analyses, i.e. brain regions consistently activated across neuroimaging studies. All analyses were thresholded at a voxel-wise $p < 0.001$ and a cluster-wise $p < 0.05$ FWE-corrected using Monte Carlo simulation (10,000 permutations). Coordinates are in MNI space. We report peaks more than 8 mm apart in clusters larger than 50 mm³. 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).

L	left	OFC	orbitofrontal cortex
R	right	PCC	posterior cingulate cortex
a (prefix)	anterior	PFC	prefrontal cortex
p (prefix)	posterior	mPFC	medial PFC
d (prefix)	dorsal	dmPFC	dorsomedial PFC
v (prefix)	ventral	vmPFC	ventromedial PFC
A1	primary auditory cortex	PMC	premotor cortex
ACC	anterior cingulate cortex	PMd	dorsal PMC
AG	angular gyrus	PMv	ventral PMC
FG	fusiform gyrus	PreCS	precentral sulcus
IFG	inferior frontal gyrus	S1	primary somatosensory cortex
IPL	inferior parietal lobe	SMA	supplementary motor area
IPS	intraparietal sulcus	SMG	supramarginal gyrus
LOC	lateral occipital cortex	SPL	superior parietal lobe
LTO	lateral temporal-occipital junction	STG	superior temporal gyrus
M1	primary motor cortex	STS	superior temporal sulcus
MCC	middle cingulate cortex	TP	temporal pole
MFG	middle frontal gyrus	TPJ	temporoparietal junction
MTG	middle temporal gyrus	V1/V2	primary/secondary visual cortex

Table S2. ALE results for action-related conceptual processing.

Region	Cluster size (mm³)	x	y	z	ALE	P	Z
L IFG / PMC	16880						
L IFG (op)		-48	6	24	0.056	2.26E-13	7.239
L IFG (tri)		-46	34	8	0.039	1.43E-08	5.550
L IFG (tri)		-48	20	0	0.033	4.17E-07	4.927
L IFG (tri)		-54	20	8	0.033	4.34E-07	4.919
L IFG (op)		-58	4	12	0.032	1.12E-06	4.730
L IFG (tri)		-46	20	24	0.031	1.49E-06	4.672
L PMd		-46	6	44	0.029	6.24E-06	4.369
L PMd		-46	2	44	0.028	9.11E-06	4.286
L IFG (tri)		-48	40	-2	0.021	2.92E-04	3.439
L LTO (pMTG/pSTS/pITG)	13632						
L pMTG		-54	-58	0	0.057	5.96E-14	7.418
L pMTG		-46	-62	12	0.031	1.96E-06	4.616
L FG4		-38	-44	-20	0.030	2.70E-06	4.549
L pSTS		-56	-38	0	0.029	4.26E-06	4.452
L AG (PGp)		-42	-66	22	0.028	8.29E-06	4.307
L aSMG / S1	10984						
L aSMG (PFt)		-60	-32	34	0.069	1.05E-17	8.488
L S1 (area 2)		-46	-42	48	0.046	1.39E-10	6.311
L/R (pre-)SMA	6504						
L pre-SMA		-4	12	52	0.037	3.57E-08	5.388
L PMd		-22	4	58	0.030	2.90E-06	4.533
L pre-SMA		-4	28	42	0.028	9.11E-06	4.286
L PMd		-28	-4	54	0.027	1.21E-05	4.222
L pre-SMA		-10	4	62	0.027	1.85E-05	4.126
L pre-SMA		-12	16	60	0.022	2.47E-04	3.484
L IPS (hIP3)	1512	-34	-64	42	0.031	1.61E-06	4.656
L OFC (Fo3)	1008	-30	36	-14	0.037	6.10E-08	5.290

Table S3. ALE results for real action execution.

Region	Cluster size (mm³)	x	y	z	ALE	P	Z
L/R M1/S1, IFG/PMC, SMA, aSMG/IPS, pSTG/STS	275560						
L SMA		-2	0	56	0.379	0	∞
L Thalamus (prefrontal)		-12	-18	4	0.305	0	∞
L M1 (4a)		-38	-20	56	0.273	0	∞
R Thalamus (premotor)		14	-18	6	0.242	0	∞
L Putamen		-24	-4	4	0.217	2.79E-39	13.060
R PMv		52	-6	36	0.207	4.97E-36	12.477
L PMd		-46	-8	44	0.202	2.54E-34	12.160
R Putamen		24	2	4	0.200	1.19E-33	12.033
L M1 (4p)		-52	-8	32	0.192	2.80E-31	11.574

Region	Cluster size (mm³)	x	y	z	ALE	P	Z
L PMv		-56	-4	26	0.190	1.10E-30	11.456
L/R Cerebellum	33160						
R Cerebellum (VI)		20	-56	-22	0.232	4.80E-44	13.870
L Cerebellum (VI)		-22	-60	-24	0.166	5.60E-24	10.030
L Cerebellum (VI)		-26	-58	-24	0.164	2.17E-23	9.896
L Cerebellum (VI)		-14	-62	-20	0.162	4.25E-23	9.828
R Cerebellum (V)		4	-62	-16	0.158	7.78E-22	9.531
R FG2		42	-68	-16	0.072	1.27E-04	3.659

Table S4. Overlap between meta-analytic maps for action-related conceptual processing and real action execution.

Region	Cluster size (mm³)	x	y	z	ALE	P	Z
L IFG / PMC	8384						
L PMv		-48	6	24	0.056	2.26E-13	7.239
L IFG (tri)		-46	20	-2	0.032	7.57E-07	4.809
L IFG (tri)		-54	18	10	0.032	1.11E-06	4.732
L IFG (op)		-58	4	12	0.032	1.13E-06	4.730
L PMd		-46	6	44	0.029	6.24E-06	4.369
L PMd		-46	2	44	0.028	9.11E-06	4.286
L IFG (tri)		-44	18	24	0.027	1.22E-05	4.220
L aSMG/IPS, S1	6872						
L aSMG (PFt)		-58	-30	34	0.067	5.50E-17	8.294
L S1 (area 2)		-46	-42	48	0.046	1.39E-10	6.311
L/R (pre-)SMA / PMd	5176						
L pre-SMA		-4	12	52	0.037	3.57E-08	5.388
L PMd		-22	2	58	0.028	8.86E-06	4.292
L PMd		-28	-4	54	0.027	1.21E-05	4.222
L pre-SMA		-10	4	62	0.027	1.85E-05	4.126
L PMd		-16	2	54	0.026	2.07E-05	4.099
L pre-SMA		-4	26	42	0.026	2.86E-05	4.024
L pSTS	112						
L pSTS		-56	-36	2	0.024	6.54E-05	3.825
L pSTS		-54	-40	4	0.022	1.83E-04	3.564
L FG3	88	-34	-50	-20	0.024	9.34E-05	3.736

Table S5. Contrasts between conceptual processing related to action and all other modalities (inclusively masked by regions significant for action and no other modality).

Region	Cluster size (mm³)	x	y	z	Action specificity (sign. contrasts out of 6)
L IFG / PMC	11800				
L IFG (orb)		-50	18	-4	4
L IFG (op)		-46	16	-2	3
L IFG (tri)		-54	22	-6	2

Region	Cluster size	x	y	z	
L IFG (orb)		-48	20	-8	1
L aSMG / IPS	9752				
L aSMG (PFop)		-60	-30	30	6
L aSMG (PFop)		-58	-30	24	5
L aSMG (PFcm)		-54	-42	22	4
L aSMG (PFcm)		-54	-42	18	3
L aSMG (PFcm)		-58	-42	16	2
L pITG / LTO	7424				
L pITG		-56	-58	-8	6
L pITG		-58	-54	-8	5
L pITG		-56	-62	-12	4
L pITG		-50	-54	-16	3
L FG2		-50	-60	-16	2
L LTO		-60	-50	0	1
L/R (pre-)SMA / PMC	4872				
R pre-SMA		2	14	50	5
L pre-SMA		0	10	48	4
L PMd		-16	0	50	3
L pre-SMA		-8	8	48	2
L MCC		-2	12	38	1
L IPS / AG	768				
L AG (PGa)		-36	-70	40	3
L AG		-38	-64	38	2
L IPS (hIP3)		-38	-60	38	1
L FG4	512	-40	-48	-24	1
L IFG (orb)	408				
L IFG (orb)		-36	38	-16	2
L IFG (orb)		-30	34	-18	1
L MTG	360				
L MTG		-56	-36	-8	2
L MTG		-60	-38	-6	1

Table S6. ALE results for sound-related conceptual processing.

Region	Cluster size (mm³)	x	y	z	ALE	P	Z
L pSTS/pMTG	1136	-60	-44	0	0.020	1.11E-06	4.733
L SMG	1008						
L SMG (PF)		-60	-42	28	0.018	7.11E-06	4.340
L SMG (PFm)		-60	-52	26	0.017	1.03E-05	4.257
R pSTS	856	46	-42	10	0.019	4.09E-06	4.460
L dmPFC	744						
L dmPFC		-6	34	38	0.018	7.87E-06	4.318
L dmPFC		-2	28	44	0.014	1.48E-04	3.618

Table S7. ALE results for real auditory perception.

Region	Cluster size (mm³)	x	y	z	ALE	P	Z
L AC, STG/MTG, IFG/Insula, MFG/PreCS	58360						
L STG		-56	-20	4	0.175	0	∞
L IPL (PFcm)		-46	-34	12	0.113	1.41E-24	10.166
L Insula		-34	22	0	0.074	4.59E-13	7.142
L IFG (tri)		-46	20	22	0.057	9.25E-09	5.625
L IFG (op)		-44	8	28	0.056	1.61E-08	5.529
L PMd		-50	-6	50	0.056	1.97E-08	5.494
L PreCS		-54	6	16	0.051	2.37E-07	5.037
L IFG (tri)		-38	42	4	0.049	4.82E-07	4.899
L IFG (tri)		-50	22	10	0.048	1.08E-06	4.738
L IFG (orb)		-46	28	-4	0.045	3.01E-06	4.526
L IFG (tri)		-40	44	6	0.045	4.13E-06	4.458
R AC, STG/MTC, IFG/Insula, MFG/PreCS	53968						
R STG		58	-16	2	0.145	1.39E-35	12.395
R STG (TE 3)		62	-26	8	0.072	1.59E-12	6.969
R Insula		34	22	-2	0.069	1.33E-11	6.664
L Thalamus (prefrontal)		-12	-16	4	0.063	4.34E-10	6.132
R IFG (op)		48	14	26	0.062	4.96E-10	6.111
R PreCS		54	10	34	0.060	1.75E-09	5.906
R PMd		54	0	46	0.054	4.32E-08	5.353
R TP (TE 3)		54	6	-16	0.053	6.10E-08	5.290
R Putamen		24	4	2	0.052	9.81E-08	5.203
R PMv		44	2	40	0.048	8.05E-07	4.797
R IFG (op)		48	12	4	0.046	2.85E-06	4.537
L/R pre-SMA	9104	-2	12	52	0.098	8.83E-20	9.027
R IPS	1864						
R IPS (hIP2)		42	-44	44	0.053	9.23E-08	5.214
R IPS (hIP3)		40	-54	50	0.045	4.15E-06	4.457

Table S8. Overlap between meta-analytic maps for sound-related conceptual processing and real auditory perception.

Region	Cluster size (mm³)	x	y	z	ALE	P	Z
R pSTS	400	46	-42	10	0.019	4.09E-06	4.460
L pSTS	224	-58	-42	2	0.017	1.61E-05	4.157

Table S9. Contrasts between conceptual processing related to sound and all other modalities (inclusively masked by regions significant for sound and no other modality).

Region	Cluster size (mm³)	x	y	z	Sound specificity (sign. contrasts out of 6)
R pSTS	856	46	-44	6	6

L pMTG	568	-58	-42	-10	5
L dmPFC	528				
L dmPFC		-6	32	34	5
L dmPFC		-2	28	32	4
L dmPFC		0	26	40	2
L pSMG	432				
L pSMG (PFm)		-62	-48	22	5

Table S10. ALE results for shape-related conceptual processing.

Region	Cluster size (mm³)	x	y	z	ALE	P	Z
L aFG / Hippocampus	1368						
L aFG (FG3)		-40	-34	-22	0.022	1.43E-07	5.133
L Hippocampus (CA3)		-32	-26	-12	0.016	1.23E-05	4.219
L LOC (hOc4la)	1160	-52	-66	-4	0.020	5.90E-07	4.859
L PreCS	832	-44	2	32	0.016	1.31E-05	4.205

Table S11. ALE results for real visual shape perception.

Region	Cluster size (mm³)	x	y	z	ALE	P	Z
Early visual cortex (V1/V2/V3/V4), R LOC (hOc4la/p), IPS/SPL, FG	46744						
R SPL (7A)		26	-64	52	0.091	1.44E-19	8.973
R FG4		42	-54	-20	0.090	3.71E-19	8.868
R LOC (hOc4la)		42	-76	-8	0.086	4.84E-18	8.578
R FG2		46	-64	-12	0.085	9.94E-18	8.494
R LOC (hOc4lp)		38	-86	0	0.066	2.68E-12	6.896
R IPS (hIP3)		32	-52	52	0.065	7.37E-12	6.750
R LOC		32	-76	32	0.061	9.65E-11	6.367
R IPS (hIP3)		40	-42	46	0.056	1.18E-09	5.970
L V1 (hOc1)		-12	-94	-2	0.043	1.42E-06	4.682
R V1 (hOc1)		8	-86	4	0.041	3.90E-06	4.471
R LOC		34	-82	18	0.034	1.16E-04	3.680
L LOC (hOc4la), FG	20632						
L LOC (hOc4la)		-40	-80	-8	0.084	3.00E-17	8.365
L FG4		-38	-56	-18	0.078	1.53E-15	7.886
L LOC (hOc4la)		-46	-68	-10	0.074	2.34E-14	7.540
L Cerebellum (VIIa crus I)		-40	-68	-28	0.030	5.79E-04	3.249
L IPS/SPL, S1	18128						
L SPL (7A)		-24	-66	48	0.077	3.82E-15	7.775
L S1 (area 2)		-40	-34	44	0.067	2.49E-12	6.906
L SPL (7A)		-16	-60	58	0.059	3.16E-10	6.182
L IPS (hIP1)		-36	-48	46	0.056	1.33E-09	5.952
L SPL (7PC)		-36	-50	60	0.046	4.02E-07	4.935
L LOC		-30	-86	26	0.039	8.79E-06	4.293

L PreCS/MFG, IFG/Insula	14808						
L PreCS		-48	8	30	0.072	5.92E-14	7.419
L MFG		-26	-2	56	0.062	4.18E-11	6.494
L Insula		-34	22	2	0.060	1.31E-10	6.320
L IFG (tri)		-44	22	18	0.048	1.48E-07	5.127
L MFG		-40	4	44	0.045	4.81E-07	4.899
L IFG (tri)		-44	20	-2	0.030	6.54E-04	3.214
L/R pre-SMA	7864	4	12	52	0.085	1.71E-17	8.431
R PMd	4720	30	-4	54	0.062	4.66E-11	6.478
R IFG/PMC	4560						
R IFG (op)		50	8	28	0.071	2.02E-13	7.254
R PMd		46	8	42	0.031	3.49E-04	3.391
R IFG/Insula	4280						
R Insula		36	24	-4	0.050	4.93E-08	5.329
R IFG (tri)		44	30	8	0.041	3.74E-06	4.479
L Hippocampus/Amygdala	1768	-20	-8	-16	0.059	2.29E-10	6.233
R Hippocampus/Amygdala	1600	22	-6	-16	0.055	2.12E-09	5.875

Table S12. Overlap between meta-analytic maps for shape-related conceptual processing and real visual shape perception.

