

Reporting Summary

Nature Research wishes to improve the reproducibility of the work that we publish. This form provides structure for consistency and transparency in reporting. For further information on Nature Research policies, see [Authors & Referees](#) and the [Editorial Policy Checklist](#).

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

n/a

Data analysis

R software for statistical analysis v.3.3.0 with package RStanArm v.2.14.1. Code to implement analyses was written by the authors.

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

All figures use raw data collected as part of this study. The data that support the findings of this study are available from the corresponding author 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](https://www.nature.com/authors/policies/ReportingSummary-flat.pdf)

Ecological, evolutionary & environmental sciences study design

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

Study description	We recorded 5,259 encounters between individuals of 38 species of Chaetodon (butterflyfishes) before and after the global coral bleaching event in 2015-2016. Encounters were recorded over 11,740 minutes (2,348 five-minute observations) at 17 reefs nested within five regions of the central Indo-Pacific. Data were analysed with a combination of non-parametric statistics and Bayesian hierarchical regression analysis.
Research sample	38 species of fish in the genus Chaetodon were observed
Sampling strategy	We aimed to observe at least 10 encounters between each species pair combination at each field site. However, in the case of the less abundant species, we observed as many individuals as we could locate. Sample sizes were also constrained by the maximum number of individuals that could be observed during our field trips as it was important to the research to include different locations to enable us to identify consistent patterns of behaviour. We used a U-shaped search pattern to ensure as far as possible that we did not observe the same individual or pair as the focal animal more than once.
Data collection	Aggression observations: we followed a focal fish for five minutes and recorded as an encounter every conspecific that came within 1 m of that individual. Encounters were categorised as passive when there was no observed change in behaviour, or aggressive when one or both individuals engaged in display or chasing behaviour. Feeding observations: we used the same protocols for selecting and following a focal fish as for aggression. Over three minute observation periods, we recorded the substrate from which each bite was taken, identifying hard corals to species following Pratchett. Chaetodon abundance & coral cover: we quantified the abundance of butterflyfishes with 50 x 5 m belt transects and the cover of hard corals (Scleractinia) was recorded every 0.5 m along 50 m point intercept transects at each of two depths (1 and 5 m). Fish and coral surveys were conducted along the same transects, with the coral surveyor trailing the fish surveyor and recording benthic cover.
Timing and spatial scale	Iriomote, Japan: 25th June - 10th July 2016; 12th July - 23rd July 2017 Luzon, Philippines: 20th March - 10th April 2016; 9th October - 21st October 2016 Christmas Island, Indian Ocean: 12th September - 28th September 2015; 25th June - 10th July 2017 Bali, Indonesia: 5th November - 26th November 2015; 21st June - 22nd June 2016 Aceh, Indonesia: 18th February - 23rd February 2016; 2nd - 13th February 2017
Data exclusions	As reported in our Methods, two species were excluded from the regression analysis because phylogenetic data were not available for them. These species contributed <1% of the total samples.
Reproducibility	The observations and the natural experiment was replicated across multiple geographic regions.
Randomization	This is not relevant because we take advantage of a natural experiment so randomization was possible.
Blinding	Blinding was not possible for fieldwork.
Did the study involve field work?	☒ Yes ☐ No

Field work, collection and transport

Field conditions	Field work took place at depths of 1 m - 5 m in benign sea conditions on tropical coral reefs. Longitude and latitude of each individual reef are reported in Supplementary Table 1 and are located in the central Indo-Pacific.
Location	See above
Access and import/export	At each location we worked with local researchers and institutions to ensure we had the necessary permissions. Our study involved no invasive methods, only observations.
Disturbance	No disturbance was caused by the study.

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

Animals and other organisms

Policy information about [studies involving animals](#); [ARRIVE guidelines](#) recommended for reporting animal research

Laboratory animals

The study did not involve laboratory animals

Wild animals

38 species of fish in the genus Chaetodon were observed. Individual age range is estimated at 1 - 7 years based on known longevity of these species.

Field-collected samples

The study did not involve samples collected from the field.