Figure S1, related to Figure 1: Anatomical tracings for piriform (PPC, red), amygdala (AMY, blue) and hippocampus (HIP, green) on one coronal slice for each subject's brain in native space. Electrode locations are shown in yellow whenever electrode placement intersected with the demarcated ROIs.
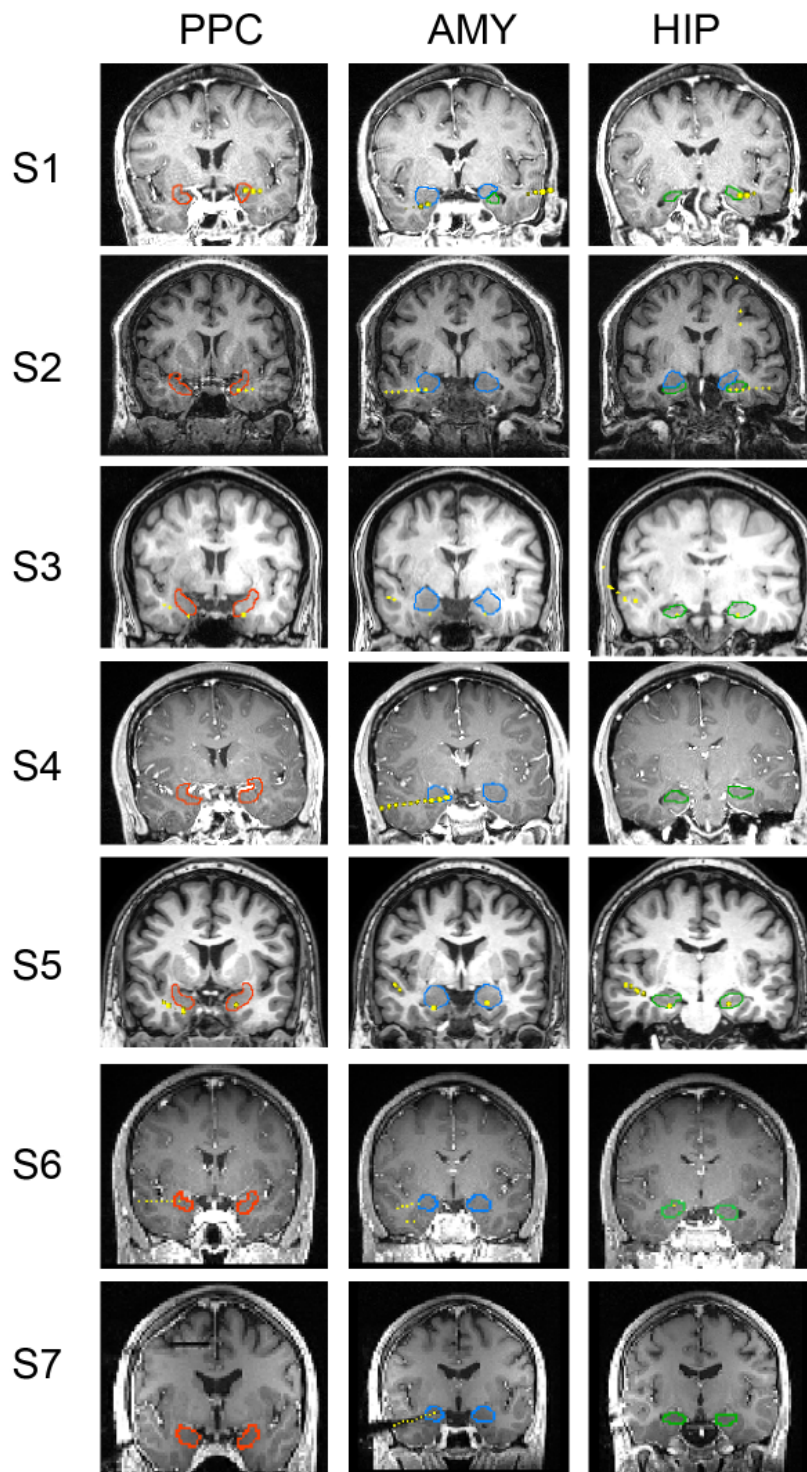
Figure S2, related to Figure 1: Single PPC odor trial traces filtered at theta (3-7 Hz, left) and gamma (30-150 Hz, right) for each subject. Red dotted line indicates time of sniff onset. Traces are Z-scored relative to all filtered trials per subject within the baseline and stimulus window (-1 to 2s). For gamma traces, the signals within the grey window encompassing -250 ms to 250 ms surrounding stimulus onset are enlarged on the inset to the right.
