nature neuroscience

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Manuscript Number:		# Supplementary Figures:	4
Manuscript Type:	Article	# Supplementary Tables:	0
		# Supplementary Videos:	0

Reporting Checklist for Nature Neuroscience

This checklist is used to ensure good reporting standards and to improve the reproducibility of published results. For more information, please read Reporting Life Sciences Research.

Please note that in the event of publication, it is mandatory that authors include all relevant methodological and statistical information in the manuscript.

Statistics reporting, by figure

- Please specify the following information for each panel reporting quantitative data, and where each item is reported (section, e.g. Results, & paragraph number).
- Each figure legend should ideally contain an exact sample size (n) for each experimental group/condition, where n is an exact number and not a range, a clear definition of how n is defined (for example x cells from x slices from x animals from x litters, collected over x days), a description of the statistical test used, the results of the tests, any descriptive statistics and clearly defined error bars if applicable.
- For any experiments using custom statistics, please indicate the test used and stats obtained for each experiment.
- Each figure legend should include a statement of how many times the experiment shown was replicated in the lab; the details of sample collection should be sufficiently clear so that the replicability of the experiment is obvious to the reader.
- For experiments reported in the text but not in the figures, please use the paragraph number instead of the figure number.

Note: Mean and standard deviation are not appropriate on small samples, and plotting independent data points is usually more informative. When technical replicates are reported, error and significance measures reflect the experimental variability and not the variability of the biological process; it is misleading not to state this clearly.

		TEST USED		n			DESCRIPTIVE STATS (AVERAGE, VARIANCE)		P VALUE		DEGREES OF FREEDOM & F/t/z/R/ETC VALUE	
	FIGURE NUMBER	WHICH TEST?	SECTION & PARAGRAPH #	EXACT VALUE	DEFINED?	SECTION & PARAGRAPH #	REPORTED?	SECTION & PARAGRAPH #	EXACT VALUE	SECTION & PARAGRAPH #	VALUE	SECTION & PARAGRAPH #
example	1a	one-way ANOVA	Fig. legend	9, 9, 10, 15	mice from at least 3 litters/group	Methods para 8	error bars are mean +/- SEM	Fig. legend	p = 0.044	Fig. legend	F(3, 36) = 2.97	Fig. legend
example	results, para 6	unpaired t-test	Results para 6	15	slices from 10 mice	Results para 6	error bars are mean +/- SEM	Results para 6	p = 0.0006	Results para 6	t(28) = 2.808	Results para 6
+ -	1B2	N.A.					95% confidence intervals					

