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.
- 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 page 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, and it is misleading not to state this clearly.

<table>
<thead>
<tr>
<th>FIGURE NUMBER</th>
<th>TEST USED</th>
<th>n</th>
<th>DESCRIBITIVE STATS (AVERAGE, VARIANCE)</th>
<th>P VALUE</th>
<th>DEGREES OF FREEDOM &amp; F/T/Z/R/ETC VALUE</th>
</tr>
</thead>
<tbody>
<tr>
<td>1a</td>
<td>one-way ANOVA</td>
<td>4, 9, 10, 15</td>
<td>mice from at least 3 litters/group</td>
<td>error bars are mean +/- SEM</td>
<td>p = 0.044</td>
</tr>
<tr>
<td>results, pg 6</td>
<td>unpaired t-test</td>
<td>15</td>
<td>slices from 10 mice</td>
<td>error bars are mean +/- SEM</td>
<td>p = 0.0006</td>
</tr>
<tr>
<td>Fig. 1d, pg 4</td>
<td>paired t-test (between control and 18BGA)</td>
<td>n = 6 pairs</td>
<td>CI=0.09, 0.05</td>
<td>mean +/- SEM</td>
<td>p = 0.001</td>
</tr>
<tr>
<td>Fig. 1e, pg 4</td>
<td>t-test (between coupled and uncoupled RGCs)</td>
<td>n = 8 pairs, 5 pairs</td>
<td>CI=0.13, 0.06</td>
<td>mean +/- SEM</td>
<td>p = 0.01</td>
</tr>
<tr>
<td>Sup. Fig. 5, pg 4</td>
<td>t-test (between coupled and Cx36/- - cRGCs)</td>
<td>n = 8 pairs, 3 pairs</td>
<td>CI=0.03</td>
<td>mean +/- SEM</td>
<td>p = 0.01</td>
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</tbody>
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Nature Neuroscience: doi:10.1038/nn.3851
<table>
<thead>
<tr>
<th>FIGURE NUMBER</th>
<th>WHICH TEST?</th>
<th>PAGE</th>
<th>n</th>
<th>DEFINED?</th>
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<th>REPORTED?</th>
<th>PAGE</th>
<th>EXACT VALUE</th>
<th>PAGE</th>
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<td>Kruskal-Wallis One-Way ANOVA on Ranks (amplitude between coupled spikelets, dendritic spikes and somatic action potentials)</td>
<td>6</td>
<td>mV=0.8, 7.9, 51.4</td>
<td>n = 4, 6, 4 cells</td>
<td>6</td>
<td>p &lt; 0.001</td>
<td>6</td>
<td>H(2) = 141.197</td>
<td>6</td>
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<tr>
<td>pg 6</td>
<td>paired t-test (control CI vs TTX puff on dendrite)</td>
<td>6</td>
<td>CI=0.27, 0.10</td>
<td>n = 5 pairs</td>
<td>6</td>
<td>p = 0.017</td>
<td>6</td>
<td>t(4) = 3.959</td>
<td>6</td>
<td></td>
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<tr>
<td>pg 7</td>
<td>paired t-test (control rate vs TTX puff on dendrite)</td>
<td>7</td>
<td>rate=123, 73</td>
<td>n = 5 pairs</td>
<td>7</td>
<td>p = 0.008</td>
<td>7</td>
<td>t(9) = 3.365</td>
<td>7</td>
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<td></td>
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<tr>
<td>pg 8</td>
<td>paired t-test (rate for common vs. uncommon flash)</td>
<td>8</td>
<td>rate=131, 115</td>
<td>n = 6 pairs</td>
<td>8</td>
<td>mean +/- SEM</td>
<td>8</td>
<td>p = 0.124</td>
<td>8</td>
<td>t(5) = 1.846</td>
<td>8</td>
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<tr>
<td>pg 8</td>
<td>paired t-test (CI for common vs. uncommon flash)</td>
<td>8</td>
<td>CI=0.16, 0.07</td>
<td>n = 6 pairs</td>
<td>8</td>
<td>mean +/- SEM</td>
<td>8</td>
<td>p = 0.003</td>
<td>8</td>
<td>t(5) = 5.192</td>
<td>8</td>
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<tr>
<td>pg 9</td>
<td>paired t-test (rate for high vs low contrast)</td>
<td>9</td>
<td>rate=145, 93</td>
<td>n = 6 pairs</td>
<td>9</td>
<td>mean +/- SEM</td>
<td>9</td>
<td>p = 0.003</td>
<td>9</td>
<td>t(5) = 6.377</td>
<td>9</td>
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<tr>
<td>pg 9</td>
<td>paired t-test (CI for high vs low contrast)</td>
<td>9</td>
<td>CI=0.09, 0.15</td>
<td>n = 6 pairs</td>