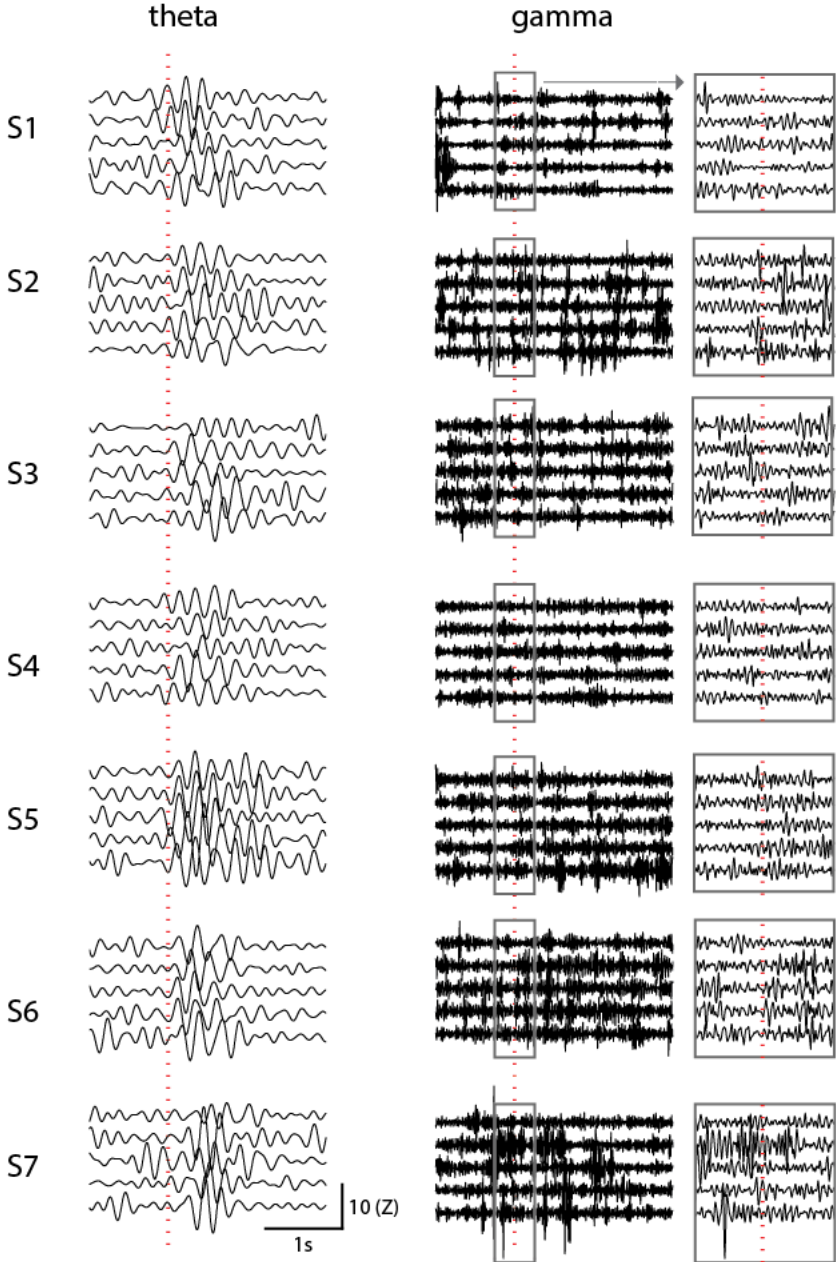
Figure S3, related to Figure 2: Trial-wise analysis of odor-induced gamma activity, based on an algorithm that detects the first occurrence of gamma above a threshold criterion. Time series of spectral power in the low gamma (**A**; 30-55 Hz) and high gamma (**C**; 70-150 Hz) ranges are plotted for each trial, which are sorted (from top to bottom) according to the timing of the first detection following sniff onset (vertical line at 0 s after sniff onset). Each trial is associated with a punctate increase (red colors) in gamma power, but was generally not followed by a sustained increase in gamma. (**B, D**) Comparison of odor (green) and no odor (blue) conditions, where trials were aligned to gamma onset at 0 s and then averaged across trials, shows no significant effect of odor stimulation on gamma power (mean ± s.e.m., per subject and condition). Note difference in x-axis.