		TEST USED		n			DESCRIPTIVE STATS (AVERAGE, VARIANCE)		P VALUE		DEGREES OF FREEDOM & F/t/z/R/ETC VALUE	
	FIGURE NUMBER	WHICH TEST?	SECTION & PARAGRAPH #	EXACT VALUE	DEFINED?	SECTION & PARAGRAPH #	REPORTED?	SECTION & PARAGRAPH #	EXACT VALUE	SECTION & PARAGRAPH #	VALUE	SECTION & PARAGRAPH #
+ -	2C						95% confidence intervals for best fit line	legend				
+ -	Main Body Par. 3			11	single units	Main Body Par. 4	Median Basal Firing rate and range	Main Body Par. 4				
+ -	Main Body , Par. 4			11	experiments	Main Body, Par. 5	Percent change spontaneous MUA firing rate, mean +/- S.E.M.	Main Body, Par. 5				
+ -	Main Body , Par. 4			11	experiments	Main Body, Par. 5	Pearson's R, mean +/- S.E.M.	Main Body, Par. 5				
+ -	2D	Wilcoxin Sign-Rank	metho ds	11	experiments	Main Body, Par. 5	Mean +/- S.E.M.	Main Body, Par. 5	Pslope = 0.83, Pintercept = 0.0049	Main Body, Par. 5		
+ -	Main Body , Par. 4			21	units	Main Body, Par. 5	Percent change spontaneous firing rate, mean +/- S.E.M.	Main Body, Par. 5				
+ -	S3C	Wilcoxin Sign-Rank	metho ds	21	units	Main Body, Par. 5	Mean +/- S.E.M.	Main Body, Par. 5	Pslope = 0.23, Pintercept = 0.0008	Main Body, Par. 5		
+ -	3B						95% confidence intervals for best fit line	legend				
+ -	3C	Wilcoxin Sign-Rank	metho ds	29	units	Main Body, Par. 6	Mean +/- S.E.M.	Main Body, Par. 6	Pslope = 0.09, Pintercept = 0.0000008	Main Body, Par. 6		
+ -	2E			11	experiments	Main Body, Par. 5	Mean +/- S.E.M.	Main Body, Par. 5				
+ -	3D			18	units	Main Body, Par. 6	Mean +/- S.E.M.	Main Body, Par. 6				
+ -	3E	Wilcoxin Sign-Rank	metho ds	18	units	Main Body, Par. 7	Mean +/- S.E.M.	Main Body, Par. 7	Pd' = 0.02	Main Body, Par. 7		
+ -	4C	Paired T-test	Main Body, Par. 8	7	cell pairs	Main Body, Par. 8	Mean +/- S.E.M.	figure legend	p=0.45	Main Body, Par. 8		
+ -	4D	Wilcoxin Sign-Rank for difference from 0	metho ds	15	units	methods	median LED MOD for FS units = 0.24	metho ds	p=0.0413	methods		
+ -	4G	Wilcoxin Sign-Rank	metho ds	12	units	Main Body, Par. 9	Mean +/- S.E.M.	Main Body, Par. 9	Pslope=0.0269	Main Body, Par. 9		
+ -	S1			3/104	mice/cells	figure legend	Mean +/- S.E.M.	figure legend				

+ -	S2A			11,101	units	figure legend	median LED MOD for SOM units = -0.76	methods				
+ -	S2B			7	units	figure legend						
+ -	S2C			7,18	units	figure legend						
+ -	S2D			11	units	figure legend	Mean +/- S.E.M.	figure legend	Pslope = 0.0009	figure legend		
+ -	S3B						95% confidence intervals for best fit line	figure legend				
+ -	S3C	Wilcoxin Sign-Rank	methods	21	units	Main Body, Par. 5	Mean +/- S.E.M.	Main Body, Par. 5	Pintercept = 0.000796	Main Body, Par. 5		
+ -	S4B						95% confidence intervals for best fit line	figure legend				
+ -	S4C	Wilcoxin Sign-Rank	methods	4,21	experiments/units	figure legend	Mean +/- S.E.M.	figure legend	Pslope = 0.00016, Pintercept = 0.15	figure legend		

Representative figures

1. Are any representative images shown (including Western blots and immunohistochemistry/staining) in the paper?

   If so, what figure(s)?

   Yes, S1

2. For each representative image, is there a clear statement of how many times this experiment was successfully repeated and a discussion of any limitations in repeatability?

   If so, where is this reported (section, paragraph #)?

   Yes, figure legend

Statistics and general methods

1. Is there a justification of the sample size?

   If so, how was it justified?

   Where (section, paragraph #)?

   Even if no sample size calculation was performed, authors should report why the sample size is adequate to measure their effect size.

   Yes. Trial numbers/condition were empirically determined and ranged from 10-20 in order to achieve separation of control and LED conditions even for cells weakly modulated by the odor and LED. Numbers of animals and single units in data sets were consistent with similar, published studies.
   Methods P5

2. Are statistical tests justified as appropriate for every figure?

   Where (section, paragraph #)?

   Yes, Methods P10

   a. If there is a section summarizing the statistical methods in the methods, is the statistical test for each experiment clearly defined?

      Yes, Methods P10

b. Do the data meet the assumptions of the specific statistical test you chose (e.g. normality for a parametric test)?

Where is this described (section, paragraph #)?