<td>9</td>
<td>mean +/- SEM</td>
<td>9</td>
<td>p = 0.022</td>
<td>9</td>
<td>t(5) = 3.655</td>
<td>9</td>
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<tr>
<td>pg 9</td>
<td>paired t-test (rate for PREF vs NULL stimuli)</td>
<td>9</td>
<td>rate=167, 51</td>
<td>n = 5 pairs</td>
<td>9</td>
<td>mean +/- SEM</td>
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<td>p = 0.004</td>
<td>9</td>
<td>t(4) = 6.061</td>
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<tr>
<td>pg 9</td>
<td>paired t-test (CI for PREF vs NULL stimuli)</td>
<td>9</td>
<td>CI=0.22, 0.04</td>
<td>n = 5 pairs</td>
<td>9</td>
<td>mean +/- SEM</td>
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<td>p = 0.014</td>
<td>9</td>
<td>t(4) = 4.160</td>
<td>0</td>
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<tr>
<td>pg 10</td>
<td>paired t-test (rate before and after excitatory blockers)</td>
<td>10</td>
<td>rate=142, 61</td>
<td>n = 6 pairs</td>
<td>10</td>
<td>raw values</td>
<td>Fig 6</td>
<td>p = 0.003</td>
<td>10</td>
<td>t(5) = 5.501</td>
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<tr>
<td>pg 10</td>
<td>paired t-test (CI before and after excitatory blockers)</td>
<td>10</td>
<td>CI=0.09, 0.17</td>
<td>n = 6 pairs</td>
<td>10</td>
<td>raw values</td>
<td>Fig 6</td>
<td>p = 0.004</td>
<td>10</td>
<td>t(5) = 4.904</td>
<td>10</td>
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<tr>
<td>pg 10</td>
<td>paired t-test (rate before and after picrotoxin)</td>
<td>10</td>
<td>rate=44, 204</td>
<td>n = 4 pairs</td>
<td>10</td>
<td>raw values</td>
<td>Fig 6</td>
<td>p &lt; 0.001</td>
<td>10</td>
<td>t(3) = 21.740</td>
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<tr>
<td>pg 10</td>
<td>paired t-test (CI before and after picrotoxin)</td>
<td>10</td>
<td>CI=0.21, 0.14</td>
<td>n = 4 pairs</td>
<td>10</td>
<td>raw values</td>
<td>Fig 6</td>
<td>p = 0.045</td>
<td>10</td>
<td>t(3) = 3.311</td>
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<tr>
<td>pg 10</td>
<td>paired t-test (rate picrotoxin high vs low contrast)</td>
<td>10</td>
<td>rate=163, 56</td>
<td>n = 4 pairs</td>
<td>10</td>
<td>raw values</td>
<td>Fig 6</td>
<td>p = 0.029</td>
<td>10</td>
<td>t(3) = 3.931</td>
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<tr>
<td>pg 10</td>
<td>paired t-test (CI picrotoxin high vs low contrast)</td>
<td>10</td>
<td>CI=0.09, 0.24</td>
<td>n = 4 pairs</td>
<td>10</td>
<td>raw values</td>
<td>Fig 6</td>
<td>p = 0.011</td>
<td>10</td>
<td>t(3) = 5.665</td>
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<tr>
<td>pg 10</td>
<td>paired t-test (rate picrotoxin high vs low contrast)</td>
<td>10</td>
<td>rate=157, 90</td>
<td>n = 5 pairs</td>
<td>10</td>
<td>mean +/- SEM</td>
<td>10</td>
<td>p &lt; 0.001</td>
<td>10</td>
<td>t(4) = 10.196</td>
<td>10</td>
</tr>
<tr>
<td>pg 11</td>
<td>paired t-test (CI high low contrast)</td>
<td>11</td>
<td>CI=0.15, 0.20</td>
<td>n = 5 pairs</td>
<td>11</td>
<td>mean +/- SEM</td>
<td>11</td>
<td>p = 0.005</td>
<td>11</td>
<td>t(4) = 5.580</td>
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<tr>
<td>pg 10</td>
<td>paired t-test (rate no gap vs gap)</td>
<td>10</td>
<td>rate=153, 95</td>
<td>n = 5 pairs</td>
<td>10</td>
<td>mean +/- SEM</td>
<td>10</td>
<td>p = 0.045</td>
<td>10</td>
<td>t(4) = 2.878</td>
<td>10</td>
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<tr>
<td>pg 11</td>
<td>paired t-test (CI no gap vs gap)</td>
<td>11</td>
<td>CI=0.13, 0.05</td>
<td>n = 5 pairs</td>
<td>11</td>
<td>mean +/- SEM</td>
<td>11</td>
<td>p = 0.018</td>
<td>11</td>
<td>t(4) = 3.858</td>
<td>11</td>
</tr>
</tbody>
</table>
Representative figures