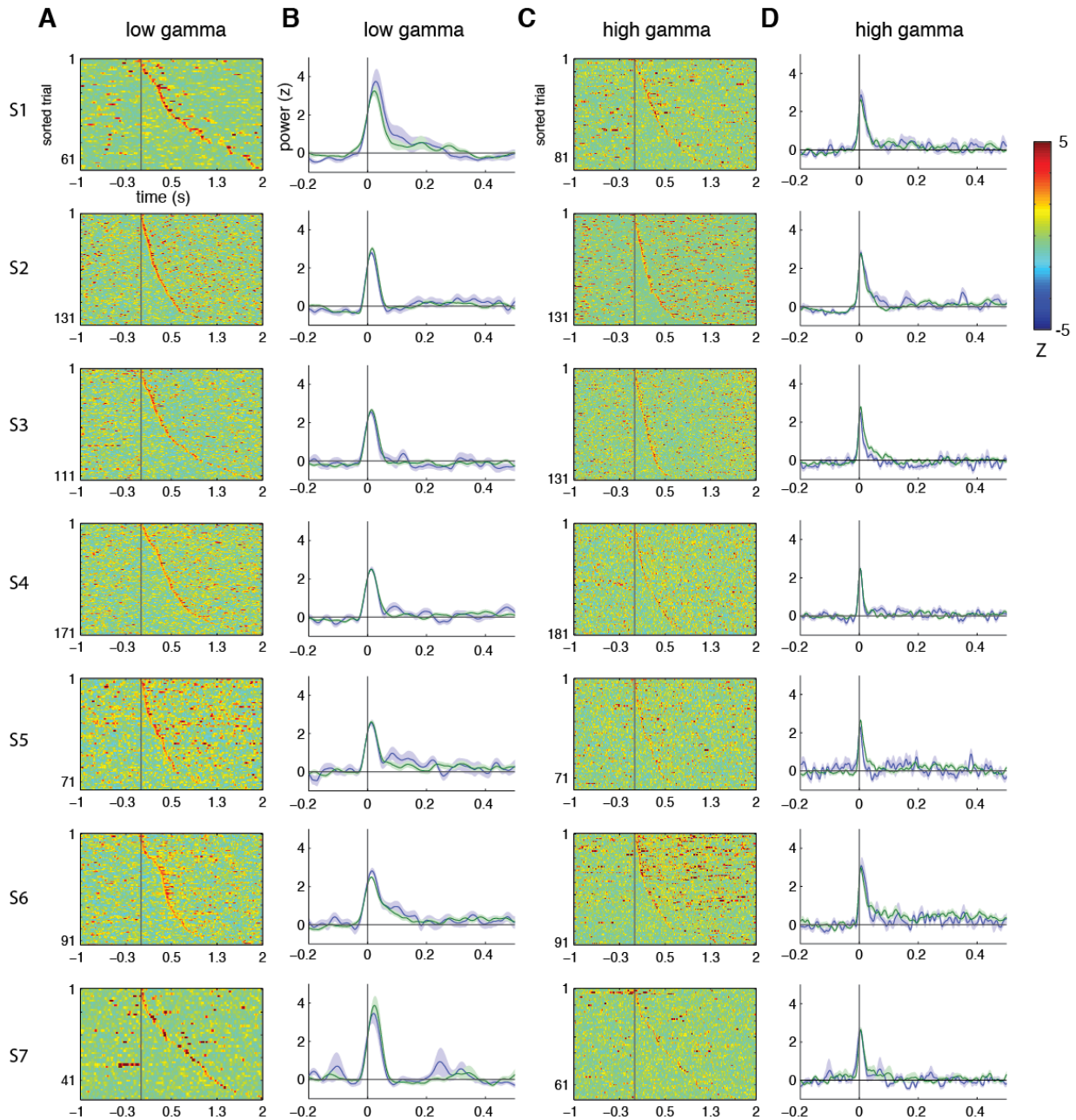
Figure S4, related to Figure 2: Spectrograms produced using the multitaper method, showing individual subject means of no odor and odor conditions (columns 1 and 2). Column 3 shows statistical comparison between odor and no odor, with outlined areas representing significant time-frequency clusters (red = odor > no odor; blue = odor < no odor).
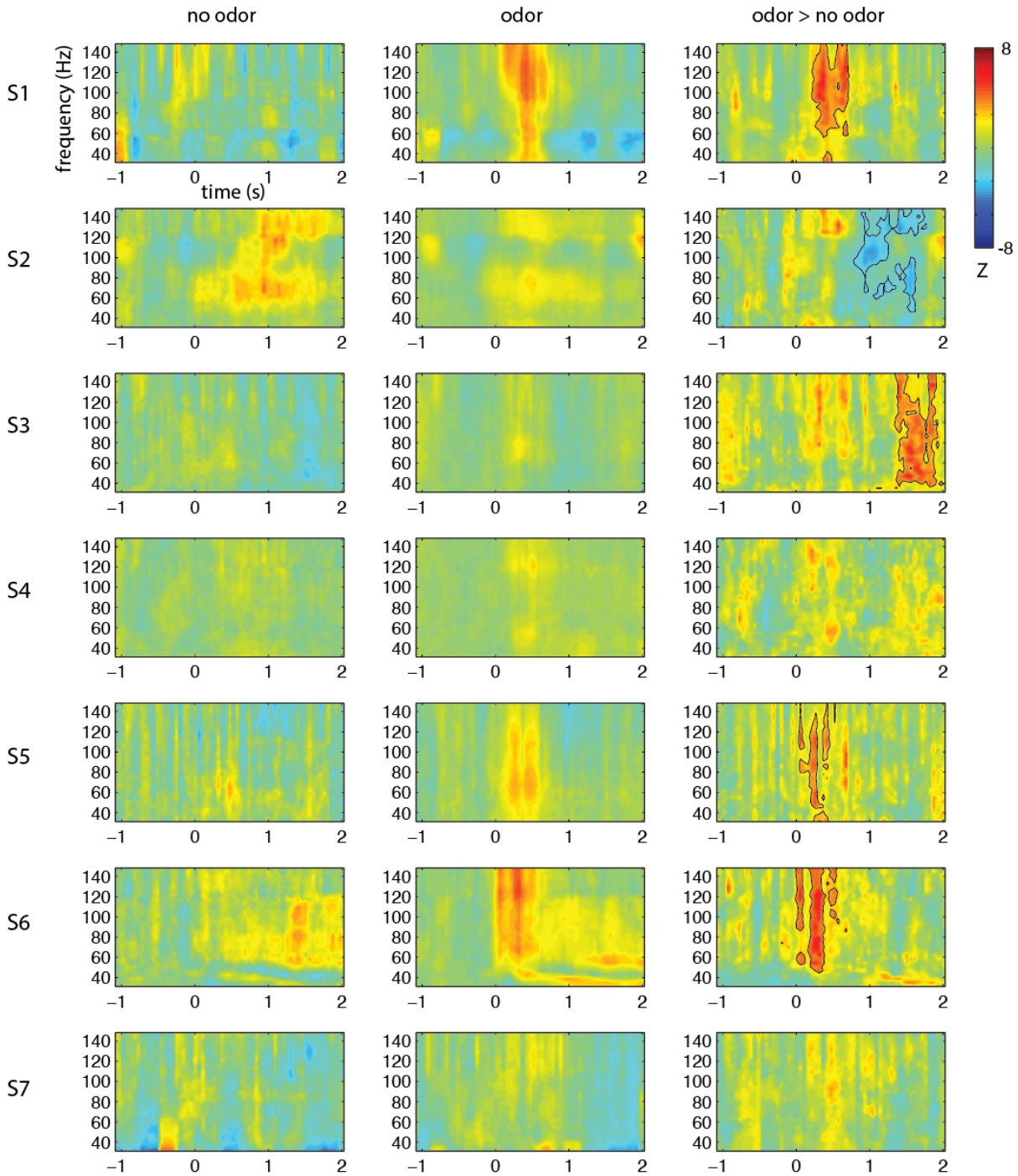
Figure S5, related to Figure 3: Odor-induced theta power mapped onto to corresponding electrode locations in the brain. **(A)** Mean theta responses during odor vs. no odor across all subjects and electrodes. *Left*: 3-D transparent brain showing all electrode locations overlaid; colors of electrodes reflect corresponding *t* values of odor > no odor (nonparametric t-test). *Right*: Same map, showing electrodes that survived statistical significance after Bonferroni correction for total number of