N.A.- nonparametric

c. Is there any estimate of variance within each group of data?

Is the variance similar between groups that are being statistically compared?

Where is this described (section, paragraph #)?

N.A.- nonparametric

d. Are tests specified as one- or two-sided?

2-sided

e. Are there adjustments for multiple comparisons?

N.A.

3. Are criteria for excluding data points reported?

Was this criterion established prior to data collection?

Where is this described (section, paragraph #)?

Yes, Yes, Methods P8-9

4. Define the method of randomization used to assign subjects (or samples) to the experimental groups and to collect and process data.

If no randomization was used, state so.

Where does this appear (section, paragraph #)?

LED and odor trials were pseudorandomized, spike sorting was performed blind to experimental outcome, single units were identified based upon objective criteria. Methods P5, 8-9

5. Is a statement of the extent to which investigator knew the group allocation during the experiment and in assessing outcome included?

If no blinding was done, state so.

Where (section, paragraph #)?

N.A.

6. For experiments in live vertebrates, is a statement of compliance with ethical guidelines/regulations included?

Where (section, paragraph #)?

Yes, Methods P1

7. Is the species of the animals used reported?

Where (section, paragraph #)?

Yes, Methods P1

8. Is the strain of the animals (including background strains of KO/ transgenic animals used) reported?

Where (section, paragraph #)?

Yes, Methods P1

9. Is the sex of the animals/subjects used reported?

Where (section, paragraph #)?

No, Methods P3

10. Is the age of the animals/subjects reported?

Where (section, paragraph #)?

Yes, Methods P3

11. For animals housed in a vivarium, is the light/dark cycle reported? Where (section, paragraph #)?	Yes, Methods P1
12. For animals housed in a vivarium, is the housing group (i.e. number of animals per cage) reported? Where (section, paragraph #)?	Yes, Methods P1
13. For behavioral experiments, is the time of day reported (e.g. light or dark cycle)? Where (section, paragraph #)?	N.A.
14. Is the previous history of the animals/subjects (e.g. prior drug administration, surgery, behavioral testing) reported? Where (section, paragraph #)?	Yes, Methods P1
a. If multiple behavioral tests were conducted in the same group of animals, is this reported? Where (section, paragraph #)?	N.A.
15. If any animals/subjects were excluded from analysis, is this reported? Where (section, paragraph #)?	N.A.
a. How were the criteria for exclusion defined? Where is this described (section, paragraph #)?	N.A.
b. Specify reasons for any discrepancy between the number of animals at the beginning and end of the study. Where is this described (section, paragraph #)?	N.A.

Reagents

1. Have antibodies been validated for use in the system under study (assay and species)?	Yes
a. Is antibody catalog number given? Where does this appear (section, paragraph #)?	Yes, Methods P2.
b. Where were the validation data reported (citation, supplementary information, Antibodypedia)? Where does this appear (section, paragraph #)?	Commercial product information with citations, Methods P2.

2. If cell lines were used to reflect the properties of a particular tissue or disease state, is their source identified?

   Where (section, paragraph #)?

   N.A.

   a. Were they recently authenticated?

      Where is this information reported (section, paragraph #)?

      N.A.

Data deposition

Data deposition in a public repository is mandatory for:

a. Protein, DNA and RNA sequences
b. Macromolecular structures
c. Crystallographic data for small molecules
d. Microarray data

Deposition is strongly recommended for many other datasets for which structured public repositories exist; more details on our data policy are available here. We encourage the provision of other source data in supplementary information or in unstructured repositories such as Figshare and Dryad.

1. Are accession codes for deposit dates provided?

   Where (section, paragraph #)?

   N.A.

Computer code/software

Any custom algorithm/software that is central to the methods must be supplied by the authors in a usable and readable form for readers at the time of publication. However, referees may ask for this information at any time during the review process.