Region	Cluster size (mm³)	x	y	z	ALE	P	Z
L LOC (hOc4la)	880	-52	-66	-4	0.020	5.90E-07	4.859
L PreCS	728	-44	2	32	0.016	1.31E-05	4.205

Table S13. Contrasts between conceptual processing related to visual shape and all other modalities (inclusively masked by regions significant for shape and no other modality).

Region	Cluster size (mm³)	x	y	z	Shape specificity (sign. contrasts out of 6)
L aFG / Hippocampus	1232				
L aFG (FG4)		-40	-34	-26	4
L Hippocampus (DG)		-30	-30	-14	3
L LOC (hOc4la)	120				
L LOC (hOc4la)		-52	-70	-8	5
L LOC (hOc4la)		-50	-66	-12	3
L PreCS	80	-44	0	32	5

Table S14. ALE results for motion-related conceptual processing.

Region	Cluster size (mm³)	x	y	z	ALE	P	Z
L pSTS/pMTG, aSMG	8000						
L pSTS		-54	-50	6	0.027	2.02E-09	5.883
L pMTG		-56	-58	4	0.025	1.44E-08	5.548
L pSTS		-62	-52	10	0.024	4.16E-08	5.360
L pSTS		-54	-34	2	0.020	6.63E-07	4.836

Region	Cluster size (mm³)	x	y	z	ALE	P	Z
L aSMG (PFcm)		-58	-42	24	0.018	3.75E-06	4.479
L aSMG (PFt)		-60	-34	36	0.016	1.27E-05	4.212
L AG (PGp)		-54	-64	22	0.015	3.26E-05	3.993
L dFG (FG3)	888	-30	-40	-18	0.022	1.50E-07	5.123
L IFG	800						
L IFG (tri)		-52	24	20	0.017	9.88E-06	4.268
L IFG (op)		-52	16	22	0.012	2.32E-04	3.501

Table S15. ALE results for real visual motion perception.

Region	Cluster size (mm³)	x	y	z	ALE	P	Z
L/R SPL/IPS, LOC	51616						
L SPL (7PC)		-30	-54	54	0.108	2.24E-29	11.192
R SPL (7A)		22	-62	56	0.084	3.37E-20	9.132
R LOC (hOc4la / V5)		46	-70	0	0.083	5.86E-20	9.072
L SPL (7A)		-20	-64	58	0.070	9.22E-16	7.956
L LOC		-24	-84	24	0.058	6.76E-12	6.763
R LOC		30	-70	40	0.050	1.22E-09	5.966
R LOC		26	-74	38	0.047	5.59E-09	5.712
R IPS (hIP2)		42	-44	46	0.046	1.36E-08	5.559
L SPL (7A)		-4	-60	56	0.038	1.56E-06	4.662
R LOC		28	-78	28	0.037	2.30E-06	4.582
L/R PMC, (pre-)SMA	31712						
L pre-SMA		0	4	58	0.101	2.21E-26	10.563
R PMd		42	-4	50	0.098	2.55E-25	10.331
R PMd		26	0	56	0.077	5.54E-18	8.562
R PMv		50	0	36	0.048	3.40E-09	5.796
R MCC		6	22	32	0.047	7.56E-09	5.660
L PMC	14120						
L PMd		-32	-4	52	0.091	5.65E-23	9.800
L PMd		-42	-2	46	0.070	9.29E-16	7.956
L PMv		-50	2	40	0.061	9.10E-13	7.048
L Thalamus/Putamen, Insula	8248						
L Thalamus (prefrontal)		-12	-16	6	0.056	1.75E-11	6.624
L Insula		-32	18	4	0.043	7.70E-08	5.248
L Putamen		-22	12	2	0.038	1.60E-06	4.658
L Putamen		-24	-2	8	0.037	2.50E-06	4.565
L Insula		-38	16	-6	0.033	2.53E-05	4.053
R Thalamus/Putamen, Insula	5904						
R Putamen		24	10	4	0.049	2.35E-09	5.857
R Thalamus (parietal)		16	-16	12	0.039	1.07E-06	4.740
R Thalamus (prefrontal)		8	-22	8	0.034	1.06E-05	4.253
R Insula		36	22	6	0.034	1.32E-05	4.203
R Thalamus (prefrontal)		12	-14	-2	0.030	9.26E-05	3.738

Region	Cluster size (mm³)	x	y	z	ALE	P	Z
L LOC (hOc4la / V5)	4640	-44	-76	4	0.064	1.08E-13	7.338
L V1/V2	3640						
L V1 (hOc1)		-12	-88	-2	0.049	2.03E-09	5.882
L V2 (hOc2)		-4	-84	-8	0.031	7.40E-05	3.794
L Cerebellum (VI)		-10	-76	-16	0.029	1.90E-04	3.553
R V1	2024	8	-88	2	0.047	9.66E-09	5.618

Table S16. Overlap between meta-analytic maps for motion-related conceptual processing and real action execution.

Region	Cluster size (mm³)	x	y	z	ALE	P	Z
L pSTS	464	-54	-34	2	0.020	6.30E-07	4.836
L aSMG	232						
L aSMG (PFt)		-58	-34	36	0.015	2.91E-05	4.020
L aSMG (PFcm)		-58	-38	26	0.013	1.21E-04	3.670
L aSMG (PF/PFcm)		-58	-40	20	0.011	7.45E-04	3.177

Table S17. Contrasts between conceptual processing related to motion and all other modalities (inclusively masked by regions significant for motion and no other modality).

Region	Cluster size (mm³)	x	y	z	Motion specificity (sign. contrasts out of 6)
L pSTS / pMTG	2544				
L pSTS		-62	-56	8	6
L pSTS		-58	-52	8	5
L pMTG		-64	-52	4	4
L pSTS		-50	-56	16	3
L dFG	808				
L dFG (FG3)		-32	-38	-16	3
L dFG (FG3)		-30	-38	-24	2
L dFG (FG3)		-28	-44	-18	1
L STS	544				
L STS		-58	-32	-2	2
L STS		-56	-28	0	1
L IFG (tri)	184				
L IFG (tri)		-54	28	18	2
L IFG (tri)		-54	22	20	1
L pMTG	152	-54	-64	18	3

Table S18. ALE results for color-related conceptual processing.

Region	Cluster size (mm³)	x	y	z	ALE	P	Z
L IPS (hIP3)	1048	-36	-62	46	0.018	6.51E-07	4.839
L vFG (FG4)	896	-42	-50	-12	0.016	3.73E-06	4.480

Table S19. ALE results for real color perception.

Region	Cluster size (mm³)	x	y	z	ALE	P	Z
L IPS	3816						
L IPS (hIP3)		-34	-56	50	0.047	6.51E-13	7.094
L IPS (hIP3)		-28	-64	42	0.030	1.87E-07	5.082
R IPS	3360						
R IPS (hIP3)		30	-56	52	0.030	1.71E-07	5.099
R IPS (hIP2)		42	-40	44	0.029	2.92E-07	4.997
R IPS (hIP3)		32	-58	46	0.029	3.61E-07	4.955
R IPS (hIP2)		44	-40	52	0.022	2.39E-05	4.066
L Insula	1808	-32	22	4	0.028	9.15E-07	4.771
R Insula	1536	34	22	0	0.028	6.84E-07	4.830
L pre-SMA	1416						
L pre-SMA		0	16	48	0.028	7.76E-07	4.805
L pre-SMA		-6	12	58	0.019	2.33E-04	3.499
L SPL (7A)		-18	-68	60	0.039	2.23E-10	6.237
R LOC (hOc4lp)	1168	34	-88	0	0.028	6.36E-07	4.844

Table S20. Overlap between meta-analytic maps for color-related conceptual processing and real color perception.

Region	Cluster size (mm³)	x	y	z	ALE	P	Z
L IPS (hIP3)	648	-36	-60	44	0.018	6.68E-07	4.834

Table S21. Contrasts between conceptual processing related to color and all other modalities (inclusively masked by regions significant for color and no other modality).

Region	Cluster size (mm³)	x	y	z	Color specificity (sign. contrasts out of 6)
L vFG (FG4)	744	-44	-52	-18	6
L IPS	560				
L IPS (hIP3)		-34	-60	46	5
L IPS (hIP1)		-40	-60	46	4

Table S22. ALE results for olfaction-gustation related conceptual processing.

Region	Cluster size (mm³)	x	y	z	ALE	P	Z
L OFC	1744						
L OFC (Fo3)		-24	36	-14	0.019	6.98E-07	4.826
L OFC (Fo3)		-26	40	-16	0.018	9.85E-07	4.756

Table S23. ALE results for real olfactory-gustatory perception.

Region	Cluster size (mm³)	x	y	z	ALE	P	Z
L/R OFC, Amygdala / Hippocampus, Thalamus, Insula	77536						

					ALE	P	Z
L Amygdala (LB)		-20	-4	-20	0.096	2.37E-25	10.338
R Amygdala (LB)		24	0	-18	0.092	5.36E-24	10.035
R Thalamus (prefrontal)		8	-8	-2	0.067	1.91E-15	7.862
L Basal Forebrain (Ch 1-3)		-6	2	-14	0.059	6.40E-13	7.097
L Insula		-32	18	2	0.055	9.39E-12	6.715
R Insula		34	24	-4	0.053	3.39E-11	6.525
R Thalamus		8	2	-2	0.052	6.35E-11	6.431
R Insula (Id1)		38	-10	-12	0.049	6.79E-10	6.060
R Insula		36	16	-8	0.046	2.95E-09	5.820
L Insula		-34	2	0	0.045	5.75E-09	5.707
R OFC (Fo3)		28	32	-10	0.044	8.80E-09	5.634
L/R ACC	3624						
R ACC		2	44	-2	0.049	6.84E-10	6.059
L ACC (area 33)		-2	32	0	0.036	1.07E-06	4.740

Table S24. Overlap between meta-analytic maps for olfaction-gustation related conceptual processing and real olfactory-gustatory perception.

Region	Cluster size (mm^3)	x	y	z	ALE	P	Z
L OFC	744						
L OFC (Fo3)		-26	40	-16	0.018	9.85E-07	4.756
L OFC (Fo3)		-24	34	-16	0.017	1.82E-06	4.631

Table S25. Contrasts between conceptual processing related to olfaction-gustation and all other modalities (inclusively masked by regions significant for olfaction-gustation and no other modality).

Region	Cluster size (mm^3)	x	y	z	Olfaction-gustation specificity (sign. contrasts out of 6)
L OFC	1528				
L OFC (Fo3)		-18	38	-14	6
L OFC (Fo3)		-22	40	-18	5
L OFC (Fo3)		-22	34	-20	4
L OFC (Fo3)		-22	30	-18	3

Table S26. ALE results for emotion-related conceptual processing.

Region	Cluster size (mm^3)	x	y	z	ALE	P	Z
L/R dmPFC	3576						
R dmPFC		6	54	22	0.027	1.13E-06	4.728
R dmPFC (Fp2)		4	56	6	0.025	5.26E-06	4.406
L dmPFC		-6	62	36	0.020	9.46E-05	3.733
L Amygdala / Hippocampus	3368						
L Amygdala (LB)		-22	-4	-18	0.048	7.05E-13	7.083
L Hippocampus (CA3)		-26	-18	-16	0.018	4.51E-04	3.319

Region	Cluster size (mm³)	x	y	z	ALE	P	Z
L AG	2168						
L AG (PGp)		-48	-64	26	0.031	1.54E-07	5.119
L AG (PGa)		-54	-58	22	0.024	1.02E-05	4.261
R Amygdala (LB)	2064	24	-2	-24	0.034	1.71E-08	5.519
L/R vmPFC	1952						
L vmPFC (Fp2)		-2	48	-18	0.021	4.94E-05	3.893
R vmPFC (Fp2)		2	48	-12	0.021	6.30E-05	3.834
L vmPFC (Fp2)		2	56	-18	0.020	1.29E-04	3.655

Table S27. ALE results for real emotion perception.

Region	Cluster size (mm³)	x	y	z	ALE	P	Z
L/R Amygdala / Hippocampus, Thalamus, IFG / Insula	159328						
L Amygdala (CM)		-20	-4	-16	0.336	0	∞
L Pallidum		-12	8	-6	0.300	0	∞
R Amygdala		24	-4	-16	0.283	0	∞
R Caudate		12	10	-4	0.269	3.40E-44	13.895
L Insula		-32	22	-2	0.264	1.44E-42	13.624
R Insula		36	22	-2	0.246	2.84E-37	12.703
R Thalamus (prefrontal)		6	-14	8	0.181	2.13E-20	9.181
L Thalamus (prefrontal)		-10	-16	8	0.178	7.79E-20	9.041
L Brainstem		-4	-26	-6	0.156	3.37E-15	7.791
R IFG (op)		46	8	26	0.150	5.85E-14	7.420
L PreCS		-44	6	30	0.143	1.08E-12	7.024
L Cingulate, mPFC	60464						
L dmPFC		-2	12	54	0.201	4.48E-25	10.277
R MCC		4	22	38	0.189	2.45E-22	9.650
R dmPFC		4	20	42	0.188	3.83E-22	9.604
L vmPFC (Fp2)		0	54	-8	0.180	3.27E-20	9.135
L dmPFC (Fp2)		-2	56	12	0.161	3.56E-16	8.077
R PCC		2	-26	34	0.159	7.31E-16	7.973
L dmPFC (Fp2)		-2	58	20	0.159	7.87E-16	7.973
L ACC		0	42	6	0.146	3.21E-13	7.191
L vmPFC (s32)		-4	40	-12	0.140	3.16E-12	6.872
L PCC		-4	-52	26	0.133	5.79E-11	6.445
L MCC		0	-4	44	0.099	1.05E-05	4.255
R LOC / FG	10536						
R LOC (hOc4la)		46	-74	-4	0.138	8.26E-12	6.734
R FG4		44	-54	-18	0.109	4.51E-07	4.912
R FG4		44	-50	-20	0.108	5.62E-07	4.869
R FG1		32	-62	-18	0.107	7.42E-07	4.814
R FG2		44	-62	-12	0.103	3.17E-06	4.514
R V3v (hOc3v)		24	-90	-8	0.092	7.63E-05	3.787

R V3v (hOc3v)		20	-82	-12	0.090	1.28E-04	3.657
L AG, LOC / FG	9920						
L FG4		-42	-60	-16	0.157	1.77E-15	7.870
L LOC (hOc4la)		-42	-76	-2	0.116	3.69E-08	5.382
L AG (PGa)		-48	-58	28	0.111	2.12E-07	5.058
L LOC		-52	-66	6	0.105	1.69E-06	4.646
L AG (PGa)		-54	-58	16	0.087	2.86E-04	3.445

Table S28. Overlap between meta-analytic maps for emotion-related conceptual processing and real emotion perception.