electrodes. **(B)** Mean theta power of odor trials compared between PPC and each other electrode for each subject. *Left*: 3-D coverage of all electrode locations; colors of electrodes reflect corresponding *t* values of PPC > other electrodes. *Right*: Same map, thresholded by electrodes that did *not* survive Bonferroni correction over electrode number (indicating that these electrodes did *not* have significantly lower theta compared to PPC, and were usually adjacent to PPC). **(C)** Mean odor-induced theta power (Z-scored per subject) for each electrode across all subjects, plotted with respect to their x axis (medial-lateral) and y axis (anterior-posterior) positions in standardized MNI (Montreal Neurological Institute) space. Plots are collapsed across the z-axis (superior-inferior). Left panel depicts raw data, and right panel is spatially smoothed. Black lines show approximate boundaries of posterior piriform cortex (PPC) and amygdala (AMY).
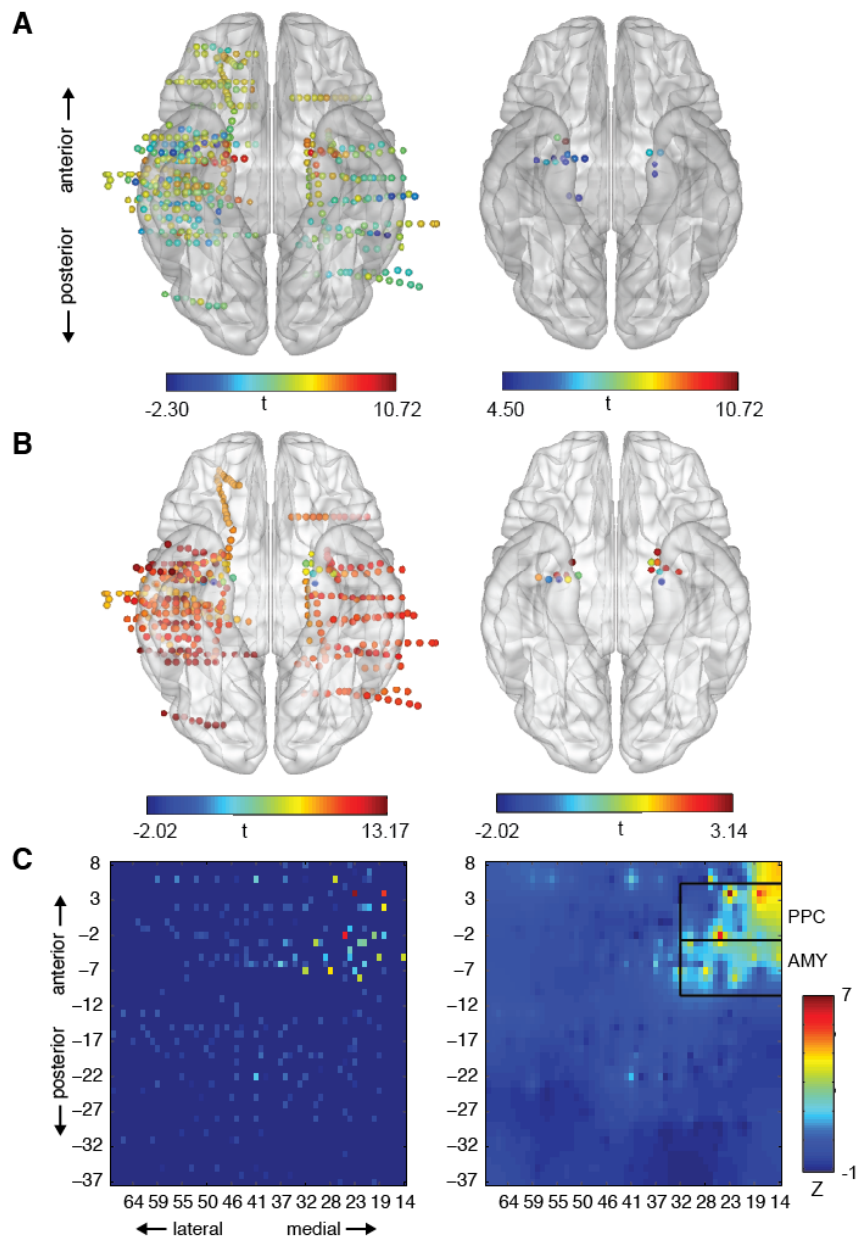q

Figure S6, related to Figure 1: Histograms depicting distributions of inspiratory duration for odorless air trials (blue) and odor trials (red) for each subject. Mean durations per condition are shown above each plot.
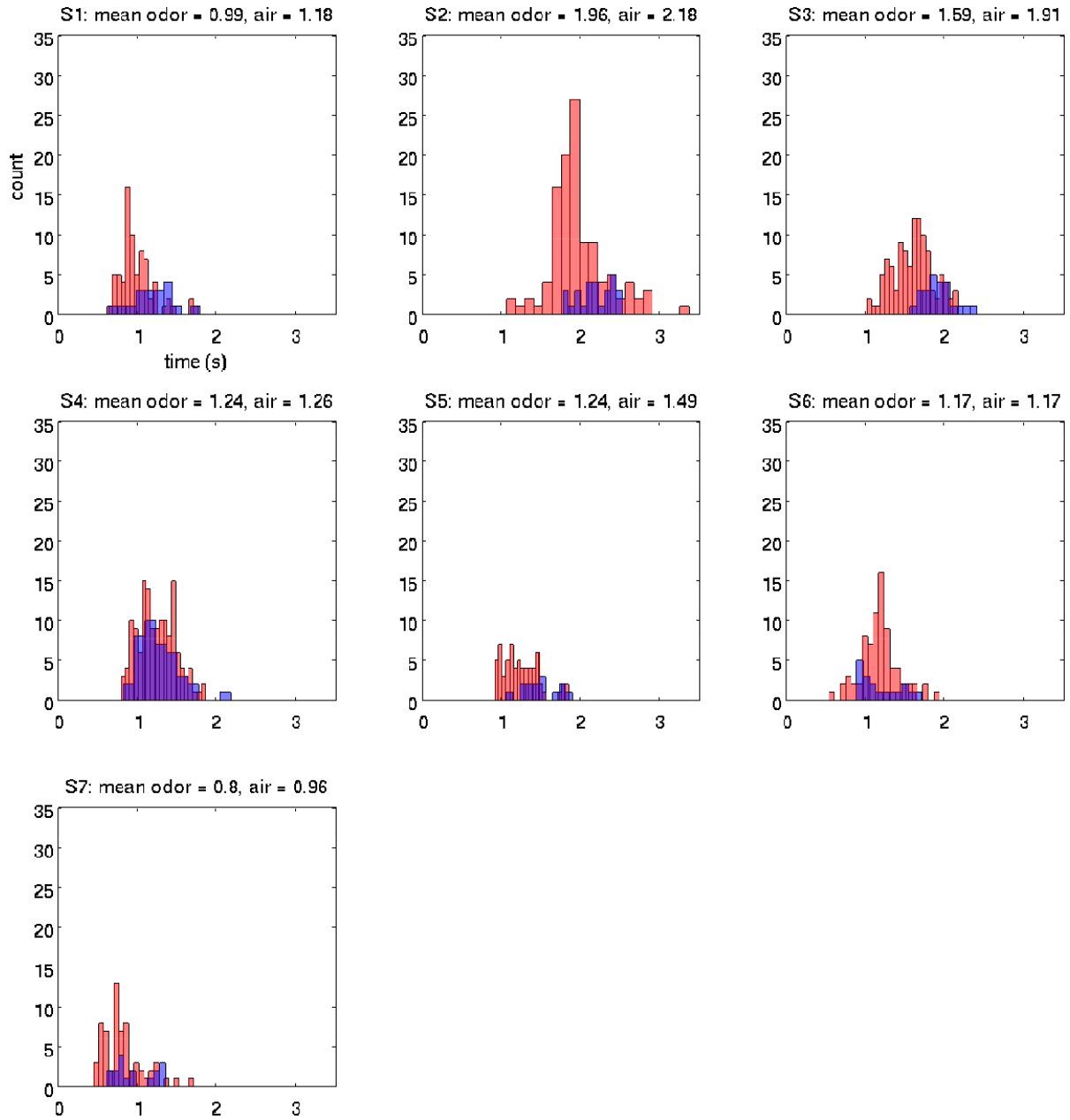
Table S1. Related to Figure 1: Patient Demographics

ID	Sex	Age at surgery	Site (NU= Northwestern University, SU= Stanford University, UC = University of Chicago)	MTL coverage (L=left, R=right)	Other coverage (P=parietal T=temporal F=frontal)	Age of seizure onset	Seizure risk factors	Family history of seizures	Seizure semiology (GTC = generalized tonic-clonic)	Working diagnosis	EEG	MRI (STG = superior temporal gyrus)
1	F	61	NU	L,R	P,T	35	Hemorrhagic L. temporo-occital arteriovenous malformation	None	Aphasic seizure; somatosensory seizure	L temporo-occipital epilepsy	L/R temporal sharp waves and seizures	