1. Identify all custom software or scripts that were required to conduct the study and where in the procedures each was used.

   data acquisition and analysis packages in matlab, spike sorting software used is public domain and referenced within the methods

2. Is computer source code/software provided with the paper or deposited in a public repository? Indicate in what form this is provided or how it can be obtained.

   can be obtained upon communication with corresponding author

Human subjects

1. Which IRB approved the protocol?

   Where is this stated (section, paragraph #)?

   N.A.

2. Is demographic information on all subjects provided?

   Where (section, paragraph #)?

   N.A.

3. Is the number of human subjects, their age and sex clearly defined?

   Where (section, paragraph #)?

   N.A.

4. Are the inclusion and exclusion criteria (if any) clearly specified?

   Where (section, paragraph #)?

N.A.

5. How well were the groups matched?

   Where is this information described (section, paragraph #)?

N.A.

6. Is a statement included confirming that informed consent was obtained from all subjects?

   Where (section, paragraph #)?

N.A.

7. For publication of patient photos, is a statement included confirming that consent to publish was obtained?

   Where (section, paragraph #)?

N.A.

fMRI studies

For papers reporting functional imaging (fMRI) results please ensure that these minimal reporting guidelines are met and that all this information is clearly provided in the methods:

1. Were any subjects scanned but then rejected for the analysis after the data was collected?

N.A.

   a. If yes, is the number rejected and reasons for rejection described?

      Where (section, paragraph #)?

N.A.

2. Is the number of blocks, trials or experimental units per session and/or subjects specified?

   Where (section, paragraph #)?

N.A.

3. Is the length of each trial and interval between trials specified?

N.A.

4. Is a blocked, event-related, or mixed design being used? If applicable, please specify the block length or how the event-related or mixed design was optimized.

N.A.

5. Is the task design clearly described?

   Where (section, paragraph #)?

N.A.

6. How was behavioral performance measured?

N.A.

7. Is an ANOVA or factorial design being used?

N.A.

8. For data acquisition, is a whole brain scan used?

   If not, state area of acquisition.

N.A.

a. How was this region determined?	N.A.
9. Is the field strength (in Tesla) of the MRI system stated?	N.A.
a. Is the pulse sequence type (gradient/spin echo, EPI/spiral) stated?	N.A.
b. Are the field-of-view, matrix size, slice thickness, and TE/TR/ flip angle clearly stated?	N.A.
10. Are the software and specific parameters (model/functions, smoothing kernel size if applicable, etc.) used for data processing and pre-processing clearly stated?	N.A.
11. Is the coordinate space for the anatomical/functional imaging data clearly defined as subject/native space or standardized stereotaxic space, e.g., original Talairach, MNI305, ICBM152, etc? Where (section, paragraph #)?	N.A.
12. If there was data normalization/standardization to a specific space template, are the type of transformation (linear vs. nonlinear) used and image types being transformed clearly described? Where (section, paragraph #)?	N.A.
13. How were anatomical locations determined, e.g., via an automated labeling algorithm (AAL), standardized coordinate database (Talairach daemon), probabilistic atlases, etc.?	N.A.
14. Were any additional regressors (behavioral covariates, motion etc) used?	N.A.
15. Is the contrast construction clearly defined?	N.A.
16. Is a mixed/random effects or fixed inference used?	N.A.
a. If fixed effects inference used, is this justified?	N.A.
17. Were repeated measures used (multiple measurements per subject)?	N.A.
a. If so, are the method to account for within subject correlation and the assumptions made about variance clearly stated?	N.A.
18. If the threshold used for inference and visualization in figures varies, is this clearly stated?	N.A.
19. Are statistical inferences corrected for multiple comparisons?	N.A.
a. If not, is this labeled as uncorrected?	N.A.

20. Are the results based on an ROI (region of interest) analysis?	N.A.
a. If so, is the rationale clearly described?	N.A.
b. How were the ROI's defined (functional vs anatomical localization)?	N.A.
21. Is there correction for multiple comparisons within each voxel?	N.A.
22. For cluster-wise significance, is the cluster-defining threshold and the corrected significance level defined?	N.A.

Additional comments

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