Region	Cluster size (mm^3)	x	y	z	ALE	P	Z
L Amygdala / Hippocampus	3360						
L Amygdala (LB)		-22	-4	-18	0.048	3.09E-12	6.875
L Hippocampus (CA2)		-32	-16	-16	0.022	6.51E-05	3.826
L/R dmPFC	3168						
R dmPFC (Fp2)		6	54	6	0.029	1.15E-06	4.725
R dmPFC		6	54	22	0.028	2.20E-06	4.592
L dmPFC		-8	58	12	0.024	1.89E-05	4.121
L dmPFC (Fp2)		-4	60	4	0.022	6.40E-05	3.830
R Amygdala (LB)	1888	24	-2	-24	0.034	4.47E-08	5.347
L/R vmPFC	1184						
L vmPFC (Fp2)		-2	48	-18	0.021	9.20E-05	3.740
R vmPFC (Fp2)		2	48	-12	0.021	1.16E-04	3.682
R vmPFC (Fp2)		4	50	-10	0.021	1.27E-04	3.657
L vmPFC (Fp2)		2	56	-18	0.020	2.28E-04	3.506
R vmPFC		8	46	-6	0.019	2.83E-04	3.447
L AG	568						
L AG (PGp)		-48	-64	24	0.029	9.88E-07	4.756
L AG (PGa)		-54	-58	20	0.024	2.24E-05	4.081

Table S29. Contrasts between conceptual processing related to emotion and all other modalities (inclusively masked by regions significant for emotion and no other modality).

Region	Cluster size (mm^3)	x	y	z	Emotion specificity (sign. contrasts out of 6)
L/R dmPFC	3968				
L dmPFC (Fp2)		-4	58	6	5
R dmPFC (Fp2)		6	54	2	4
R dmPFC (Fp2)		8	60	8	3
L Amygdala / Hippocampus	3448				
L Amygdala (LB)		-26	-6	-22	6
L Amygdala (LB)		-24	-6	-28	5
L Hippocampus (CA2)		-34	-18	-16	4
L Hippocampus (CA3)		-30	-18	-18	3
R Amygdala	1920				

R Amygdala (LB)		24	-4	-28		6	
R Amygdala (LB)		20	-4	-26		5	
L/R vmPFC	1392						
L vmPFC (Fo1)		-2	50	-22		5	
L vmPFC (Fp2)		0	48	-18		4	
L vmPFC (Fo1)		-2	44	-22		3	
L TP	1368						
L TP		-50	10	-32		6	
L TP		-52	4	-26		5	
L TP		-44	8	-20		4	
L AG	1240						
L AG (PGa)		-54	-56	20		4	
L AG (PGp)		-48	-70	26		2	

Table S30. Multimodal convergence zones (overlap between the meta-analytic maps for all conceptual modalities).

Region	Cluster size (mm³)	x	y	z	ALE	P	Z
Trimodal: Action & Sound & Motion							
L pMTG (core)	264						
L pMTG		-58	-40	0	0.014	8.87E-05	3.749
L pMTG		-56	-46	2	0.014	1.48E-04	3.618
L IPL (PFcm)	256	-60	-42	26	0.017	1.83E-05	4.127
Bimodal: Action & Sound							
L dmPFC	208	-2	28	42	0.014	1.67E-04	3.587
L pMTG (belt)	168	-58	-40	-6	0.013	2.02E-04	3.537
L IPL (PF)	72	-56	-38	28	0.012	5.93E-04	3.242
Bimodal: Action & Color							
L IPS (hIP3)	488	-36	-62	44	0.018	6.97E-07	4.826
L FG4	88	-36	-46	-20	0.009	7.04E-04	3.193
L FG4	64	-46	-52	-16	0.010	3.12E-04	3.421
Bimodal: Action & Emotion							
L AG (PGp)	328	-46	-64	22	0.023	2.91E-05	4.020
Bimodal: Action & Motion							
L pMTG (posterior)	2144	-56	-56	4	0.024	4.02E-08	5.366
L IPL (PF/PFt)	904	-58	-44	16	0.014	1.07E-04	3.702
L pMTG (anterior)	496	-62	-38	-4	0.011	8.02E-04	3.155
L IFG (tri)	376	-52	22	16	0.011	6.14E-04	3.232
L FG3	72	-34	-42	-22	0.011	6.95E-04	3.197

Bimodal: Action & Olfaction-Gustation							
L OFC (Fo3)	216	-28	36	-14	0.014	3.28E-05	3.991
Bimodal: Action & Shape							
L LOC (hOc4la)	1024	-52	-66	-4	0.020	5.90E-07	4.859
L PreCS	736	-44	2	28	0.010	9.67E-04	3.100
L FG4	104	-40	-42	-22	0.010	9.78E-04	3.106
Bimodal: Motion & Sound							
L IPL (PFm/PF)	248	-60	-44	26	0.016	3.29E-05	3.991
L pMTG (belt)	72	-58	-46	2	0.012	4.09E-04	3.346
L pMTG (belt)	56	-62	-42	-4	0.011	4.74E-04	3.305
Bimodal: Emotion & Motion							
L TPJ (PGp/PGa)	176	-54	-60	20	0.011	4.51E-04	3.320

Supplementary analyses without low-level contrasts
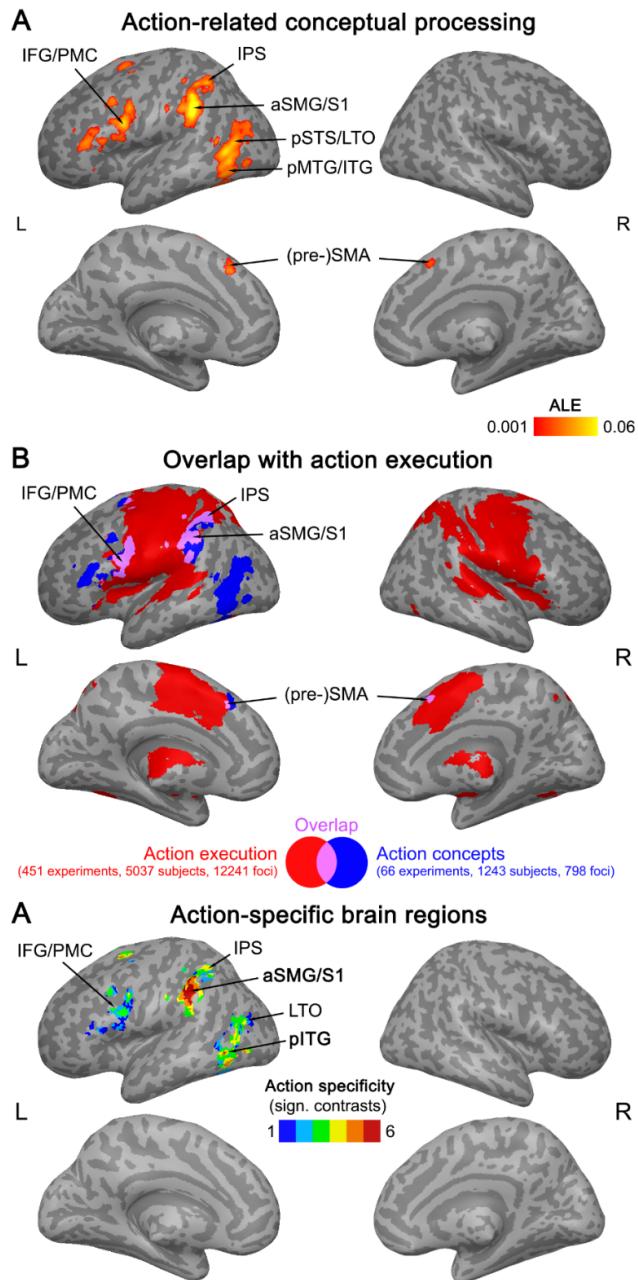
Figure S1. (A) Results of a supplementary ALE meta-analysis on action-related conceptual processing that excluded low-level contrasts (thresholded at a voxel-wise p < 0.001, cluster-wise p < 0.05 FWE-corrected). (B) Overlap (purple) between meta-analytic maps for action-related conceptual processing (blue) and real action execution (red). (C) Regions showing consistent engagement for conceptual processing related to action and no other modality, and higher activation likelihood for action than the other modalities (number of significant contrasts is displayed).
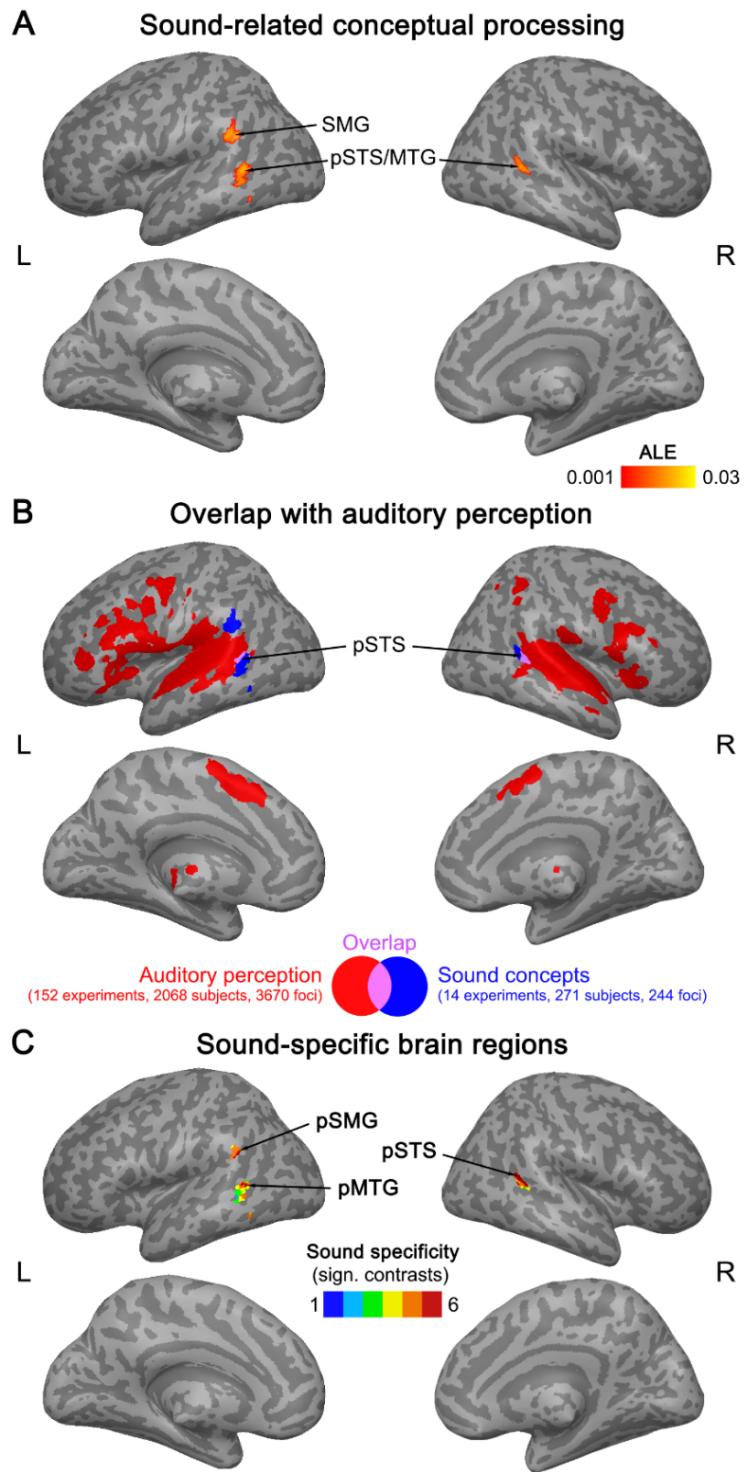
Figure S2. (A) Results of a supplementary ALE meta-analysis on sound-related conceptual processing that excluded low-level contrasts (thresholded at a voxel-wise p < 0.001, cluster-wise p < 0.05 FWE-corrected). (B) Overlap (purple) between meta-analytic maps for sound-related conceptual processing (blue) and real sound perception (red). (C) Regions showing consistent engagement for conceptual processing related to sound and no other modality, and higher activation likelihood for sound than the other modalities (number of significant contrasts is displayed).

