

Materials Design Analysis Reporting (MDAR) **Checklist for Authors**

The [MDAR framework](#) establishes a minimum set of requirements in transparent reporting mainly applicable to studies in the life sciences.

eLife asks authors to **provide detailed information within their article** to facilitate the interpretation and replication of their work. Authors can also upload supporting materials to comply with relevant reporting guidelines for health-related research (see [EQUATOR Network](#)), life science research (see the [BioSharing Information Resource](#)), or animal research (see the [ARRIVE Guidelines](#) and the [STRANGE Framework](#); for details, see *eLife*'s [Journal Policies](#)). Where applicable, authors should refer to any relevant reporting standards materials in this form.

For all that apply, please note **where in the article** the information is provided. Please note that we also collect information about data availability and ethics in the submission form.

Materials:

Newly created materials	Indicate where provided: section/ figure legend	N/A
The manuscript includes a dedicated "materials availability statement" providing transparent disclosure about availability of newly created materials including details on how materials can be accessed and describing any restrictions on access.	Behavior, EM, and model analysis pipelines are described in the Materials and Methods section. Code for behavior and modeling is publicly available at: https://github.com/PrimoRavbar/Inhibitory-circuits and https://github.com/SyedDurafshan/Inhibitory-circuits-Source.git	

Antibodies	Indicate where provided: section/ figure legend	N/A
For commercial reagents, provide supplier name, catalogue number and RRID , if available.	Information provided in the key resources table	

DNA and RNA sequences	Indicate where provided: section/ figure legend	N/A
Short novel DNA or RNA including primers, probes: Sequences should be included or deposited in a public repository.		N/A

Cell materials	Indicate where provided: section/ figure legend	N/A
Cell lines: Provide species information, strain. Provide accession number in repository OR supplier name, catalog number, clone number, OR RRID.		N/A
Primary cultures: Provide species, strain, sex of origin, genetic modification status.		N/A

Experimental animals	Indicate where provided: section/ figure legend	N/A
Laboratory animals or Model organisms: Provide species, strain, sex, age, genetic modification status. Provide accession number in repository OR supplier name, catalog number, clone number, OR RRID.	Drosophila melanogaster, 3–6 day old males, raised at 25 degree celcius, were used for behavior experiments. Genotypes are listed in the Materials and Methods section and in the Key Resources Table, including RRIDs where available.	

Animal observed in or captured from the field: Provide species, sex, and age where possible.		N/A
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Plants and microbes	Indicate where provided: section/figure legend	N/A
Plants: provide species and strain, ecotype and cultivar where relevant, unique accession number if available, and source (including location for collected wild specimens).		N/A
Microbes: provide species and strain, unique accession number if available, and source.		N/A

Human research participants	Indicate where provided: section/figure legend) or state if these demographics were not collected	N/A
If collected and within the bounds of privacy constraints report on age, sex, gender and ethnicity for all study participants.		N/A

Design:

Study protocol	Indicate where provided: section/figure legend	N/A
If the study protocol has been pre-registered, provide DOI. For clinical trials, provide the trial registration number OR cite DOI.		N/A

Laboratory protocol	Indicate where provided: section/figure legend	N/A
Provide DOI OR other citation details if detailed step-by-step protocols are available.	Detailed protocol written in materials and methods section	

Experimental study design (statistics details) *		
For in vivo studies: State whether and how the following have been done	Indicate where provided: section/figure legend. If it could have been done, but was not, write "not done"	N/A
Sample size determination	Statistical calculations for sample size are not routinely applied in <i>Drosophila</i> studies and were not performed here. Sample sizes were chosen based on common practices in the field.	

Randomisation	Randomization was not applied in behavioral or optogenetic experiments, as flies were assigned to experimental groups based on genotype and availability. Experiments were conducted in a consistent order to minimize variability, and environmental conditions were controlled.	
Blinding	Experimenters were not fully blinded to genotype during behavioral experiments due to the need to operate specific optogenetic setups. However, data analysis and scoring of behavior were performed using automated tracking or objective code-based pipelines to minimize bias.	
Inclusion/exclusion criteria	All flies that met the age, sex, and genotype criteria described in Materials and Methods were included in analyses. Animals were excluded only in rare cases where technical issues (e.g., tracking failures due to dust accumulation in FlyStudio, incomplete recordings, or damage to legs or wings during dusting) prevented reliable data collection.	

Sample definition and in-laboratory replication	Indicate where provided: section/ figure legend	N/A
State number of times the experiment was replicated in the laboratory.	Experiment was repeated 2–3 times on separate days as independent biological replicates. Sample sizes, indicated in the figure legends, correspond to individual animals.	
Define whether data describe technical or biological replicates.	Both. Biological replicates are independent experiments on separate days, and technical replicates are measurements from individual flies within each experiment.	

