nature neuroscience

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# Main Figures:	3
# Supplementary Figures:	6
# Supplementary Tables:	4
# 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

	FIGURE NUMBER	TEST USED		n			DESCRIPTIVE STATS (AVERAGE, VARIANCE)		P VALUE		DEGREES OF FREEDOM & F/t/z/R/ETC VALUE	
		WHICH TEST?	SECTION & PARAGRAPH #	EXACT VALUE	DEFINED?	SECTION & PARAGRAPH #	REPORTED?	SECTION & PARAGRAPH #	EXACT VALUE	SECTION & PARAGRAPH #	VALUE	SECTION & PARAGRAPH #
+／−	main text p. 5, legend Fig. 2	unpaired t-test	p. 5, legend Fig. 2	37	number of lucid vs. number of non-lucid dream reports during 40 Hz stimulations	p. 5, legend Fig 2, Online Methods	yes	Fig. 2	0.00003	p. 5, legend Fig 2, Online Methods	42/5.01	p. 5, legend Fig. 2
+／−	main text p. 5, legend Fig. 2	unpaired t-test	p. 5, legend Fig. 2	23	number of lucid vs. number of non-lucid dream reports during 25 Hz stimulations	p. 5, legend Fig 2, Online Methods	yes	Fig. 2	0.0102	p. 5, legend Fig 2, Online Methods	24/2.80	p. 5, legend Fig. 2
+／−	main text p. 5, Supp. Table 2	MANOVA	main text p. 5, Supp. Table 2	207	yes	main text p. 5, Supp. Table 2, Online Methods	yes	main text p. 5, Supp. Table 2	< 0.000000001	main text p. 5, Supp. Table 2	56, 1039/3.29	main text p. 5, Supp. Table 2
+／−	main text p. 5, Supp. Table 2	ANOVA	main text p. 5, Supp. Table 2	207	yes	main text p. 5, Supp. Table 2, Online Methods	yes	main text p. 5, Supp. Table 2	0.00003	main text p. 5, Supp. Table 2	7, 199/4.97	main text p. 5, Supp. Table 2
+／−	main text p. 5, Supp. Table 2	ANOVA	main text p. 5, Supp. Table 2	207	yes	main text p. 5, Supp. Table 2, Online Methods	yes	main text p. 5, Supp. Table 2	0.0001	main text p. 5, Supp. Table 2	7,199/4.68	main text p. 5, Supp. Table 2
+／−	main text p. 5, Supp. Table 2	ANOVA	main text p. 5, Supp. Table 2	207	yes	main text p. 5, Supp. Table 2, Online Methods	yes	main text p. 5, Supp. Table 2	0.0028	main text p. 5, Supp. Table 2	7, 199/3.24	main text p. 5, Supp. Table 2
+／−	main text p. 5, Supp. Table 2	ANOVA	main text p. 5, Supp. Table 2	207	yes	main text p. 5, Supp. Table 2, Online Methods	yes	main text p. 5, Supp. Table 2	0.0038	main text p. 5, Supp. Table 2	7, 199/3.12	main text p. 5, Supp. Table 2
+／−	main text p. 5, Supp. Table 2	ANOVA	main text p. 5, Supp. Table 2	207	yes	main text p. 5, Supp. Table 2, Online Methods	yes	main text p. 5, Supp. Table 2	< 0.000000001	main text p. 5, Supp. Table 2	7, 199/10.62	main text p. 5, Supp. Table 2