Remote prior L. posterior parietal craniotomy, w/cystic encephalomalacia and gliosis; gliosis in L parahippocampal gyrus & L middle/inferior temporal white matter
2	F	28	SU	L,R	F	13	Born with nuchal cord	Maternal aunt	Temporal lobe complex partial seizures	Non-lesional L temporal lobe epilepsy	Left temporal epileptiform discharges, left temporal slowing, four L temporal onset complex partial seizures, one with secondary generalization	Normal
3	F	46	UC	L,R	T	16	Spinal meningitis	None	Dialeptic with secondary GTC, left hand dystonia	R mesial temporal lobe epilepsy	Bi-mesial temporal interictal discharges and R mesial temporal seizures	R mesial temporal sclerosis
4	F	23	NU	R	P, T	20	Headaches	Maternal uncle, sister	Aura, déjà vu; psychic aura with autonomic seizures	R temporo-parietal epilepsy	R temporal theta transients and occasional sharp transients	Nodular foci (2) along lateral R temporal horn periventricular white matter
5	M	20	UC	L,R	T, F	15	None	None	Staring, ictal yelling, unresponsive, aphasic, hand automatisms, occasional GTC	Non-lesional L mesial temporal lobe epilepsy	Bilateral temporal interictal discharges	Normal
6	F	27	NU	R	P, T	13	Headaches	None	Psychic/gustatory aura, generalized tonic-clonic seizure, automotor seizure	Temporal lobe epilepsy	Sharp waves maximal in R temporal – R parietal regions	Small nonspecific foci of hyperintense T2FLAIR in bilateral frontal lobe white matter & L parietal white matter
7	F	28	NU	R	F	20	Medullo-blastoma	Maternal grand-father	Staring, head drop, motor automatisms, unresponsiveness	R fronto-temporal epilepsy	R temporal seizures with rapid spread to R central region and early spread to L fronto-central region	Small cavernous malformations in R medial orbital gyrus & L STG; meningiolma in anterior interhemispheric falx & focal cortical enhancement in L. temporo-occipital region and pons.