1. Are any representative images shown (including Western blots and immunohistochemistry/staining) in the paper?
If so, what figure(s)?

Representative results are shown throughout the manuscript including: Fig. 1b-f; Fig. 2a-d; Fig. 3a,b; Fig. 4a-d; Fig. 5b-d, Fig. 6a, Fig. 7a.

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, on what page(s) is this reported?

For each representative result shown in a figure, it is clearly listed, either in the related text or the figure legend how many times the experiment repeated, as well as the exact P value for the experiment. The page reference for n is indicated in the table above.

Statistics and general methods

1. Is there a justification of the sample size?
If so, how was it justified?
On what page(s)?

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

In general, sample sizes were set such that they exceeded the number of repetitions required to obtain statistical significance.

2. Are statistical tests justified as appropriate for every figure?
On what page(s)?

T-tests, paired t-tests, and a one-way ANOVA are used in the paper. The rational for using these is outlined in the methods.

Comparisons between groups were made with t-tests. Comparisons made between recordings from the same cell before and after manipulations were made using paired t-tests. Comparison between three groups was made using a one-way ANOVA. This is outlined in the Methods.

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

Comparisons between groups were made with t-tests. Comparisons made between recordings from the same cell before and after manipulations were made using paired t-tests. Comparison between three groups was made using a one-way ANOVA. This is outlined in the Methods.

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?

To test for normality, we used the Shapiro-Wilk normality test. This is described in the Methods.

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?

Throughout the manuscript we present data as mean +/- SEM, as well as the n for each experiment. The variance can be easily calculated from these values.

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

All t-tests were two-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?
On what page(s) is this described?

n/a
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.

On what page(s) does this appear? n/a

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, is a statement to this effect included?

On what page(s)? n/a

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

On what page(s)? In the methods we indicate that all procedures were performed in accordance with the Canadian Council on Animal Care and approved by the University of Victoria’s or the University of Washington’s Animal Care Committee.

7. Is the species of the animals used reported?

On what page(s)? In the methods.

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

On what page(s)? In the methods.

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

On what page(s)? In the methods.

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

On what page(s)? In the methods.

11. For animals housed in a vivarium, is the light/dark cycle reported?

On what page(s)? In the methods.

12. For animals housed in a vivarium, is the housing group (i.e. number of animals per cage) reported?

On what page(s)? n/a

13. For behavioral experiments, is the time of day reported (e.g. light or dark cycle)?

On what page(s)? n/a

14. Is the previous history of the animals/subjects (e.g. prior drug administration, surgery, behavioral testing) reported?