+/−												
+ −	main text p. 5, Supp. Table 2	post hoc test, Bonferroni corrected	main text p. 5, Supp. Table 2	207	yes, subtest for DISSOCIATION between sham (N = 30) and 40 Hz condition (N = 44)	main text p. 5, Supp. Table 2	yes	Fig 3	0.000002	main text p. 5, Supp. Table 2	72, medium difference 0.9889	not listed
+ −	main text p. 5, Supp. Table 2	post hoc test, Bonferroni corrected	main text p. 5, Supp. Table 2	207	yes, subtest for DISSOCIATION between 2 Hz (N = 31) and 40 Hz condition (N = 44)	main text p. 5, Supp. Table 2	yes	Fig 3	0.000005	main text p. 5, Supp. Table 2	73, medium difference 0.9877	not listed
+ −	main text p. 5, Supp. Table 2	post hoc test, Bonferroni corrected	main text p. 5, Supp. Table 2	207	yes, subtest for DISSOCIATION between 6 Hz (N = 19) and 40 Hz condition (N = 44)	main text p. 5, Supp. Table 2	yes	Fig 3	0.000001	main text p. 5, Supp. Table 2	61, medium difference 1.1696	not listed
+ −	main text p. 5, Supp. Table 2	post hoc test, Bonferroni corrected	main text p. 5, Supp. Table 2	207	yes, subtest for DISSOCIATION between 12 Hz (N = 18) and 40 Hz condition (N = 44)	main text p. 5, Supp. Table 2	yes	Fig 3	0.0000007	main text p. 5, Supp. Table 2	60, medium difference 1.2222	not listed
+ −	main text p. 5, Supp. Table 2	post hoc test, Bonferroni corrected	main text p. 5, Supp. Table 2	207	yes, subtest for DISSOCIATION between 70 Hz (N = 21) and 40 Hz condition (N = 44)	main text p. 5, Supp. Table 2	yes	Fig 3	0.0016	main text p. 5, Supp. Table 2	63, medium difference 0.8254	not listed
+ −	main text p. 5, Supp. Table 2	post hoc test, Bonferroni corrected	main text p. 5, Supp. Table 2	207	yes, subtest for INSIGHT between sham (N = 30) and 40 Hz condition (N = 44)	main text p. 5, Supp. Table 2	yes	Fig 3	0.0009	main text p. 5, Supp. Table 2	72, medium difference 0.5416	not listed
+ −	main text p. 5, Supp. Table 2	post hoc test, Bonferroni corrected	main text p. 5, Supp. Table 2	207	yes, subtest for INSIGHT between 2 Hz (N = 31) and 40 Hz condition (N = 44)	main text p. 5, Supp. Table 2	yes	Fig 3	0.0159	main text p. 5, Supp. Table 2	73, medium difference 0.4738	not listed
+ −	main text p. 5, Supp. Table 2	post hoc test, Bonferroni corrected	main text p. 5, Supp. Table 2	207	yes, subtest for INSIGHT between 12 Hz (N = 18) and 40 Hz condition (N = 44)	main text p. 5, Supp. Table 2	yes	Fig 3	0.0466	main text p. 5, Supp. Table 2	60, medium difference 0.4961	not listed
+ −	main text p. 5, Supp. Table 2	post hoc test, Bonferroni corrected	main text p. 5, Supp. Table 2	207	yes, subtest for INSIGHT between 70 Hz (N = 21) and 40 Hz condition (N = 44)	main text p. 5, Supp. Table 2	yes	Fig 3	0.0099	main text p. 5, Supp. Table 2	73, medium difference 0.5337	not listed
+ −	main text p. 6, Supp. Table 2	post hoc test, Bonferroni correcteds	main text p. 6, Supp. Table 2	207	yes, subtest for CONTROL between 2 Hz (N = 31) and 25 Hz condition (N = 26)	main text p. 6, Supp. Table 2	yes	Fig 3	0.0004	main text p. 6, Supp. Table 2	55, medium difference 0.3761	not listed