A Shape-related conceptual processing

L

LOC (hOc4la)

ALE
0.001 0.03

B Overlap with visual shape perception

L

LOC (hOc4la)

Overlap

Shape perception
(147 experiments, 1869 subjects, 3074 foci)

Shape concepts
(20 experiments, 316 subjects, 223 foci)

C Shape-specific brain regions

L

LOC (hOc4la)

Shape specificity
(sign. contrasts)
1 6
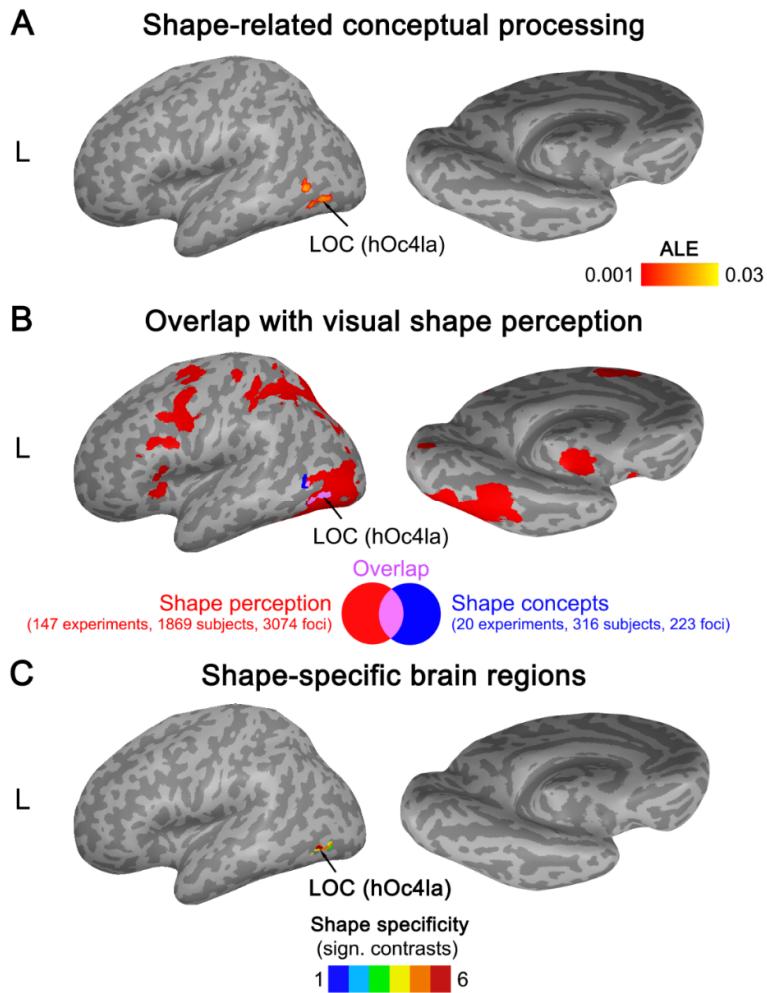
Figure S3. (A) Results of a supplementary ALE meta-analysis on shape-related conceptual processing that excluded low-level contrasts (thresholded at a voxel-wise p < 0.001, cluster-wise p < 0.05 FWE-corrected). (B) Overlap (purple) between meta-analytic maps for shape-related conceptual processing (blue) and real visual shape perception (red). (C) Regions showing consistent engagement for conceptual processing related to shape and no other modality, and higher activation likelihood for shape than the other modalities (number of significant contrasts is displayed).
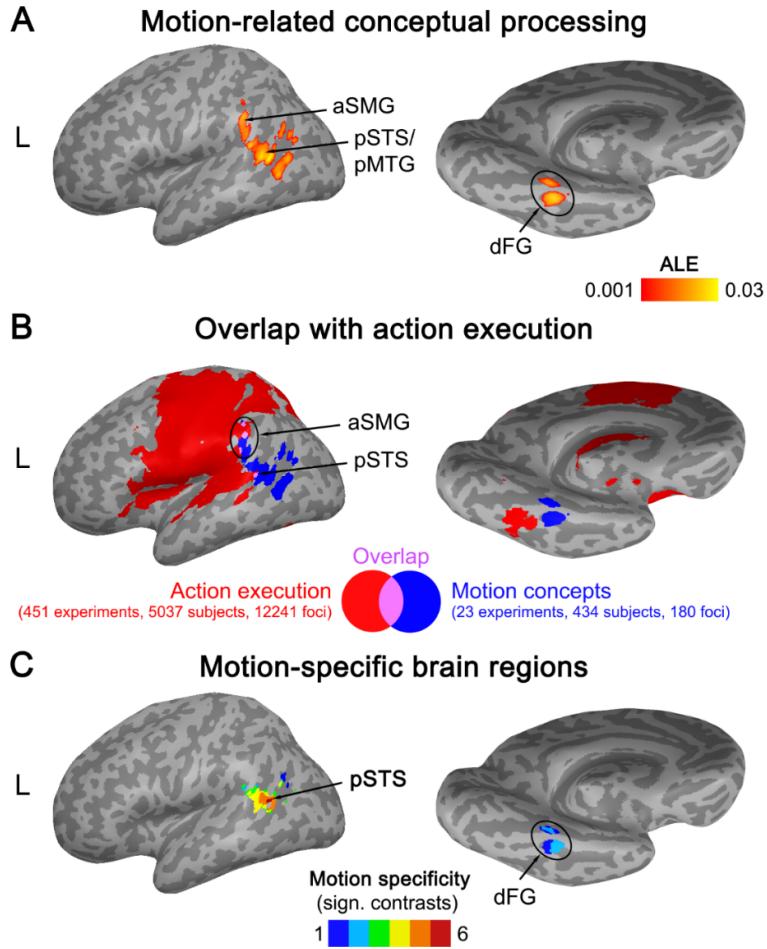
Figure S4. (A) Results of a supplementary ALE meta-analysis on motion-related conceptual processing that excluded low-level contrasts (thresholded at a voxel-wise p < 0.001, cluster-wise p < 0.05 FWE-corrected). (B) Overlap (purple) between meta-analytic maps for motion-related conceptual processing (blue) and real action execution (red). (C) Regions showing consistent engagement for conceptual processing related to motion and no other modality, and higher activation likelihood for motion than the other modalities (number of significant contrasts is displayed).
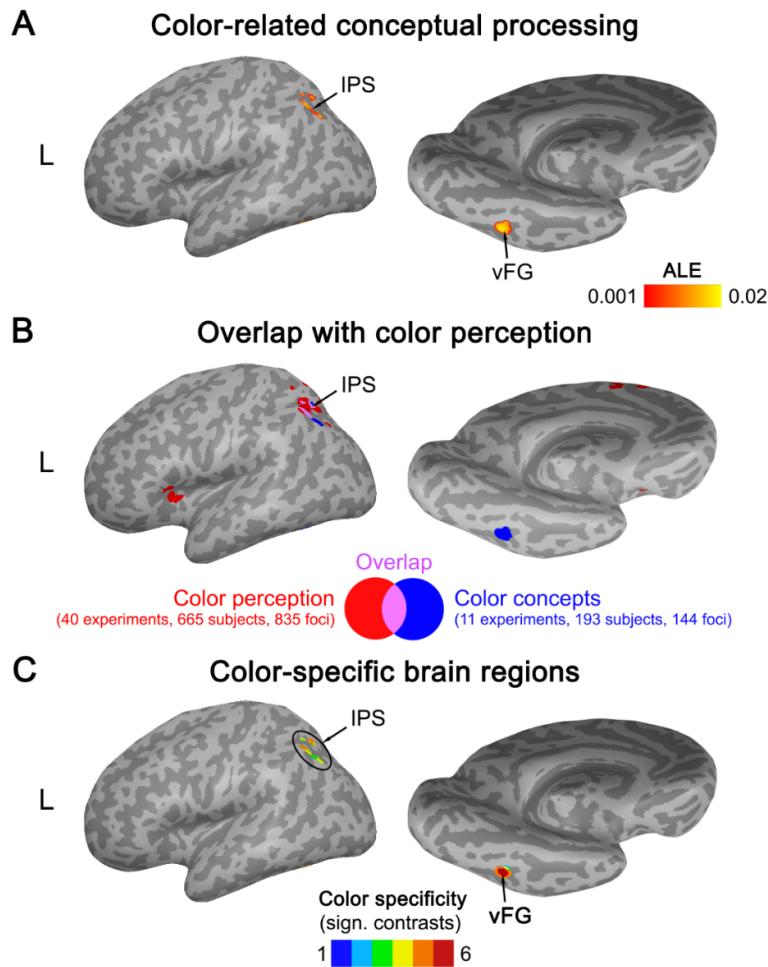
Figure S5. (A) Results of a supplementary ALE meta-analysis on color-related conceptual processing that excluded low-level contrasts (thresholded at a voxel-wise p < 0.001, cluster-wise p < 0.05 FWE-corrected). (B) Overlap (purple) between meta-analytic maps for color-related conceptual processing (blue) and real color perception (red). (C) Regions showing consistent engagement for conceptual processing related to color and no other modality, and higher activation likelihood for color than the other modalities (number of significant contrasts is displayed).
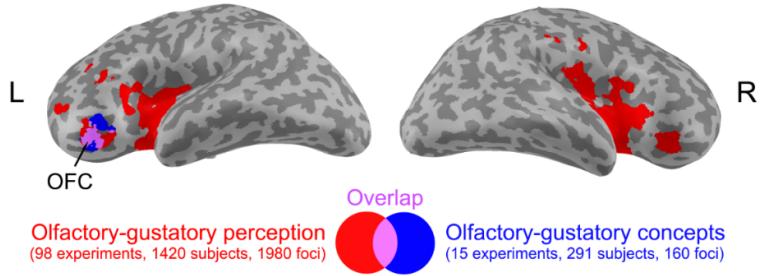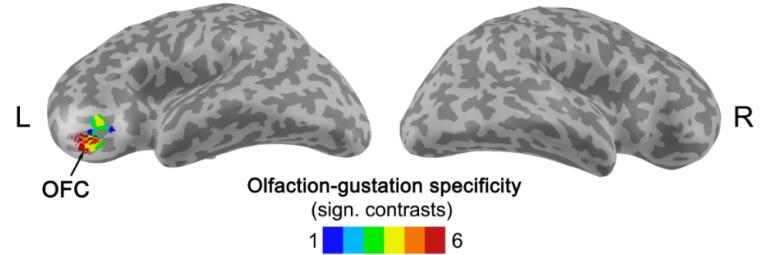
Figure S6. (A) Results of a supplementary ALE meta-analysis on olfaction-gustation related conceptual processing that excluded low-level contrasts (thresholded at a voxel-wise $p < 0.001$, cluster-wise $p < 0.05$ FWE-corrected). (B) Overlap (purple) between meta-analytic maps for olfaction-gustation related conceptual processing (blue) and real olfactory-gustatory perception (red). (C) Regions showing consistent engagement for conceptual processing related to olfaction-gustation and no other modality, and higher activation likelihood for olfaction-gustation than the other modalities (number of significant contrasts is displayed).
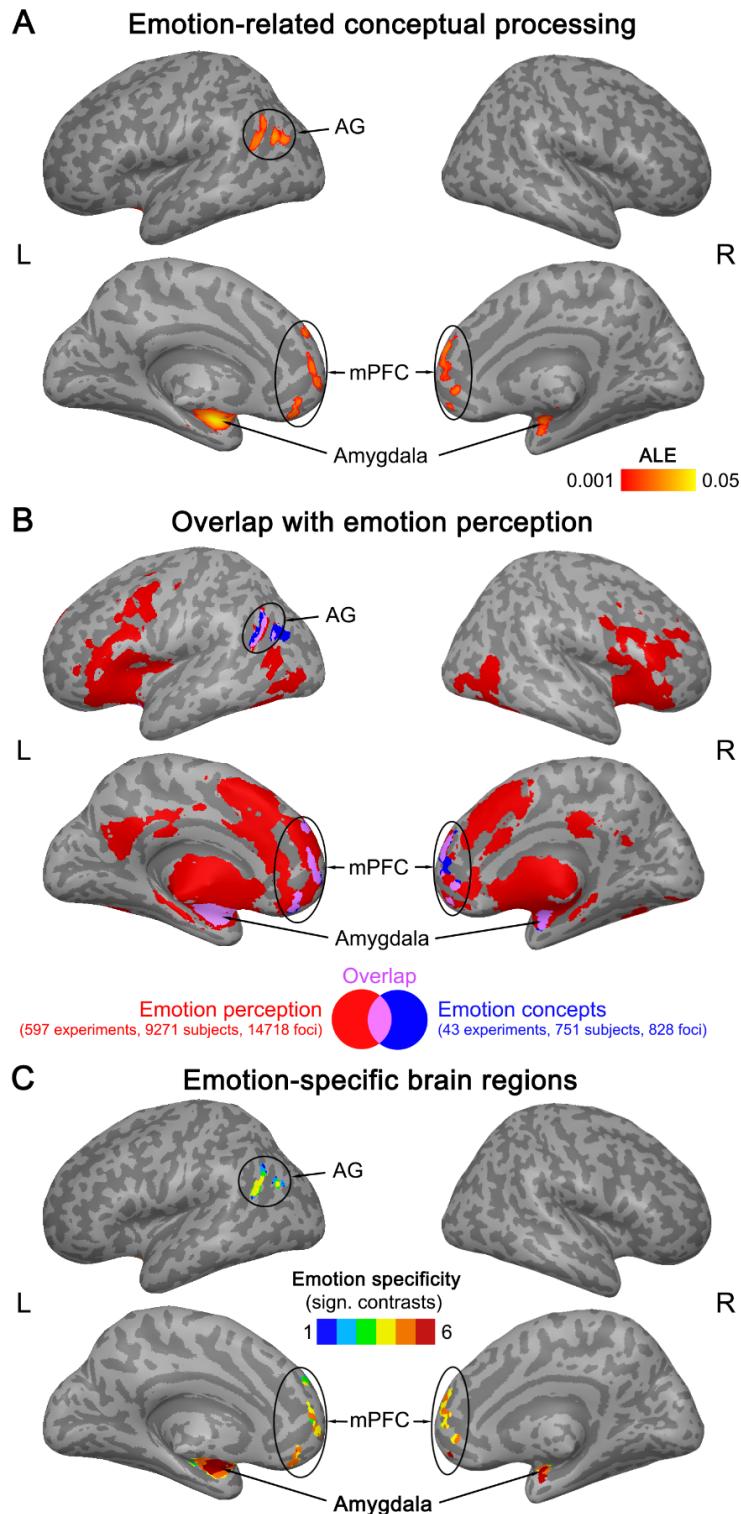
Figure S7. (A) Results of a supplementary ALE meta-analysis on emotion-related conceptual processing that excluded low-level contrasts (thresholded at a voxel-wise $p < 0.001$, cluster-wise $p < 0.05$ FWE-corrected). (B) Overlap (purple) between meta-analytic maps for emotion-related conceptual processing (blue) and real emotion perception (red). (C) Regions showing consistent engagement for conceptual processing related to emotion and no other modality, and higher activation likelihood for emotion than the other modalities (number of significant contrasts is displayed).

**No overlap between motion-related conceptual processing and visual motion perception**

L   R

Visual motion perception
(97 experiments, 1019 subjects, 2703 foci)

Motion concepts
(24 experiments, 450 subjects, 220 foci)
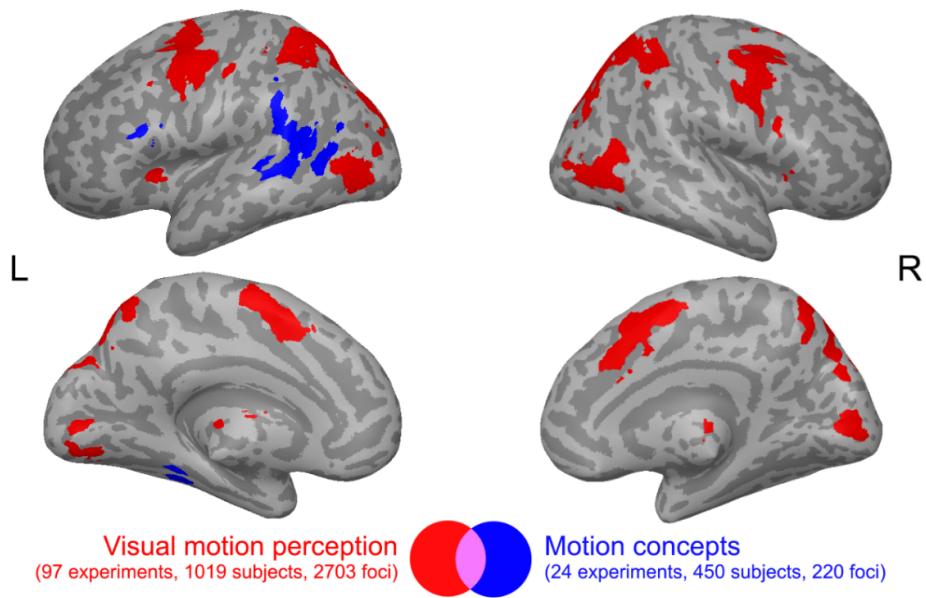
Figure S8. Motion-related conceptual processing (blue) did not overlap with real visual motion perception (red).