Table S2, related to Figure 3: Statistical comparisons of the mean theta power response from the medial piriform electrode, separately for each odor vs. no odor, and for each subject. Each row shows the non-parametric bootstrapped t-statistic and associated p-value for a different odor compared to odorless air. Degrees of freedom (df) were calculated using nonhomogeneous variance. *p*-values in red, *p* < 0.05; *p*-values in blue, p < 0.10.

Subject	Odor (vs. no odor)	df	t value	p value	Trials (total)
1	garlic	19.2754	5.4858	0.001	100
1	gasoline	21.9183	3.4966	0.001	
1	peanut	22.7132	3.033	0.003	
1	rose	17.8152	2.592	0.019	
2	garlic	38.0424	6.8842	0.001	150
2	gasoline	41.0903	3.8502	0.001	
2	peanut	40.6075	1.8105	0.0809	
2	rose	37.027	4.7382	0.001	
3	orange	40.0661	3.2057	0.001	150
3	sesame	26.6881	4.4378	0.001	
3	pine	32.1881	4.1308	0.001	
3	rose	42.2111	1.8114	0.0669	
4	orange	47.8485	3.3942	0.001	200
4	peanut	38.6635	3.6329	0.001	
4	powder	65.3361	2.758	0.007	
4	rose	44.5664	4.6399	0.001	
5	cheese	25.7583	0.777	0.5225	100
5	gasoline	16.117	3.4	0.001	
5	orange	17.8484	2.0886	0.035	
5	rose	28.4376	1.2887	0.2328	
6	gasoline	23.0574	9.0527	0.001	100
6	banana	18.9924	4.5099	0.001	
6	almond	19.9873	5.1103	0.001	
6	jasmine	22.1353	5.4952	0.001	
7	gasoline	24.8058	1.7347	0.0969	100
7	strawberry	17.501	1.9594	0.039	
7	almond	17.2207	2.4785	0.025	
7	jasmine	17.2207	1.5797	0.0689	

Table S3, related to Figure 5: Perceived odor intensity and valence do not substantially contribute to odor decoding in PPC. Table shows mean (+/- SD) accuracies for binary decoding of odor pairs differing in low and high intensity and differing in low and high valence.

	Low intensity difference	High intensity difference	Low valence difference	High valence difference
S1	65.88 ± 7.10	63.19 ± 9.51	69.23 ± 7.85	59.83 ± 4.29
S3	64.70 ± 5.96	69.08 ± 5.14	64.21 ± 5.50	69.57 ± 2.51
S4	64.52 ± 2.11	59.25 ± 5.14	62.67 ± 4.91	61.09 ± 5.07
S5	63.78 ± 8.00	72.88 ± 7.98	69.51 ± 12.93	67.15 ± 4.26
S6	57.31 ± 4.90	65.22 ± 4.80	63.45 ± 6.48	59.08 ± 4.26
Mean	63.24 ± 3.40	65.92 ± 5.26	65.82 ± 3.29	63.34 ± 4.71