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Corresponding author(s): Matthew Nassar

Reporting Summary

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Statistical parameters

When statistical analyses are reported, confirm that the following items are present in the relevant location (e.g. figure legend, table legend, main text, or Methods section).

n/a	Confirmed	
☐	☒	The exact sample size (*n*) for each experimental group/condition, given as a discrete number and unit of measurement
☐	☒	An indication of whether measurements were taken from distinct samples or whether the same sample was measured repeatedly
☐	☒	The statistical test(s) used AND whether they are one- or two-sided *Only common tests should be described solely by name; describe more complex techniques in the Methods section.*
☐	☒	A description of all covariates tested
☐	☒	A description of any assumptions or corrections, such as tests of normality and adjustment for multiple comparisons
☐	☒	A full description of the statistics including central tendency (e.g. means) or other basic estimates (e.g. regression coefficient) AND variation (e.g. standard deviation) or associated estimates of uncertainty (e.g. confidence intervals)
☐	☒	For null hypothesis testing, the test statistic (e.g. *F*, *t*, *r*) with confidence intervals, effect sizes, degrees of freedom and *P* value noted *Give P values as exact values whenever suitable.*
☐	☒	For Bayesian analysis, information on the choice of priors and Markov chain Monte Carlo settings
☐	☒	For hierarchical and complex designs, identification of the appropriate level for tests and full reporting of outcomes
☐	☒	Estimates of effect sizes (e.g. Cohen's *d*, Pearson's *r*), indicating how they were calculated
☐	☒	Clearly defined error bars *State explicitly what error bars represent (e.g. SD, SE, CI)*

Our web collection on statistics for biologists may be useful.

Software and code

Policy information about availability of computer code

Data collection	Data was collected through Amazon Mechanical Turk (MTurk). We used the psiTurk Toolbox (https://psiturk.org/) to maintain the web server and manage the database for the experiments. We customized the JavaScript template code from the jsPsych library (https://www.jspsych.org/) to run our behavioral experiments.
Data analysis	All analyses were performed using custom MATLAB scripts. Hierarchical regression model was fit using STAN for MCMC sampling and matlabSTAN to interface with matlab.

For manuscripts utilizing custom algorithms or software that are central to the research but not yet described in published literature, software must be made available to editors/reviewers upon request. We strongly encourage code deposition in a community repository (e.g. GitHub). See the Nature Research guidelines for submitting code & software for further information.

Data

Policy information about availability of data

All manuscripts must include a data availability statement. This statement should provide the following information, where applicable:

- Accession codes, unique identifiers, or web links for publicly available datasets
- A list of figures that have associated raw data
- A description of any restrictions on data availability

The data from both experiments and the scripts used to analyze and model the data are available from the authors upon request.

Field-specific reporting

Please select the best fit for your research. If you are not sure, read the appropriate sections before making your selection.

☐ Life sciences ☒ Behavioural & social sciences ☐ Ecological, evolutionary & environmental sciences

For a reference copy of the document with all sections, see nature.com/authors/policies/ReportingSummary-flat.pdf

Behavioural & social sciences study design

All studies must disclose on these points even when the disclosure is negative.

Study description	This study involved quantitative measurements of decision making and learning behavior along with quantitative measurements of incidental memories formed about images presented in the learning and decision making task, which were collected either immediately (no delay) or 24 hours after completion of the initial task (24hr delay).
Research sample	Users of Amazon Mechanical Turk (MTurk) that had IP addresses in the United States of America and had to have 95% of their previous HITs approved. Previous work has indicated that mechanical turk samples are not representative of the population as a whole, but that results from mechanical turk cognitive science studies replicate those performed in the laboratory, which typically rely on undergraduate participants. Here we opted to use MTurk in order to ensure sufficient power to test our hypotheses given that we expected our measurements of trial-to-trial memory reports to contain substantial variability.
Sampling strategy	Our experiment, along with a brief advertisement describing it, was posted as a HIT (human intelligence task). We excluded MTurk users that were outside of the country. Assignment to conditions was determined according to the day that a user accepted the HIT and experimenters were blind the specific users that were present on the days in which HITs were posted. Explicit power analyses were not performed before data collection. Sample sizes were based on other recognition memory studies and MTurk studies and are in line with similar recognition memory experiments that have relied on MTurk for data collection (eg. Rouhani, Norman & Niv, 2018).
Data collection	Data was collected on personal computers (not tablets or phones) of the participants through a web-based video game interface. Experimenters did not interact with participants during data collection and thus any person that was present at the time of data collection was blind to the experimental condition and the study hypothesis.
Timing	Experiment 1 was conducted between May and December, 2015. Experiment 2 was conducted in April and May, 2016
Data exclusions	In Experiment 1, 88 out of 287 subjects were excluded. In Experiment 2, 105 out of 279 subjects were excluded. In both cases, subjects were excluded if they have completed any prior version of our tasks, so that they are not aware of the surprise recognition memory portion of the task. Subjects were also excluded if their performance on the learning task was not significantly better than simulated random behavior to ensure that subjects were actively engaged in the task. Both exclusion criteria were determined prior to data analysis.
Non-participation	Subjects had the option to participate in the study after reading the online advertisement, which provided a general explanation of the task. Subjects were also free to quit at any point during the task. However, we do not have data on how many subjects have declined to participate or quit after starting the task.
Randomization	Experimental tasks in both delay conditions (no delay or 24 hour delay) were available at a first-come first-served basis, at varying times during the day and week.

Reporting for specific materials, systems and methods

Materials & experimental systems

n/a	Involved in the study
☒	☐ Unique biological materials
☒	☐ Antibodies
☒	☐ Eukaryotic cell lines
☒	☐ Palaeontology
☒	☐ Animals and other organisms
☐	☒ Human research participants

Methods

n/a	Involved in the study
☒	☐ ChIP-seq
☒	☐ Flow cytometry
☒	☐ MRI-based neuroimaging

Human research participants

Policy information about studies involving human research participants

Population characteristics	Experiment 1: 199 subjects (101 males, 98 females; aged 32.2 ± 8.5 (mean ± SD)). Experiment 2: 174 subjects (101 males, 71 females, 2 no response; aged 34.0 ± 9.1 (mean ± SD))
Recruitment	Subjects were recruited via Amazon Mechanical Turk (MTurk). Subjects recruited through MTurk has genrally been reported to be diverse in demographics, and we are unaware of any self-selection bias that may affect the results from our behavioral task. See Mason & Suri, 2012 for a discussion on MTurk. Mason, W., & Suri, S. (2012). Conducting behavioral research on Amazon's Mechanical Turk. Behavior research methods, 44(1), 1-23.