+ –	main text p. 6, Supp. Table 2	post hoc test, Bonferroni corrected	main text p. 6, Supp. Table 2	207	yes, subtest for CONTROL between 6 Hz (N = 19) and 25 Hz condition (N = 26)	main text p. 6, Supp. Table 2	yes	Fig 3	0.0150	main text p. 6, Supp. Table 2	43, medium difference 0.3249	not listed
+ –	main text p. 6, Supp. Table 2	post hoc test, Bonferroni corrected	main text p. 6, Supp. Table 2	207	yes, subtest for CONTROL between 12 Hz (N = 18) and 25 Hz condition (N = 26)	main text p. 6, Supp. Table 2	yes	Fig 3	0.0074	main text p. 6, Supp. Table 2	42, medium difference 0.3483	not listed
+ –	main text p. 6, Supp. Table 2	post hoc test, Bonferroni corrected	main text p. 6, Supp. Table 2	207	yes, subtest for CONTROL between 40 Hz (N = 44) and 25 Hz condition (N = 26)	main text p. 6, Supp. Table 2	yes	Fig 3	0.0010	main text p. 6, Supp. Table 2	68, medium difference 0.3153	not listed
+ –	main text p. 6, Supp. Table 2	post hoc test, Bonferroni corrected	main text p. 6, Supp. Table 2	207	yes, subtest for CONTROL between 70 Hz (N = 21) and 25 Hz condition (N = 26)	main text p. 6, Supp. Table 2	yes	Fig 3	0.0003	main text p. 6, Supp. Table 2	45, medium difference 0.4038	not listed
+ –	main text p. 6, Supp. Table 2	post hoc test, Bonferroni corrected	main text p. 6, Supp. Table 2	207	yes, subtest for CONTROL between 100 Hz (N = 18) and 25 Hz condition (N = 26)	main text p. 6, Supp. Table 2	yes	Fig 3	0.0007	main text p. 6, Supp. Table 2	42, medium difference 0.4038	not listed
+ –	main text p. 6, Supp Table 3	Spearman correlation coefficient	main text p. 6, Supp Table 3	207	yes, INSIGHT and 40 Hz	main text p. 6, Supp Table 3	yes	Supp Table 3	0.0001	main text p. 6, Supp Table 3	207, 0.30	Supp Table 3
+ –	main text p. 6, Supp Table 3	Spearman correlation coefficient	main text p. 6, Supp Table 3	207	yes, DISSOCIATION and 40 Hz	main text p. 6, Supp Table 3	yes	main text p. 6, Supp Table 3	0.00000003	main text p. 6, Supp Table 3	207, 0.43	main text p. 6, Supp Table 3
+ –	main text p. 6, Supp Table 3	Spearman correlation coefficient	main text p. 6, Supp Table 3	207	yes, INSIGHT and 25 Hz	main text p. 6, Supp Table 3	yes	main text p. 6, Supp Table 3	0.0098	main text p. 6, Supp Table 3	207, 0.16	main text p. 6, Supp Table 3
+ –	main text p. 6, Supp Table 3	Spearman correlation coefficient	main text p. 6, Supp Table 3	207	yes, DISSOCIATION and 25 Hz	main text p. 6, Supp Table 3	yes	main text p. 6, Supp Table 3	0.0081	main text p. 6, Supp Table 3	207, 0.18	main text p. 6, Supp Table 3
+ –	online methods	Spearman correlation coefficient	online methods	207	yes, INSIGHT AND DISSOCIATION	online methods	yes	online methods	0.0000012	online methods	207, 0.32	online methods
+ –	legend Fig. 2	unpaired t-test	legend Fig. 2	70	yes	legend Fig. 2	yes	legend Fig. 2	0.00003	legend Fig. 2	68/4.55	legend Fig. 2
+ –	legend Fig. 2	unpaired t-test	legend Fig. 2	70	yes	legend Fig. 2	yes	legend Fig. 2	0.2387	legend Fig. 2	68/1.19	--

+/−												
+−	Supp. Table 2	post hoc test, Bonferroni corrected	Supp. Table 2	207	yes, subtest for DISSOCIATION between 25 Hz (N = 26) and 40 Hz condition (N = 44)	Supp. Table 2	yes	Supp. Table 2	1.0000	Supp. Table 2	68, medium difference 0.2991	-
+−	Supp. Table 2	post hoc test, Bonferroni corrected	Supp. Table 2	207	yes, subtest for INSIGHT between 25 Hz (N = 26) and 40 Hz condition (N = 44)	Supp. Table 2	yes	Supp. Table 2	1.0000	Supp. Table 2	68, medium difference 0.0331	-
+−	Supp. Table 2	post hoc test, Bonferroni corrected	Supp. Table 2	207	yes, subtest for INSIGHT between 6 Hz (N = 19) and 40 Hz condition (N = 44)	Supp. Table 2	yes	Supp. Table 2	0.3338	Supp. Table 2	61, medium difference 0.3867	-
+−	Supp. Table 2	post hoc test, Bonferroni corrected	Supp. Table 2	207	yes, subtest for CONTROL between sham (N = 30) and 25 Hz condition (N = 26)	Supp. Table 2	yes	Supp. Table 2	0.0866	Supp. Table 2	54, medium difference 0.2455	-
+−	Supp. Table 3	Spearman correlation coefficient	Supp. Table 3	207	yes, power ratio 25 vs. 40 Hz	Supp. Table 3	yes	Supp. Table 3	0.022	Supp. Table 3	207, 0.0012	legend Supp. Table 3
+−	Supp. Table 2	post hoc test, Bonferroni corrected	Supp. Table 2	207	yes, subtest for DISSOCIATION between 40 Hz (N = 44) and 100 Hz condition (N = 18)	Supp. Table 2	yes	Supp. Table 2	0.000009	Supp. Table 2	60, 1.1111	-
+−	Supp. Table 2	post hoc test, Bonferroni corrected	Supp. Table 2	207	yes, subtest for INSIGHT between 40 Hz (N = 44) and 100 Hz condition (N = 18)	Supp. Table 2	yes	Supp. Table 2	0.1197	Supp. Table 2	60, 0.4491	-
+−	main text p. 6	post hoc test, Bonferroni corrected	main text p. 6	207	yes, subtest for INSIGHT between sham (N = 30) and 25 Hz condition (N = 26)	main text p. 6	yes	main text p. 6	0.0248	main text p. 6	0.5084	-

▸ Representative figures

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

   If so, what figure(s)?