Ethics	Indicate where provided: section/ submission form	N/A
Studies involving human participants: State details of authority granting ethics approval (IRB or equivalent committee(s), provide reference number for approval.		N/A
Studies involving experimental animals: State details of authority granting ethics approval (IRB or equivalent committee(s), provide reference number for approval.	Research using <i>Drosophila melanogaster</i> does not require institutional ethics approval.	N/A

Studies involving specimen and field samples: State if relevant permits obtained, provide details of authority approving study; if none were required, explain why.		N/A
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Dual Use Research of Concern (DURC)	Indicate where provided: section/ submission form	N/A
If study is subject to dual use research of concern regulations, state the authority granting approval and reference number for the regulatory approval.		N/A

Analysis:

Attrition	Indicate where provided: section/ figure legend	N/A
Describe whether exclusion criteria were pre-established. Report if sample or data points were omitted from analysis. If yes, report if this was due to attrition or intentional exclusion and provide justification.	Exclusion criteria were not formally pre-established. Data points were only omitted in rare cases where technical issues (e.g., tracking failures due to dust accumulation in FlyStudio, incomplete recordings, or physical damage to legs or wings) prevented reliable measurements.	

Statistics	Indicate where provided: section/ figure legend	N/A
Describe statistical tests used and justify choice of tests.	Differences between experimental groups were analyzed using Linear Mixed Models (LMMs) to account for non-independence of segment-level data nested within flies. Multiple comparisons were corrected using the False Discovery Rate ($\alpha = 0.05$). LMMs were chosen because behavioral segments from the same animal are correlated, and the tests are robust to unequal group sizes and clustered data. For further details read materials and methods section.	

Data availability	Indicate where provided: section/ submission form	N/A
For newly created and reused datasets, the manuscript includes a data availability statement that provides details for access (or notes restrictions on access).	Data in Figures and tables, and publicly available at: https://github.com/PrimoRavbar/Inhibitory-circuits and https://github.com/SyedDurafshan/Inhibitory-circuits-Source.git	

When newly created datasets are publicly available, provide accession number in repository OR DOI and licensing details where available.		N/A
If reused data is publicly available provide accession number in repository OR DOI, OR URL, OR citation.		N/A

Code availability	Indicate where provided: section/ figure legend	N/A
For any computer code/software/mathematical algorithms essential for replicating the main findings of the study, whether newly generated or re-used, the manuscript includes a data availability statement that provides details for access or notes restrictions.	code publicly available at https://github.com/PrimoRavbar/Inhibitory-circuits	
Where newly generated code is publicly available, provide accession number in repository, OR DOI OR URL and licensing details where available. State any restrictions on code availability or accessibility.	https://github.com/PrimoRavbar/Inhibitory-circuits	
If reused code is publicly available provide accession number in repository OR DOI OR URL, OR citation.	Links are provided in Key Resources Table	

Reporting:

The MDAR framework recommends adoption of discipline-specific guidelines, established and endorsed through community initiatives.

Adherence to community standards	Indicate where provided: section/ figure legend	N/A
State if relevant guidelines (e.g., ICMJE, MIBBI, ARRIVE, STRANGE) have been followed, and whether a checklist (e.g., CONSORT, PRISMA, ARRIVE) is provided with the manuscript.		N/A

* We provide the following guidance regarding transparent reporting and statistics; we also refer authors to [Ten common statistical mistakes to watch out for when writing or reviewing a manuscript](#).

Sample-size estimation

- You should state whether an appropriate sample size was computed when the study was being designed
- You should state the statistical method of sample size computation and any required assumptions
- If no explicit power analysis was used, you should describe how you decided what sample (replicate) size (number) to use

Replicates

- You should report how often each experiment was performed

- You should include a definition of biological versus technical replication
- The data obtained should be provided and sufficient information should be provided to indicate the number of independent biological and/or technical replicates
- If you encountered any outliers, you should describe how these were handled
- Criteria for exclusion/inclusion of data should be clearly stated
- High-throughput sequence data should be uploaded before submission, with a private link for reviewers provided (these are available from both GEO and ArrayExpress)

Statistical reporting

- Statistical analysis methods should be described and justified
- Raw data should be presented in figures whenever informative to do so (typically when N per group is less than 10)
- For each experiment, you should identify the statistical tests used, exact values of N, definitions of center, methods of multiple test correction, and dispersion and precision measures (e.g., mean, median, SD, SEM, confidence intervals; and, for the major substantive results, a measure of effect size (e.g., Pearson's r, Cohen's d)
- Report exact p-values wherever possible alongside the summary statistics and 95% confidence intervals. These should be reported for all key questions and not only when the p-value is less than 0.05.

Group allocation

- Indicate how samples were allocated into experimental groups (in the case of clinical studies, please specify allocation to treatment method); if randomization was used, please also state if restricted randomization was applied
- Indicate if masking was used during group allocation, data collection and/or data analysis