Experiment Tables

The following tables summarize essential information on the included experiments and contrasts for each ALE meta-analysis.

Table S31. Experiments included in the ALE meta-analysis on conceptual processing related to action.

| Exp.	Paper	Method	Participants (N)	Task	Stimulus Modality	Contrast	Space	Foci (N)	Contrast Type
1	Baumgaertner et al. (2007)	fMRI	19	semantic decision	spoken sentences	action sentences > non-action sentences	MNI	9	high
1	Baumgaertner et al. (2007)	fMRI	19	semantic decision	videos	action sentences > non-action sentences	MNI	2	high
1	Baumgaertner et al. (2007)	fMRI	19	semantic decision	spoken sentences, videos	(action > non-action sentences) ∩ (action > non-action videos)	MNI	3	high
2	Bedny et al. (2008)	fMRI	12	semantic decision	spoken words	action verbs > animal nouns	MNI	1	high
3	Bellebaum et al. (2013)	fMRI	16	perceptual decision	pictures	post- > pre-training for manipulation > scrambled images	MNI	16	high
4	Bonner et al. (2013)	fMRI	20	lexical decision	written words	manipulation words > sound words	MNI	4	high
4	Bonner et al. (2013)	fMRI	20	lexical decision	written words	manipulation words > pseudowords	MNI	8	high
5	Borghesani et al. (2019)	fMRI	13	semantic decision	pictures	tool pictures > animal pictures	MNI	2	high
6	Boronat et al. (2005)	fMRI	15	semantic decision	pictures, written words	manipulation > pseudowords and scrambled pictures	MNI	7	high
6	Boronat et al. (2005)	fMRI	15	semantic decision	written words	manipulable objects > pseudowords	MNI	5	high
6	Boronat et al. (2005)	fMRI	15	semantic decision	pictures	manipulable objects > scrambled pictures	MNI	7	high
7	Boulenger et al. (2009)	fMRI	18	passive reading	written sentences	early analysis: action sentences > hashmarks	MNI	11	low
7	Boulenger et al. (2009)	fMRI	18	passive reading	written sentences	late analysis: action sentences > hashmarks	MNI	10	low
7	Boulenger et al. (2009)	fMRI	18	passive reading	written sentences	early analysis: literal sentences > hash marks	MNI	12	low
7	Boulenger et al. (2009)	fMRI	18	passive reading	written sentences	late analysis: literal sentences > hash marks	MNI	10	low
7	Boulenger et al. (2009)	fMRI	18	passive reading	written sentences	early analysis: idiomatic sentences > hash marks	MNI	14	low
7	Boulenger et al. (2009)	fMRI	18	passive reading	written sentences	late analysis: idiomatic sentences > hash marks	MNI	13	low

Exp.	Paper	Method	Participants (N)	Task	Stimulus Modality	Contrast	Space	Foci (N)	Contrast Type
8	Bracci & Peelen (2013)	fMRI	13	working memory recall	pictures	object effectors > non-effector object control	TAL	1	high
9	Cappa et al. (1998)	PET	13	semantic decision	written words	tools > animals	TAL	4	high
9	Cappa et al. (1998)	PET	13	semantic decision	written words	associative semantics (tools) > pseudowords	TAL	3	high
10	Chao & Martin (2000)	fMRI	5	passive viewing	pictures	tool pictures > animal pictures	TAL	2	high
10	Chao & Martin (2000)	fMRI	5	naming	pictures	tool pictures > animal pictures	TAL	3	high
11	Chow et al. (2014)	fMRI	24	semantic decision	spoken narratives	action paragraphs > perception and emotion paragraphs	MNI	2	high
12	Damasio et al. (1996)	PET	9	picture naming	pictures	tools > unfamiliar faces	TAL	3	high
12	Damasio et al. (1996)	PET	9	picture naming	pictures	tools > unfamiliar faces	TAL	3	high
12	Damasio et al. (1996)	PET	9	picture naming	pictures	tools > unfamiliar faces	TAL	3	high
13	Damasio et al. (2001)	PET	20	naming	pictures	actions performed with a tool > orientation of faces	TAL	21	high
13	Damasio et al. (2001)	PET	20	naming	pictures	actions performed with a tool > concrete entities	TAL	3	high
14	De Grauwe et al. (2014)	fMRI	20	semantic decision	written words	motor words > non-motor words	MNI	14	high
15	Desai et al. (2010)	fMRI	33	semantic decision	spoken sentences	motor sentences > visual sentences	TAL	2	high
15	Desai et al. (2010)	fMRI	33	semantic decision	spoken sentences	motor sentences > abstract sentences	TAL	2	high
15	Desai et al. (2010)	fMRI	33	semantic decision	spoken sentences	hand associations > arm associations	TAL	17	high
16	Desai et al. (2011)	fMRI	22	semantic decision	written sentences	literal action sentences > abstract sentences	TAL	9	high
16	Desai et al. (2011)	fMRI	22	semantic decision	written sentences	metaphoric action sentences > abstract sentences	TAL	8	high
16	Desai et al. (2011)	fMRI	22	semantic decision	written sentences	literal action sentences > metaphoric action sentences	TAL	1	high
17	Desai et al. (2013)	fMRI	27	semantic decision	written sentences	metaphorical action sentences > abstract sentences	TAL	3	high
17	Desai et al. (2013)	fMRI	27	semantic decision	written sentences	idiomatic action sentences > abstract sentences	TAL	4	high
17	Desai et al. (2013)	fMRI	27	semantic decision	written sentences	literal sentences > abstract sentences	TAL	12	high

Exp.	Paper	Method	Participants (N)	Task	Stimulus Modality	Contrast	Space	Foci (N)	Contrast Type
18	Desai et al. (2016)	fMRI	40	passive reading	written sentences	correlation with noun manipulability	TAL	11	high
19	Desai et al. (2016)	fMRI	31	passive reading	written narratives	correlation with noun manipulability	TAL	15	high
20	Dreyer et al. (2018)	fMRI	28	passive reading	written words	tool words > hash marks	MNI	7	low
21	Fernandino et al. (2016)	fMRI	44	semantic decision	written words	manipulation > other attributes	TAL	1	high
21	Fernandino et al. (2016)	fMRI	44	semantic decision	written words	manipulation > other attributes except shape	TAL	14	high
22	Gilead et al. (2016)	fMRI	28	semantic decision	written sentences	actions: how > why	MNI	9	high
23	Goldberg et al. (2006a)	fMRI	13	word generation, semantic decision	written words	functional words > visual words	TAL	2	high
24	Grossman et al. (2002a)	fMRI	16	semantic decision	written words	implements > animal words	TAL	2	high
24	Grossman et al. (2002a)	fMRI	16	semantic decision	written words	implements > pseudowords	TAL	2	high
25	Hauk et al. (2004)	fMRI	14	passive reading	written words	action words > hash marks	MNI	7	low
25	Hauk et al. (2004)	fMRI	14	passive reading	written words	face words > hash marks	MNI	9	low
25	Hauk et al. (2004)	fMRI	14	passive reading	written words	arm words > hash marks	MNI	10	low
25	Hauk et al. (2004)	fMRI	14	passive reading	written words	leg words > hash marks	MNI	10	low
26	Hauk et al. (2008)	fMRI	21	passive reading	written words	correlation with action-relatedness	MNI	5	high
27	Hoenig et al. (2008)	fMRI	20	semantic decision	written words	artifactual items > natural items	MNI	6	high
28	Hoeren et al. (2013)	fMRI	30	semantic decision	pictures, videos	context tool use incorrect > context tool use correct	MNI	8	high
28	Hoeren et al. (2013)	fMRI	30	semantic decision	pictures, videos	correct hand postures > incorrect hand postures	MNI	2	high
29	Johnson-Frey et al. (2005)	fMRI	13	mental imagery	spoken words	right hand: tool use gestures > non-meaningful gestures	TAL	26	high
29	Johnson-Frey et al. (2005)	fMRI	13	mental imagery	spoken words	left hand: tool use gestures > non-meaningful gestures	TAL	13	high

Exp.	Paper	Method	Participants (N)	Task	Stimulus Modality	Contrast	Space	Foci (N)	Contrast Type
30	Just et al. (2010)	fMRI	11	mental imagery	written words	manipulation factor	MNI	4	low
31	Kable & Chatterjee (2006)	fMRI	9	semantic decision	videos	new person, new action > new person, old action	MNI	5	high
32	Kana et al. (2012)	fMRI	24	semantic decision	written sentences	action verbs > mental verbs	MNI	8	high
33	Kellenbach et al. (2003)	PET	9	semantic decision	pictures	action: semantic decision on objects > perceptual decision on scrambled pictures	MNI	9	high
33	Kellenbach et al. (2003)	PET	9	semantic decision	pictures	manipulable function: semantic decision on object > perceptual decision on scrambled pictures	MNI	9	high
34	Kemmerer et al. (2008)	fMRI	16	semantic decision	written words	hitting verbs > meaningless symbols	MNI	14	low
34	Kemmerer et al. (2008)	fMRI	16	semantic decision	written words	cutting verbs > meaningless symbols	MNI	23	low
35	Khader et al. (2010)	fMRI	17	word generation task, rhyme generation task	written sentences	verb generation > rhyme generation	TAL	2	high
35	Khader et al. (2010)	fMRI	17	word generation task, rhyme generation task	written sentences	verb generation > letter search	TAL	5	high
36	Kleineberg et al. (2018)	fMRI	18	semantic decision	pictures	manipulation > function and monetary value	MNI	6	high
37	Kuhnke et al. (2020)	fMRI	40	semantic decision	written words	high > low action words	MNI	65	high
38	Lauro et al. (2013)	fMRI	24	semantic decision	written sentences	action sentences involving upper-limb > cognition sentences	MNI	8	high
38	Lauro et al. (2013)	fMRI	24	semantic decision	written sentences	idiomatic action sentences involving upper-limb > cognition sentences	MNI	3	high
38	Lauro et al. (2013)	fMRI	24	semantic decision	written sentences	literal action sentences involving upper-limb > cognition sentences	MNI	4	high
39	Macdonald & Culham (2015)	fMRI	12	passive viewing	pictures	tool pictures > non-tool pictures	TAL	16	high
40	Martin et al. (1995)	PET	12	word generation	pictures	action word generation > color word generation	TAL	5	high
40	Martin et al. (1995)	PET	12	word generation	written words	action word generation > color word generation	TAL	4	high
40	Martin et al. (1995)	PET	12	word generation	pictures	action word generation > object naming	TAL	10	high
41	Martin et al. (1996)	PET	16	passive naming, naming	pictures	silently naming tools > viewing non-sense objects	TAL	9	high

Exp.	Paper	Method	Participants (N)	Task	Stimulus Modality	Contrast	Space	Foci (N)	Contrast Type
42	Moseley et al. (2012)	fMRI	18	passive reading	written words	face action words > hash marks	MNI	17	low
42	Moseley et al. (2012)	fMRI	18	passive reading	written words	arm action words > hash marks	MNI	18	low
43	Neudorf et al. (2019)	fMRI	25	mental imagery, lexical decision	written words	(related > unrelated) for (action > object priming)	MNI	13	high
44	Nijhof & Willems (2015)	fMRI	18	passive listening	spoken narratives	action sentences > mentalizing sentences	MNI	3	high
45	Noppeney et al. (2005)	fMRI	12	semantic decision	spoken words	action words > auditory, motion, visual words	TAL	2	high
45	Noppeney et al. (2005)	fMRI	12	semantic decision	spoken words	hand action words > body movement words	TAL	1	high
46	Noppeney et al. (2005)	fMRI	15	semantic decision	written words	action words > auditory, motion, visual words	TAL	2	high
46	Noppeney et al. (2005)	fMRI	27	semantic decision	spoken words, written words	action words > auditory, motion, visual words	TAL	2	high
47	Noppeney et al. (2006)	fMRI	22	semantic decision	pictures, written words	tools > animals	TAL	7	high
47	Noppeney et al. (2006)	fMRI	22	semantic decision	pictures, written words	explicit > implicit task for tools > animals	TAL	3	high
48	Peelen et al. (2013)	fMRI	16	semantic decision	spoken words	tool words > animals and nonmanipulable object words	TAL	1	high
49	Phillips et al. (2002)	PET	12	semantic decision	pictures, written words	(action > size retrieval) ∩ (action retrieval > screen size control)	MNI	3	high
49	Phillips et al. (2002)	PET	12	semantic decision	pictures, written words	tools > fruit	MNI	2	high
50	Popp et al. (2019a)	fMRI	22	lexical decision	written words	action verbs > sound verbs	MNI	4	high
50	Popp et al. (2019a)	fMRI	22	lexical decision	written words	action ratings > sound ratings	MNI	4	high
50	Popp et al. (2019a)	fMRI	22	lexical decision	written words	action verbs > pseudoverbs	MNI	46	high
51	Popp et al. (2019b)	fMRI	30	semantic decision	written words	action > sound verbs	MNI	7	high
51	Popp et al. (2019b)	fMRI	30	semantic decision	written words	semantically-related action verbs > semantically-related sound verbs	MNI	12	high
51	Popp et al. (2019b)	fMRI	30	lexical decision	written words	repetition suppression by action verbs	MNI	1	high
51	Popp et al. (2019b)	fMRI	30	lexical decision	written words	repetition enhancement by action verbs	MNI	5	high