   > yes, Figure 2 and Figure 3

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, in 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,
   >
   > As there were no a priori effect size estimates available, we based our sample size on the assumption of a medium effect size and, as this was a repeated measures design, also on justifiable strain on our subjects.
   >
   > Online Methods section, Statistical Analyses

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

   Where (section, paragraph #)?

   > no

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

      > yes
      > Online Methods section, Statistical Analyses

   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 #)?

      > yes,
      > Online Methods section, Statistical Analyses

   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 #)?

      > yes,
      >
      > yes
      >
      > Online Methods section, Statistical Analyses

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

      > two-sided

   e. Are there adjustments for multiple comparisons?

      > yes, Bonferroni corrections for multiple comparisons
      > Online Methods section, Statistical Analyses

3. Are criteria for excluding data points reported?

   Was this criterion established prior to data collection?

   Where is this described (section, paragraph #)?

   > yes
   > yes
   >
   > Online Methods section, Statistical Analyses

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 #)?

   > repeated measures counterbalanced design
   >
   > Online Methods section, Procedure

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 #)?

   > yes, the study was performed double blind
   >
   > legend Supp Fig 1

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

Where (section, paragraph #)?

n.a.

7. Is the species of the animals used reported?

Where (section, paragraph #)?

yes, throughout the text, also Online Methods section, Approval for experiments with human subjects

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

Where (section, paragraph #)?

n.a.

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

Where (section, paragraph #)?

yes,
Online Methods section, subjects

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

Where (section, paragraph #)?

yes,
Online Methods section, subjects

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

Where (section, paragraph #)?

n.a.

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

Where (section, paragraph #)?

n.a.

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

Where (section, paragraph #)?

yes
Supp Fig 1

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

Where (section, paragraph #)?

yes
Online Methods section, subjects and exclusion criteria

a. If multiple behavioral tests were conducted in the same group of animals, is this reported?

Where (section, paragraph #)?

yes
Online Methods section, procedure

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 #)?

yes
Online Methods section, subjects and exclusion criteria

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)?

   n.a.

   a. Is antibody catalog number given?

      Where does this appear (section, paragraph #)?

   b. Where were the validation data reported (citation, supplementary information, Antibodypedia)?

      Where does this appear (section, paragraph #)?

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

   Where (section, paragraph #)?

   a. Were they recently authenticated?

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

▶ 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 #)?

▶ 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.

   SPSS 20.0 for statistical analyses

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.

> no

▶ Human subjects

1. Which IRB approved the protocol?

    Where is this stated (section, paragraph #)?

    > Ethics Committee of Göttingen University Medical Center, Germany
    >
    > Online Methods, Approval for experiments with human subjects.

2. Is demographic information on all subjects provided?

    Where (section, paragraph #)?

    > yes
    > Online Methods section, subjects

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

    Where (section, paragraph #)?

    > yes
    > Online Methods section, subjects

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

    Where (section, paragraph #)?

    > yes
    > Online Methods section, subjects

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 #)?

    > yes
    > Online Methods section, subjects

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?

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

        Where (section, paragraph #)?

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

    Where (section, paragraph #)?

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

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.

5. Is the task design clearly described?

   Where (section, paragraph #)?

6. How was behavioral performance measured?

7. Is an ANOVA or factorial design being used?

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

   If not, state area of acquisition.

   a. How was this region determined?

9. Is the field strength (in Tesla) of the MRI system stated?

   a. Is the pulse sequence type (gradient/spin echo, EPI/spiral) stated?

   b. Are the field-of-view, matrix size, slice thickness, and TE/TR/ flip angle clearly stated?

10. Are the software and specific parameters (model/functions, smoothing kernel size if applicable, etc.) used for data processing and pre-processing clearly stated?

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 #)?

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 #)?

13. How were anatomical locations determined, e.g., via an automated labeling algorithm (AAL), standardized coordinate database (Talairach daemon), probabilistic atlases, etc.?

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

15. Is the contrast construction clearly defined?

16. Is a mixed/random effects or fixed inference used?

    a. If fixed effects inference used, is this justified?

17. 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?

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

19. Are statistical inferences corrected for multiple comparisons?

    a. If not, is this labeled as uncorrected?

20. 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)?

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

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

▶ Additional comments

Additional Comments