On what page(s)? n/a
a. If multiple behavioral tests were conducted in the same group of animals, is this reported?  
On what page(s)?  
n/a

15. If any animals/subjects were excluded from analysis, is this reported?  
On what page(s)?  
n/a

a. How were the criteria for exclusion defined?  
Where is this described?  
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?  
n/a

Reagents

1. Have antibodies been validated for use in the system under study (assay and species)?  
On what page(s)?  
n/a

a. Is antibody catalog number given?  
On what page(s) does this appear?  
n/a

b. Where were the validation data reported (citation, supplementary information, Antibodypedia)?  
On what page(s) does this appear?  
n/a

2. If cell lines were used to reflect the properties of a particular tissue or disease state, is their source identified?  
On what page(s)?  
n/a

a. Were they recently authenticated?  
On what page(s) is this information reported?  
n/a
### Data deposition

Data deposition in a public repository is mandatory for:

- Protein, DNA and RNA sequences
- Macromolecular structures
- Crystallographic data for small molecules
- 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?  
   
   On what page(s)?  
   
   **n/a**

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### Computer code/software

1. Is there any custom algorithm/software that is integral to the study that has not been previously reported?  
   
   If so, is this algorithm/software provided in a usable and readable form for the referees?  
   
   Indicate in what form this is provided.  
   
   **n/a**

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### Human subjects

1. Which IRB approved the protocol?  
   
   Where is this stated?  
   
   **n/a**

2. Is demographic information on all subjects provided?  
   
   On what page(s)?  
   
   **n/a**

3. Is the number of human subjects, their age and sex clearly defined?  
   
   On what page(s)?  
   
   **n/a**

4. Are the inclusion and exclusion criteria (if any) clearly specified?  
   
   On what page(s)?  
   
   **n/a**

5. How well were the groups matched?  
   
   Where is this information described?  
   
   **n/a**

6. Is a statement confirming that informed consent was obtained from all subjects included?  
   
   On what page(s)?  
   
   **n/a**
7. For publication of patient photos, is a statement confirming that consent to publish was obtained included?
   On what page(s)?
   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?
   On what page(s)?
   n/a
   a. If yes, is the number rejected and reasons for rejection described?
      On what page(s)?
      n/a

2. Is the number of blocks, trials or experimental units per session and/or subjects specified?
   On what page(s)?
   n/a

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

4. Is a blocked design used?
   If so, is length of blocks specified?
   n/a

5. Is an event-related design being used?
   If so, how was the design optimized?
   n/a

6. Is the task design clearly described?
   Where?
   n/a

7. How was behavioral performance measured?
   n/a

8. Are any planned comparisons being used?
   a. Are they clearly described?
      n/a
   b. Is an ANOVA used?
      n/a

9. For data acquisition, is a whole brain scan used?
   If not, state area of acquisition.
   a. How was this region determined?
      n/a

10. 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?

11. Is the software used for data processing and pre-processing clearly stated?

12. For any anatomical imaging, is the coordinate space defined?

13. How was the brain image template space, name, modality and resolution determined?

14. How were anatomical locations determined?

15. Is the statistical model and estimation method clearly described?

16. Were any additional regressors (behavioral covariates, motion etc) used?

17. Is the contrast construction clearly defined?

18. Is a mixed/random effects or fixed inference used?
   a. If fixed effects inference used, is this justified?

19. Were repeated measures used (multiple measurements per subject)?
   a. If so, are the method to account for within subject correlation and the assumptions made about variance clearly stated?

20. If the threshold used for inference and visualization in figures varies, is this clearly stated?

21. Are statistical inferences corrected for multiple comparisons?
   a. If not, is this labeled as uncorrected?

22. Are the results based on an ROI (region of interest) analysis?
   a. If so, is the rationale clearly described?
   b. How were the ROI’s defined (functional vs anatomical localization)?

23. Is there correction for multiple comparisons within each voxel?

24. For cluster-wise significance, is the cluster-defining threshold and the corrected significance level defined?
Additional comments

Additional Comments

n/a