Exp.	Paper	Method	Participants (N)	Task	Stimulus Modality	Contrast	Space	Foci (N)	Contrast Type
52	Raposo et al. (2009)	fMRI	14	passive listening	spoken words	action words > non-action words	MNI	1	high
53	Raposo et al. (2009)	fMRI	22	passive listening	spoken sentences	literal sentences > idiomatic sentences	MNI	1	high
54	Ruby & Decety (2001)	PET	10	mental imagery	pictures, spoken sentences	first-person perspective: (auditory action sentences > auditory non-action sentences) ∩ (imagery of interaction with objects > passively viewing objects)	MNI	9	high
54	Ruby & Decety (2001)	PET	10	mental imagery	pictures, spoken sentences	third-person perspective: (auditory action sentences > auditory non-action sentences) ∩ (imagery of interaction with objects > passively viewing objects)	MNI	7	high
55	Rueschemeyer et al. (2007)	fMRI	20	lexical decision	written words	(simple motor > simple abstract verbs) > (complex motor > complex abstract verbs)	TAL	3	high
55	Rueschemeyer et al. (2007)	fMRI	20	lexical decision	written words	simple verbs: motor > abstract	TAL	9	high
55	Rueschemeyer et al. (2007)	fMRI	20	lexical decision	written words	complex verbs: motor > abstract	TAL	2	high
55	Rueschemeyer et al. (2007)	fMRI	20	lexical decision	written words	(task > baseline) ∩ (simple motor > simple abstract verbs)	TAL	5	high
56	Rueschemeyer et al. (2010)	fMRI	14	lexical decision	written words	objects: manipulability necessary for function > manipulability not necessary for function	MNI	5	high
57	Speer et al. (2009)	fMRI	28	passive reading	written narratives	manipulable-object change > other changes	MNI	1	high
57	Speer et al. (2009)	fMRI	28	passive reading	written narratives	manipulable-object change > clause onset	MNI	10	high
58	Spunt & Lieberman (2012)	fMRI	21	semantic decision	videos, written sentences	actions: video (how > why) ∩ text (how > why)	MNI	6	high
59	Tettamanti et al. (2005)	fMRI	17	passive listening	spoken sentences	action sentences > abstract sentences	MNI	1	high
59	Tettamanti et al. (2005)	fMRI	17	passive listening	spoken sentences	mouth sentences > abstract sentences	MNI	5	high
59	Tettamanti et al. (2005)	fMRI	17	passive listening	spoken sentences	hand sentences > abstract sentences	MNI	8	high
59	Tettamanti et al. (2005)	fMRI	17	passive listening	spoken sentences	leg sentences > abstract sentences	MNI	5	high
60	Tettamanti et al. (2008)	fMRI	18	passive listening	spoken sentences	action sentences > abstract sentences	MNI	10	high
60	Tettamanti et al. (2008)	fMRI	18	passive listening	spoken sentences	(action-related affirmative > action-related negative sentences) > (abstract affirmative > abstract negative sentences)	MNI	6	high

Exp.	Paper	Method	Participants (N)	Task	Stimulus Modality	Contrast	Space	Foci (N)	Contrast Type
61	Tomasino et al. (2007)	fMRI	15	mental imagery, perceptual decision	written sentences	motor sentences > non-motor sentences	MNI	1	high
61	Tomasino et al. (2007)	fMRI	15	mental imagery, perceptual decision	written sentences	imagery > letter detection for motor > non-motor sentences	MNI	1	high
62	Tomasino et al. (2014)	fMRI	24	mental imagery	written words	(imagery: action > abstract) > (letter detection: action > abstract)	MNI	15	high
63	van Ackeren et al. (2016)	fMRI	22	semantic decision	spoken narratives	indirect request to act > indirect reply	MNI	3	high
64	van Dam et al. (2010)	fMRI	14	semantic decision	written words	action verbs > abstract verbs	MNI	5	high
64	van Dam et al. (2010)	fMRI	14	semantic decision	written words	highly-specific action verbs > basic action verbs	MNI	4	high
64	van Dam et al. (2010)	fMRI	14	semantic decision	written words	basic action verbs > highly-specific action verbs	MNI	1	high
64	van Dam et al. (2010)	fMRI	14	semantic decision	written words	basic action verbs > fixation	MNI	8	low
64	van Dam et al. (2010)	fMRI	14	semantic decision	written words	highly-specific action verbs > fixation	MNI	8	low
65	van Dam et al. (2019)	fMRI	17	semantic decision	pictures	action pictures > manner pictures	TAL	8	high
65	van Dam et al. (2019)	fMRI	17	semantic decision	pictures	action pictures > scrambled action pictures	TAL	6	high
65	van Dam et al. (2019)	fMRI	17	lexical decision, go/no-go	written words	action verbs > pseudoverbs	TAL	5	high
66	Warburton et al. (1996)	PET	4	word generation	spoken words	verb generation > passive listening	TAL	10	high
66	Warburton et al. (1996)	PET	4	word generation	spoken words	verb generation > rest	TAL	12	low
67	Warburton et al. (1996)	PET	9	word generation	spoken words	verb generation > rest	TAL	9	low
67	Warburton et al. (1996)	PET	9	word generation	spoken words	verb generation > rest	TAL	14	low
68	Warburton et al. (1996)	PET	6	word generation	spoken words	verb generation > silent repetition of pseudowords	TAL	5	high
68	Warburton et al. (1996)	PET	6	word generation	spoken words	verb generation > rest	TAL	11	low
69	Warburton et al. (1996)	PET	9	word generation	spoken words	verb generation > noun generation	TAL	6	high
69	Warburton et al. (1996)	PET	9	word generation	spoken words	verb-noun comparison > rest	TAL	5	low
70	Webster et al. (2017)	fMRI	17	semantic decision	sounds	action sound > vocalization sound	TAL	7	high

Exp.	Paper	Method	Participants (N)	Task	Stimulus Modality	Contrast	Space	Foci (N)	Contrast Type
71	Wheatley et al. (2005)	fMRI	15	passive reading	written words	tools > animate objects	TAL	7	high
72	Willems et al. (2010)	fMRI	20	lexical decision	written words	lexical decision: manual verbs > non-manual verbs	MNI	3	high
72	Willems et al. (2010)	fMRI	20	lexical decision	written words	imagery: manual verbs > non-manual verbs	MNI	8	high
72	Willems et al. (2010)	fMRI	20	lexical decision	written words	[lexical decision on manual verbs > rest] ∩ [lexical decision on non-manual verbs > rest]	MNI	25	low
72	Willems et al. (2010)	fMRI	20	lexical decision	written words	[imagery for manual verbs > rest] ∩ [Imagery for non-manual verbs > rest]	MNI	16	low
73	Wriessnegger et al. (2016)	fMRI	21	mental imagery	pictograms	motor imagery joint action > motor imagery single action	MNI	2	high
73	Wriessnegger et al. (2016)	fMRI	21	mental imagery	pictograms	motor imagery joint action > fixation	MNI	2	low
73	Wriessnegger et al. (2016)	fMRI	21	mental imagery	pictograms	motor imagery single action > fixation	MNI	3	low
73	Wriessnegger et al. (2016)	fMRI	21	mental imagery	pictograms	motor imagery > fixation	MNI	5	low
74	Yang & Shu (2014)	fMRI	20	mental imagery, passive reading	written words	hand actions: motor imagery > passive reading	TAL	6	high
74	Yang & Shu (2014)	fMRI	20	mental imagery, passive reading	written words	hand and tool actions: motor imagery > passive reading	TAL	6	high
74	Yang & Shu (2014)	fMRI	20	mental imagery, passive reading	written words	tool actions: motor imagery > passive reading	TAL	6	high
74	Yang & Shu (2014)	fMRI	20	mental imagery, passive reading	written words	motor imagery > rest	TAL	11	low

Table S32. Experiments included in the ALE meta-analysis on conceptual processing related to sound.

Exp.	Paper	Method	Participants (N)	Task	Stimulus Modality	Contrast	Space	Foci (N)	Contrast Type
1	Bonner et al. (2013)	fMRI	20	lexical decision	written words	sound words > sight words	MNI	1	high
1	Bonner et al. (2013)	fMRI	20	lexical decision	written words	sound words > pseudowords	MNI	5	high
2	Fernandino et al. (2016)	fMRI	44	semantic decision	written words	sound > other attributes	TAL	7	high
2	Fernandino et al. (2016)	fMRI	44	semantic decision	written words	sound > other attributes except motion	TAL	3	high
3	Goldberg et al. (2006b)	fMRI	14	semantic decision	written words	auditory words > gustatory, tactile, visual words	TAL	1	high
4	Halpern & Zatorre (1999)	PET	8	mental imagery	none	auditory imagery > listening	TAL	16	high
4	Halpern & Zatorre (1999)	PET	8	mental imagery	none	auditory imagery after cue > imagery of control sequence	TAL	10	high
4	Halpern & Zatorre (1999)	PET	8	mental imagery	none	auditory imagery of control sequence > listening	TAL	9	high
5	Halpern et al. (2004)	fMRI	10	mental imagery	written words	timbre imagery > visual imagery	TAL	2	high
5	Halpern et al. (2004)	fMRI	10	mental imagery	written words	timbre imagery > visual imagery	TAL	7	high
5	Halpern et al. (2004)	fMRI	10	mental imagery	written words	timbre imagery ∩ timbre perception	TAL	3	high
6	Hoenig et al. (2011)	fMRI	40	semantic decision	pictures, written words	(musicians > non-musicians) for (musical instruments > control objects)	MNI	12	low
7	Kellenbach et al. (2001)	PET	10	semantic decision	written words	sound verifications > color verifications	MNI	2	high
7	Kellenbach et al. (2001)	PET	10	semantic decision	written words	sound verifications > size verifications	MNI	5	high
7	Kellenbach et al. (2001)	PET	10	semantic decision	written words	sound verifications > color and size verifications	MNI	4	high
7	Kellenbach et al. (2001)	PET	10	semantic decision	written words	sound verifications > letter-strings	MNI	12	high
8	Kiefer et al. (2008)	fMRI	16	lexical decision	written words	(words with > without auditory features) ∩ (object sounds > silence)	MNI	1	high
8	Kiefer et al. (2008)	fMRI	16	lexical decision	written words	words with > without auditory features	MNI	8	high
8	Kiefer et al. (2008)	fMRI	16	lexical decision	written words	correlation of auditory conceptual feature ratings	MNI	1	high
9	Kuhnke et al. (2020)	fMRI	40	semantic decision	written words	high > low sound words	MNI	21	high
10	Noppeney et al. (2002)	PET	12	semantic decision	spoken words	auditory words > visual and abstract words	TAL	1	high

Exp.	Paper	Method	Participants (N)	Task	Stimulus Modality	Contrast	Space	Foci (N)	Contrast Type
11	Popp et al. (2019a)	fMRI	22	lexical decision	written words	sound verbs > action verbs	MNI	18	high
11	Popp et al. (2019a)	fMRI	22	lexical decision	written words	sound verbs > pseudoverbs	MNI	36	high
12	Popp et al. (2019b)	fMRI	30	semantic decision	written words	sound verbs > action verbs	MNI	8	high
12	Popp et al. (2019b)	fMRI	30	semantic decision	written words	semantically-related sound verbs > semantically-related action verbs	MNI	2	high
12	Popp et al. (2019b)	fMRI	30	lexical decision	written words	repetition enhancement by sound verbs	MNI	9	high
13	Wheeler et al. (2000)	fMRI	18	episodic memory recall	written words	sound recall > picture recall	TAL	9	high
14	Yoo et al. (2001)	fMRI	12	mental imagery	none	auditory imagery > rest	TAL	19	low
15	Zatorre et al. (1996)	PET	12	perceptual decision, mental imagery	written words	decision on pitch in perceptual and imagery task > decision on word length	TAL	21	high
16	Zvyagintsev et al. (2013)	fMRI	15	mental imagery	none	auditory imagery > visual imagery	TAL	15	high
16	Zvyagintsev et al. (2013)	fMRI	15	mental imagery	none	auditory imagery > backwards counting	TAL	7	high

Table S33. Experiments included in the ALE meta-analysis on conceptual processing related to visual shape.

Exp.	Paper	Method	Participants (N)	Task	Stimulus Modality	Contrast	Space	Foci (N)	Contrast Type
1	Bonner et al. (2013)	fMRI	20	lexical decision	written words	visual words > sound words	MNI	1	high
1	Bonner et al. (2013)	fMRI	20	lexical decision	written words	visual words > pseudowords	MNI	6	high
2	Cappa et al. (1998)	PET	13	semantic decision	written words	visual > associative	TAL	12	high
2	Cappa et al. (1998)	PET	13	semantic decision	written words	visual semantics (animals) > pseudowords	TAL	8	high
2	Cappa et al. (1998)	PET	13	semantic decision	written words	visual semantics (tools) > pseudowords	TAL	6	high
3	D'Esposito et al. (1997)	fMRI	7	mental imagery	spoken words, sounds	concrete > abstract	TAL	3	high
4	Fernandino et al. (2016)	fMRI	44	semantic decision	written words	shape > other attributes	TAL	24	high
4	Fernandino et al. (2016)	fMRI	44	semantic decision	written words	shape > other attributes except color	TAL	17	high
5	Gauvin et al. (2019)	fMRI	19	picture naming	pictures	visually similar > congruent distractor word	MNI	2	high
6	Goldberg et al. (2006a)	fMRI	13	word generation, semantic decision	written words	visual words > functional words	TAL	2	high
7	Grossman et al. (2002a)	fMRI	16	semantic decision	written words	animal words > pseudowords	TAL	1	high
8	Hauk et al. (2008)	fMRI	21	passive reading	written words	correlation with imageability	MNI	7	high
9	Ishai et al. (2000)	fMRI	9	mental imagery	rest	imagery > passively viewing gray square	TAL	16	high
10	Kellenbach et al. (2001)	PET	10	semantic decision	written words	size verifications > color verifications	MNI	1	high
10	Kellenbach et al. (2001)	PET	10	semantic decision	written words	size verifications > sound verifications	MNI	5	high
10	Kellenbach et al. (2001)	PET	10	semantic decision	written words	size verifications > letter-strings	MNI	5	low
11	Khader et al. (2010)	fMRI	17	word generation task, rhyme generation task	written sentences	noun generation > rhyme generation	TAL	8	high
11	Khader et al. (2010)	fMRI	17	word generation task, rhyme generation task	written sentences	noun generation > letter search	TAL	4	high
12	Kosslyn et al. (1995)	PET	12	mental imagery	spoken words	imagery small sized images > passive listening	TAL	3	high
12	Kosslyn et al. (1995)	PET	12	mental imagery	spoken words	imagery medium sized images > passive listening	TAL	1	high

Exp.	Paper	Method	Participants (N)	Task	Stimulus Modality	Contrast	Space	Foci (N)	Contrast Type
12	Kosslyn et al. (1995)	PET	12	mental imagery	spoken words	imagery large sized images > passive listening	TAL	3	high
13	Mellet et al. (1998)	PET	8	mental imagery	spoken sentences	imagery (concrete) > listen (abstract)	TAL	9	high
13	Mellet et al. (1998)	PET	8	mental imagery	spoken sentences	imagery > rest	TAL	15	low
14	Nagels et al. (2013)	fMRI	17	perceptual decision	videos, spoken sentences	shape-related > space-related speech-gesture pairs	MNI	10	high
15	Neudorf et al. (2019)	fMRI	25	mental imagery, lexical decision	written words	(target > pseudohomophone) for (object > action priming)	MNI	6	high
16	Noppeney et al. (2002)	PET	12	semantic decision	spoken words	visual words in semantic decision > perceptual decision	TAL	1	low
17	Phillips et al. (2002)	PET	12	semantic decision	pictures, written words	(size > action retrieval) ∩ (size retrieval > screen size control)	MNI	1	high
18	Pulvermueller et al. (2006)	fMRI	14	passive reading	written words	form words > hash marks	TAL	12	low
19	Thompson-Schill et al. (1999)	fMRI	5	semantic decision	spoken sentences	visual semantics (living) > reversed words	TAL	5	high
19	Thompson-Schill et al. (1999)	fMRI	5	semantic decision	spoken sentences	visual semantics (non-living) > reversed words	TAL	4	high
20	Wheatley et al. (2005)	fMRI	15	passive reading	written words	animate objects > tools	TAL	26	high
21	Wheeler et al. (2000)	fMRI	18	episodic memory recall	written words	picture recall > sound recall	TAL	13	high
22	Zvyagintsev et al. (2013)	fMRI	15	mental imagery	rest	visual imagery > backwards counting	TAL	11	high
22	Zvyagintsev et al. (2013)	fMRI	15	mental imagery	rest	visual imagery > auditory imagery	TAL	8	high

Table S34. Experiments included in the ALE meta-analysis on conceptual processing related to motion.

Exp.	Paper	Method	Participants (N)	Task	Stimulus Modality	Contrast	Space	Foci (N)	Contrast Type
1	Bedny et al. (2012)	fMRI	21	semantic decision	spoken words	high-motion verbs > low-motion verbs	MNI	5	high
1	Bedny et al. (2012)	fMRI	21	semantic decision	spoken words	high-motion verbs > low-motion nouns	MNI	2	high
2	Bedny et al. (2014)	fMRI	18	semantic decision	spoken words	event nouns > plant nouns	MNI	4	high
2	Bedny et al. (2014)	fMRI	18	semantic decision	spoken words	motion verbs > animal nouns	MNI	1	high
3	Borghesani et al. (2019)	fMRI	13	semantic decision	pictures	movement task > place task	MNI	4	high
4	Chen et al. (2008)	fMRI	14	semantic decision	written sentences	literal motion sentences > non-motion sentences	TAL	6	high
4	Chen et al. (2008)	fMRI	14	semantic decision	written sentences	metaphor motion sentences > non-motion sentences	TAL	1	high
5	Deen & McCarthy (2010)	fMRI	15	passive reading	written sentences	motion sentences > non-motion sentences	MNI	13	high
6	Dravida et al. (2013)	fMRI	18	semantic decision	written narratives, spoken words	high motion passages > low motion passages	MNI	19	high
6	Dravida et al. (2013)	fMRI	18	semantic decision	written narratives, spoken words	high motion nouns > low motion nouns	MNI	5	high
6	Dravida et al. (2013)	fMRI	18	semantic decision	written narratives, spoken words	high motion verbs > low motion verbs	MNI	3	high
7	Fernandino et al. (2016)	fMRI	44	semantic decision	written words	visual motion > other attributes	TAL	1	high
7	Fernandino et al. (2016)	fMRI	44	semantic decision	written words	motion > other attributes except sound	TAL	4	high
8	Grossman et al. (2002b)	fMRI	16	semantic decision	written words	motion verbs > cognition verbs	TAL	3	high
9	Humphreys et al. (2013)	fMRI	10	semantic decision	pictures, spoken sentences	motion sentences > static sentences	MNI	1	high
10	Kemmerer et al. (2008)	fMRI	16	semantic decision	written words	running verbs > meaningless symbols	MNI	23	low
10	Kemmerer et al. (2008)	fMRI	16	semantic decision	written words	speaking verbs > meaningless symbols	MNI	8	low
10	Kemmerer et al. (2008)	fMRI	16	semantic decision	written words	change of state verbs > meaningless symbols	MNI	9	low
11	Lai & Desai (2016)	fMRI	22	semantic decision	written sentences	temporal fictive motion sentences > temporal, static sentences	TAL	5	high

Exp.	Paper	Method	Participants (N)	Task	Stimulus Modality	Contrast	Space	Foci (N)	Contrast Type
12	Lauro et al. (2013)	fMRI	24	semantic decision	written sentences	idiomatic motion sentences involving lower-limb > cognition sentences	MNI	4	high
12	Lauro et al. (2013)	fMRI	24	semantic decision	written sentences	metaphorical motion sentences involving lower-limb > cognition sentences	MNI	1	high
13	Lin et al. (2015)	fMRI	17	semantic decision	written words	social interaction verbs > non-human verbs	TAL	6	high
13	Lin et al. (2015)	fMRI	17	semantic decision	written words	motion verbs > non-human verbs	TAL	5	high
14	Nagels et al. (2013)	fMRI	17	perceptual decision	videos, spoken sentences	space-related > shape-related speech-gesture pairs	MNI	8	high
15	Noppeney et al. (2005)	fMRI	12	semantic decision	spoken words	body movement words > hand action words	TAL	1	high
16	Peelen et al. (2012)	fMRI	27	working memory recall	written words	action verbs > object nouns	TAL	4	high
17	Rodriguez-Ferreiro et al. (2011)	fMRI	14	passive reading	written words	motion verbs > emotion verbs	MNI	3	high
17	Rodriguez-Ferreiro et al. (2011)	fMRI	14	passive reading	written words	transitive motion verbs > emotion verbs	MNI	2	high
17	Rodriguez-Ferreiro et al. (2011)	fMRI	14	passive reading	written words	motion verbs > pseudoverbs	MNI	7	high
18	Schuil et al. (2013)	fMRI	20	lexical decision	written sentences	literal > non-literal hand- and foot-related sentences	MNI	2	high
18	Schuil et al. (2013)	fMRI	20	lexical decision	written sentences	literal hand- and foot-related sentences > non-word sentences	MNI	6	high
18	Schuil et al. (2013)	fMRI	20	lexical decision	written sentences	non-literal hand- and foot-related sentences > non-word sentences	MNI	4	high
19	Speer et al. (2009)	fMRI	28	passive reading	written narratives	location change > clause onset	MNI	12	high
20	van Dam & Desai (2016)	fMRI	14	semantic decision	written sentences	concrete motion sentences > abstract sentences	TAL	4	high
20	van Dam & Desai (2016)	fMRI	14	semantic decision	written sentences	concrete caused motion > abstract caused motion	TAL	4	high
20	van Dam & Desai (2016)	fMRI	14	semantic decision	written sentences	concrete intransitive motion > abstract intransitive sentences	TAL	4	high
21	van Dam et al. (2019)	fMRI	17	semantic decision	pictures	manner pictures > action pictures	TAL	5	high
21	van Dam et al. (2019)	fMRI	17	semantic decision	pictures	manner pictures > scrambled manner pictures	TAL	3	high
21	van Dam et al. (2019)	fMRI	17	lexical decision, go/no-go	written words	manner verbs > pseudoverbs	TAL	5	high
22	Vigliocco et al. (2006)	PET	12	passive listening	spoken words	motion words > sensory words	MNI	2	high

Exp.	Paper	Method	Participants (N)	Task	Stimulus Modality	Contrast	Space	Foci (N)	Contrast Type
23	Wallentin et al. (2005)	fMRI	15	semantic decision	spoken sentences	motion sentences > static sentences	MNI	5	high
24	Wallentin et al. (2011)	fMRI	26	passive listening	spoken narratives	motion verbs > rest of story	MNI	2	high

Table S35. Experiments included in the ALE meta-analysis on conceptual processing related to color.

Exp.	Paper	Method	Participants (N)	Task	Stimulus Modality	Contrast	Space	Foci (N)	Contrast Type
1	Chao & Martin (1999)	PET	12	word generation	pictures	color word generation > achromatic object naming	TAL	16	high
1	Chao & Martin (1999)	PET	12	word generation	pictures	color word generation > passive viewing	TAL	20	high
1	Chao & Martin (1999)	PET	12	word generation	pictures	color word generation > colored object naming	TAL	6	high
2	Fernandino et al. (2016)	fMRI	44	semantic decision	written words	color > other attributes	TAL	6	high
2	Fernandino et al. (2016)	fMRI	44	semantic decision	written words	color > other attributes except shape	TAL	25	high
3	Goldberg et al. (2006b)	fMRI	14	semantic decision	written words	color words > auditory, gustatory, tactile words	TAL	3	high
4	Howard et al. (1998)	fMRI	7	mental imagery	spoken sentences	color imagery > non-color visual imagery	TAL	5	high
5	Hsu et al. (2011)	fMRI	12	semantic decision	written words	(task > fixation) ∩ (within > between color comparisons)	TAL	13	high
6	Hsu et al. (2011)	fMRI	12	semantic decision	spoken words	(task > fixation) ∩ (within > between color comparisons)	MNI	13	high
7	Kellenbach et al. (2001)	PET	10	semantic decision	written words	color verifications > size verifications	MNI	1	high
7	Kellenbach et al. (2001)	PET	10	semantic decision	written words	color verifications > sound verifications	MNI	3	high
7	Kellenbach et al. (2001)	PET	10	semantic decision	written words	color verifications > letter-strings	MNI	7	low
8	Martin et al. (1995)	PET	12	word generation	pictures	color word generation > action word generation	TAL	5	high
8	Martin et al. (1995)	PET	12	word generation	written words	color word generation > action word generation	TAL	4	high
8	Martin et al. (1995)	PET	12	word generation	pictures	color word generation > object naming	TAL	8	high
9	Mummery et al. (1998)	PET	10	similarity judgment task	written words	color words > location words	TAL	2	high

Exp.	Paper	Method	Participants (N)	Task	Stimulus Modality	Contrast	Space	Foci (N)	Contrast Type
10	Pulvermueller et al. (2006)	fMRI	14	passive reading	written words	color words > hash marks	TAL	3	low
11	Slotnick (2009)	fMRI	12	episodic memory recall	pictures	color-hit-hit > color-hit-miss and grey-hit-hit	TAL	1	high
12	Wang et al. (2013)	fMRI	48	semantic decision	perceptual decision, semantic decision	correlation with color knowledge scores	MNI	6	high
12	Wang et al. (2013)	fMRI	48	semantic decision	perceptual decision, semantic decision	correlation with color knowledge scores (controlling for form, motion and sound scores)	MNI	7	high

Table S36. Experiments included in the ALE meta-analysis on conceptual processing related to olfaction-gustation.

Exp.	Paper	Method	Participants (N)	Task	Stimulus Modality	Contrast	Space	Foci (N)	Contrast Type
1	Barrós-Loscertales et al. (2012)	fMRI	59	passive reading	written words	taste-related words > taste-unrelated words	MNI	11	high
2	Cerf-Ducastel & Murphy (2006)	fMRI	10	working memory recall	written words	known > unknown odor names	TAL	21	high
2	Cerf-Ducastel & Murphy (2006)	fMRI	10	working memory recall	written words	known > unknown odor names	TAL	26	high
3	Citron & Goldberg (2014)	fMRI	26	semantic decision	written sentences	taste-related metaphors > literal, not taste-related counterparts	MNI	19	high
4	Dreyer et al. (2018)	fMRI	28	passive reading	written words	food words > hash marks	MNI	4	low
5	Fairhall (2020)	fMRI	16	semantic decision	written words	food words > people and place words	MNI	3	high
6	Fournel et al. (2017)	fMRI	19	passive smelling, working memory recall	odors	associative learning > perceptual learning	MNI	5	high
6	Fournel et al. (2017)	fMRI	19	passive smelling, working memory recall	odors	previously learned odor > unknown odor	MNI	5	high
7	Ghio et al. (2016a)	fMRI	16	episodic memory recall	pictures	olfactory > visual	MNI	1	high
8	Goldberg et al. (2006a)	fMRI	13	word generation, semantic decision	written words	fruit words > bird, body part, clothing words	TAL	5	high
9	Goldberg et al. (2006b)	fMRI	14	semantic decision	written words	gustatory words > auditory, tactile, visual words	TAL	1	high

Exp.	Paper	Method	Participants (N)	Task	Stimulus Modality	Contrast	Space	Foci (N)	Contrast Type
10	Gonzalez et al. (2006)	fMRI	23	passive reading	written words	olfactory words > non-olfactory words	MNI	8	high
11	Gottfried & Dolan (2003)	fMRI	17	perceptual decision	odors	olfactory-visual > olfaction + vision	MNI	5	high
11	Gottfried & Dolan (2003)	fMRI	17	perceptual decision	odors	olfactory-visual congruent > olfaction + vision	MNI	4	high
11	Gottfried & Dolan (2003)	fMRI	17	perceptual decision	odors	olfactory-visual congruent > incongruent	MNI	3	high
11	Gottfried & Dolan (2003)	fMRI	17	perceptual decision	odors	correlation with olfactory-visual congruency	MNI	3	high
12	Just et al. (2010)	fMRI	11	mental imagery	written words	eating factor	MNI	3	low
13	Kobayashi et al. (2004)	fMRI	25	mental imagery	written words	gustatory imagery > passive reading	MNI	6	high
13	Kobayashi et al. (2004)	fMRI	25	mental imagery	written words	gustatory imagery > visual imagery	MNI	3	high
13	Kobayashi et al. (2004)	fMRI	25	mental imagery	written words	gustatory imagery > visual imagery	MNI	1	high
13	Kobayashi et al. (2004)	fMRI	25	mental imagery	written words	gustatory imagery > passive observation	MNI	6	high
13	Kobayashi et al. (2004)	fMRI	25	mental imagery	written words	gustatory imagery > rest	MNI	7	high
14	Phillips et al. (2002)	PET	12	semantic decision	pictures, written words	fruits > tools	MNI	1	high
15	Pomp et al. (2018)	fMRI	18	semantic decision	written sentences	olfactory metaphors > literal paraphrases	MNI	2	high
15	Pomp et al. (2018)	fMRI	18	semantic decision	written sentences	literal olfactory sentences > literal paraphrases	MNI	2	high
15	Pomp et al. (2018)	fMRI	18	semantic decision	written sentences	literal paraphrases > literal olfactory sentences	MNI	2	high
15	Pomp et al. (2018)	fMRI	18	semantic decision	written sentences	literal olfactory sentences > olfactory metaphors	MNI	1	high
16	Savic & Berglund (2004)	PET	14	passive smelling	odors	familiar odor > unfamiliar odor	TAL	3	high
17	Simmons et al. (2005)	fMRI	9	working memory recall	pictures	food pictures > location pictures	MNI	6	high

Table S37. Experiments included in the ALE meta-analysis on conceptual processing related to emotion.

Exp.	Paper	Method	Participants (N)	Task	Stimulus Modality	Contrast	Space	Foci (N)	Contrast Type
1	Altenmueller et al. (2014)	fMRI	18	episodic memory recall	music	positive valence > negative valence	TAL	9	high
2	Berthoz et al. (2002)	fMRI	12	mental imagery	written narratives	(intentional and unintentional embarrassment) > normal story	TAL	18	high
2	Berthoz et al. (2002)	fMRI	12	mental imagery	written narratives	unintentional embarrassment > normal story	TAL	15	high
3	Bogert et al. (2016)	fMRI	56	semantic judgment	music	main effect of emotion	MNI	7	high
3	Bogert et al. (2016)	fMRI	56	semantic judgment	music	explicit task > implicit task	MNI	4	high
4	Chow et al. (2014)	fMRI	24	semantic decision	spoken narratives	emotion paragraphs > action and perception paragraphs	MNI	16	high
5	Crosson et al. (1999)	fMRI	17	word generation	spoken words	emotionally connotated words > neutral words	TAL	2	high
5	Crosson et al. (1999)	fMRI	17	word generation	spoken words	emotionally evocative words > repetition	TAL	12	high
5	Crosson et al. (1999)	fMRI	17	word generation	spoken words	emotionally neutral words > repetition	TAL	7	high
6	Cunningham et al. (2003)	fMRI	12	semantic decision	written words	evaluative judgments > non-evaluative judgments	MNI	3	high
6	Cunningham et al. (2003)	fMRI	12	semantic decision	written words	correlation of ambivalence score for evaluative judgments	MNI	1	high
6	Cunningham et al. (2003)	fMRI	12	semantic decision	written words	bad judgments > good judgments	MNI	2	high
7	Cunningham et al. (2004)	fMRI	20	semantic decision	written words	(good > bad) > (abstract > concrete)	MNI	14	high
7	Cunningham et al. (2004)	fMRI	20	semantic decision	written words	emotional intensity: good > bad ∩ abstract > concrete	MNI	13	high
7	Cunningham et al. (2004)	fMRI	20	semantic decision	written words	emotional intensity: (good > bad) > (abstract > concrete)	MNI	3	high
7	Cunningham et al. (2004)	fMRI	20	semantic decision	written words	emotional intensity: good > bad	MNI	7	high
7	Cunningham et al. (2004)	fMRI	20	semantic decision	written words	emotional valence: good > bad ∩ abstract > concrete	MNI	3	high
7	Cunningham et al. (2004)	fMRI	20	semantic decision	written words	emotional valence: good > bad	MNI	1	high
8	Dietrich et al. (2008)	fMRI	16	passive listening	spoken words	affective high-lexical interjections > rest	MNI	2	low
8	Dietrich et al. (2008)	fMRI	16	passive listening	spoken words	affective low-lexical interjections > rest	MNI	2	low
8	Dietrich et al. (2008)	fMRI	16	passive listening	spoken words	affective high and low lexical interjections > rest	MNI	4	low
9	Dreyer et al. (2018)	fMRI	28	passive reading	written words	abstract emotional words > hash marks	MNI	5	low
10	Ferstl & von Cramon (2007)	fMRI	20	semantic decision	written narratives	emotion stories > time and space stories	TAL	1	high

Exp.	Paper	Method	Participants (N)	Task	Stimulus Modality	Contrast	Space	Foci (N)	Contrast Type
11	Ferstl et al. (2005)	fMRI	20	semantic decision	spoken narratives	emotional stories > chronological stories	TAL	3	high
11	Ferstl et al. (2005)	fMRI	20	semantic decision	spoken narratives	emotional stories: inconsistent > consistent	TAL	3	high
12	Ghio et al. (2016b)	fMRI	50	passive viewing	pictures	emotion localizer task > rest	MNI	38	low
13	Goel & Dolan (2003)	fMRI	19	semantic decision	written sentences	emotional reasoning > neutral reasoning	MNI	2	high
14	Hellbernd & Sammler (2018)	fMRI	22	semantic decision	sounds	social function: clear > ambiguous	MNI	24	high
15	Herz et al. (2004)	fMRI	5	mental imagery	pictures, odors	memory-linked odors > photographs	TAL	1	high
15	Herz et al. (2004)	fMRI	5	mental imagery	pictures, odors	memory-linked odors > neutral odors and photographs	TAL	1	high
15	Herz et al. (2004)	fMRI	5	mental imagery	pictures, odors	memory-linked odors > control odors	TAL	6	high
16	Hofstetter et al. (2012)	fMRI	18	episodic memory recall	pictures, written words	negative association > neutral association	MNI	10	high
17	Isenberg et al. (1999)	PET	6	perceptual decision	written words	threat words > neutral words	TAL	4	high
18	Jabbi et al. (2007)	fMRI	18	semantic judgment	pictures, beverages	(disgusting taste and disgusted faces) > (neutral taste and neutral faces)	MNI	5	high
18	Jabbi et al. (2007)	fMRI	18	semantic judgment	pictures, beverages	(delicious taste and satisfied faces) > (neutral taste and neutral faces)	MNI	2	high
19	Kedia et al. (2008)	fMRI	29	mental imagery	written sentences	emotional > neutral	TAL	5	high
19	Kedia et al. (2008)	fMRI	29	mental imagery	written sentences	anger for other and compassion > anger for self and guilt	TAL	3	high
19	Kedia et al. (2008)	fMRI	29	mental imagery	written sentences	(guilt > anger for other) > (anger for self > compassion)	TAL	12	high
20	Knutson et al. (2006)	fMRI	30	semantic decision	pictures	attitude-congruent > attitude-incongruent	TAL	2	high
20	Knutson et al. (2006)	fMRI	30	semantic decision	pictures	attitude-congruent > perceptual decision	TAL	4	high
21	Kuchinke et al. (2005)	fMRI	20	lexical decision	written words	emotional words > neutral words	MNI	3	high
21	Kuchinke et al. (2005)	fMRI	20	lexical decision	written words	negative words > neutral words	MNI	1	high
21	Kuchinke et al. (2005)	fMRI	20	lexical decision	written words	positive words > neutral words	MNI	4	high
21	Kuchinke et al. (2005)	fMRI	20	lexical decision	written words	positive words > negative words	MNI	4	high

Exp.	Paper	Method	Participants (N)	Task	Stimulus Modality	Contrast	Space	Foci (N)	Contrast Type
22	Luo et al. (2004)	fMRI	9	perceptual decision	written words	prime identical to negative target > unrelated prime	TAL	3	high
22	Luo et al. (2004)	fMRI	9	perceptual decision	written words	prime identical to positive target > unrelated prime	TAL	2	high
23	Maddock et al. (2003)	fMRI	8	semantic decision	spoken words	unpleasant words > neutral words	TAL	28	high
23	Maddock et al. (2003)	fMRI	8	semantic decision	spoken words	pleasant words > neutral words	TAL	16	high
24	Maratos et al. (2001)	fMRI	12	semantic judgment, working memory recall	written sentences	negative sentences > neutral sentences	TAL	11	high
24	Maratos et al. (2001)	fMRI	12	semantic judgment, working memory recall	written sentences	negative sentences > neutral sentences	TAL	8	high
24	Maratos et al. (2001)	fMRI	12	semantic judgment, working memory recall	written sentences	positive sentences > neutral sentences	TAL	10	high
24	Maratos et al. (2001)	fMRI	12	semantic judgment, working memory recall	written sentences	positive sentences > neutral sentences	TAL	2	high
25	Michl et al. (2014)	fMRI	14	mental imagery	written sentences	shame > neutral	TAL	10	high
25	Michl et al. (2014)	fMRI	14	mental imagery	written sentences	guilt > neutral	TAL	19	high
25	Michl et al. (2014)	fMRI	14	mental imagery	written sentences	shame > guilt	TAL	7	high
25	Michl et al. (2014)	fMRI	14	mental imagery	written sentences	guilt > shame	TAL	3	high
26	Moll et al. (2007)	fMRI	12	mental imagery	written sentences	guilt > neutral	TAL	6	high
26	Moll et al. (2007)	fMRI	12	mental imagery	written sentences	embarrassment > neutral	TAL	5	high
26	Moll et al. (2007)	fMRI	12	mental imagery	written sentences	compassion > neutral	TAL	11	high
26	Moll et al. (2007)	fMRI	12	mental imagery	written sentences	disgust > neutral	TAL	9	high
26	Moll et al. (2007)	fMRI	12	mental imagery	written sentences	indignation for self > neutral	TAL	4	high
26	Moll et al. (2007)	fMRI	12	mental imagery	written sentences	indignation for other > neutral	TAL	5	high
27	Moseley et al. (2012)	fMRI	18	passive reading	written words	emotion words > hash marks	MNI	16	low
27	Moseley et al. (2012)	fMRI	18	passive reading	written words	abstract emotion words > hash marks	MNI	16	low
28	Nakic et al. (2006)	fMRI	13	lexical decision	written words	negative words > neutral words	TAL	7	high
29	Oosterwick et al. (2015)	fMRI	18	semantic decision	written sentences	emotion sentences with internal focus > emotion sentences with external focus	TAL	1	high
29	Oosterwick et al. (2015)	fMRI	18	semantic decision	written sentences	emotion sentences with internal focus > non-emotion sentences with internal focus	TAL	2	high
29	Oosterwick et al. (2015)	fMRI	18	semantic decision	written sentences	emotion sentences with internal focus > non-emotion sentences with external focus	TAL	1	high

Exp.	Paper	Method	Participants (N)	Task	Stimulus Modality	Contrast	Space	Foci (N)	Contrast Type
30	Phillips et al. (1998)	fMRI	6	perceptual decision	pictures	disgust > neutral	TAL	18	high
30	Phillips et al. (1998)	fMRI	6	perceptual decision	pictures	fear > neutral	TAL	12	high
30	Phillips et al. (1998)	fMRI	6	perceptual decision	pictures	fear > disgust	TAL	10	high
30	Phillips et al. (1998)	fMRI	6	perceptual decision	pictures	disgust > fear	TAL	9	high
30	Phillips et al. (1998)	fMRI	6	perceptual decision	sounds	disgust > neutral	TAL	14	high
30	Phillips et al. (1998)	fMRI	6	perceptual decision	sounds	fear > neutral	TAL	14	high
30	Phillips et al. (1998)	fMRI	6	perceptual decision	sounds	fear > disgust	TAL	7	high
30	Phillips et al. (1998)	fMRI	6	perceptual decision	sounds	disgust > fear	TAL	8	high
31	Rodriguez-Ferreiro et al. (2011)	fMRI	14	passive reading	written words	transitive emotion verbs > motion verbs	MNI	5	high
32	Ruby & Decety (2004)	PET	10	mental imagery	written sentences	emotional sentences > neutral sentences	MNI	7	high
32	Ruby & Decety (2004)	PET	10	mental imagery	written sentences	emotional > neutral sentences for 3rd > 1st perspective	MNI	1	high
32	Ruby & Decety (2004)	PET	10	mental imagery	written sentences	emotional > neutral sentences for 1st > 3rd perspective	MNI	1	high
33	Saxbe et al. (2013)	fMRI	28	semantic judgment	videos	correlation affective word use and BOLD activity for emotion trials > fixation	MNI	32	high
34	Skipper & Olson (2014)	fMRI	19	semantic decision, lexical decision	written words	valenced words > neutral words	MNI	1	high
34	Skipper & Olson (2014)	fMRI	19	semantic decision, lexical decision	written words	valenced words > pseudowords	MNI	18	high
35	Skipper et al. (2011)	fMRI	18	semantic decision	pictures, sounds	social > non-social	TAL	11	high
36	Smith et al. (2004)	fMRI	15	working memory recall	pictures	emotional hits > neutral hits	MNI	11	high
36	Smith et al. (2004)	fMRI	15	working memory recall	pictures	negative hits > positive hits	MNI	8	high
36	Smith et al. (2004)	fMRI	15	working memory recall	pictures	positive hits > negative hits	MNI	2	high
36	Smith et al. (2004)	fMRI	15	working memory recall	pictures	negative hits > neutral hits	MNI	5	high
36	Smith et al. (2004)	fMRI	15	working memory recall	pictures	positive hits > neutral hits	MNI	2	high
36	Smith et al. (2004)	fMRI	15	working memory recall	pictures	encoding objects: emotional context > neutral context	MNI	12	high
37	Steinbeis & Koelsch (2008)	fMRI	16	semantic decision	sounds, written words	incongruent > congruent pleasantness of chords and target words	TAL	2	high
38	Strange et al. (2000)	fMRI	11	perceptual decision, semantic decision	written words	emotional oddball words > neutral words	TAL	2	high

Exp.	Paper	Method	Participants (N)	Task	Stimulus Modality	Contrast	Space	Foci (N)	Contrast Type
39	Takahashi et al. (2004)	fMRI	19	passive reading, semantic decision	written sentences	guilt > neutral	TAL	5	high
39	Takahashi et al. (2004)	fMRI	19	passive reading, semantic decision	written sentences	embarrassment > neutral	TAL	10	high
39	Takahashi et al. (2004)	fMRI	19	passive reading, semantic decision	written sentences	guilt, embarrassment > neutral	TAL	5	high
39	Takahashi et al. (2004)	fMRI	19	passive reading, semantic decision	written sentences	embarrassment > guilt	TAL	7	high
39	Takahashi et al. (2004)	fMRI	19	passive reading, semantic decision	written sentences	guilt > embarrassment	TAL	1	high
40	Tavares et al. (2011)	fMRI	16	semantic decision	animations	interacting animations > neutral animations	TAL	15	high
41	Tettamanti et al. (2012)	fMRI	19	passive viewing	videos	emotional > neutral videos	MNI	13	high
41	Tettamanti et al. (2012)	fMRI	19	passive viewing	videos	fear > neutral videos	MNI	12	high
41	Tettamanti et al. (2012)	fMRI	19	passive viewing	videos	disgust > neutral videos	MNI	48	high
41	Tettamanti et al. (2012)	fMRI	19	passive viewing	videos	happy > neutral videos	MNI	4	high
42	Vigliocco et al. (2014)	fMRI	20	lexical decision	written words	correlation with emotional valence for all words	MNI	9	high
42	Vigliocco et al. (2014)	fMRI	20	lexical decision	written words	correlation with emotional valence for abstract > concrete words	MNI	1	high
42	Vigliocco et al. (2014)	fMRI	20	lexical decision	written words	correlation with emotional valence for concrete words	MNI	2	high
43	Wang et al. (2019)	fMRI	23	semantic decision	written words	positive valence > neutral valence	MNI	4	high
43	Wang et al. (2019)	fMRI	23	semantic decision	written words	social > non-social for positive > neutral valence	MNI	10	high
44	Wicker et al. (2003)	fMRI	14	passive viewing	videos	disgusted > neutral faces	MNI	17	high
44	Wicker et al. (2003)	fMRI	14	passive viewing	videos	pleasured > neutral faces	MNI	6	high
44	Wicker et al. (2003)	fMRI	14	passive viewing	videos	disgusted faces ∩ disgusting odor	MNI	4	high
45	Wilson-Mendenhall et al. (2011)	fMRI	20	mental imagery	spoken sentences	anger > fear, observe, plan	TAL	2	high
45	Wilson-Mendenhall et al. (2011)	fMRI	20	mental imagery	spoken sentences	anger, fear, plan > observe	TAL	7	high
46	Zysset et al. (2002)	fMRI	13	semantic decision	written sentences	evaluative judgments > semantic judgments	TAL	17	high
47	Zysset et al. (2003)	fMRI	18	semantic decision	written sentences	evaluative judgments > semantic judgments	TAL	10	high

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