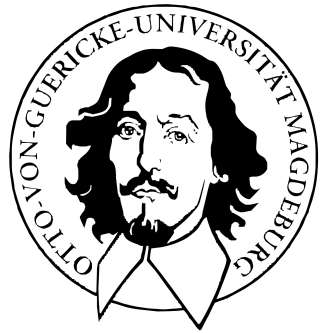


Analyse und Dokumentation

BSc Psychologie SoSe 2026

Belinda Fleischmann

Datum	Gruppe 1	Gruppe 2	Format	Thema
Fr, 10.04.2026	11-13 Uhr	13-15 Uhr	Seminar	(1) Quarto, Zotero, Tidyverse
Fr, 17.04.2026	11-13 Uhr	13-15 Uhr	Seminar	(2) Forschungsethik
Fr, 24.04.2026	11-13 Uhr	13-15 Uhr	Seminar	(3) Wissenschaftliche Berichte
Mi, 29.04.2026	11-13 Uhr	13-15 Uhr	Praxisseminar	Offene Übung (Quarto und Zotero)
Fr, 08.05.2026	**11-13 Uhr**	**13-15 Uhr**	**Seminar**	**(4) Offenheit und Transparenz**
Fr, 15.05.2026	11-13 Uhr	13-15 Uhr	Übung	Einfache Lineare Regression
Mo, 18.05.2026	11-13 Uhr	15-17 Uhr	Übung	Korrelation
Fr, 05.06.2026	11-13 Uhr	13-15 Uhr	Übung	Einstichproben-T-Test
Mi, 10.06.2026	13-15 Uhr	17-19 Uhr	Übung	Zweistichproben-T-Test
Fr, 26.06.2026	11-13 Uhr	13-15 Uhr	Übung	Einfaktorielle Varianzanalyse
Fr, 26.06.2026	15-17 Uhr	17-19 Uhr	Übung	Zweifaktorielle Varianzanalyse
Fr, 03.07.2026	11-13 Uhr	13-15 Uhr	Übung	Multiple Regression
Fr, 10.07.2026	11-13 Uhr	13-15 Uhr	Übung	Kovarianzanalyse
Fr, 24.07.2026			Klausurtermin	

(4) Offenheit und Transparenz

Motivation

Methodentransparenz

Datentransparenz

Selbstkontrollfragen

Motivation

Methodentransparenz

Datentransparenz

Selbstkontrollfragen

Motivation

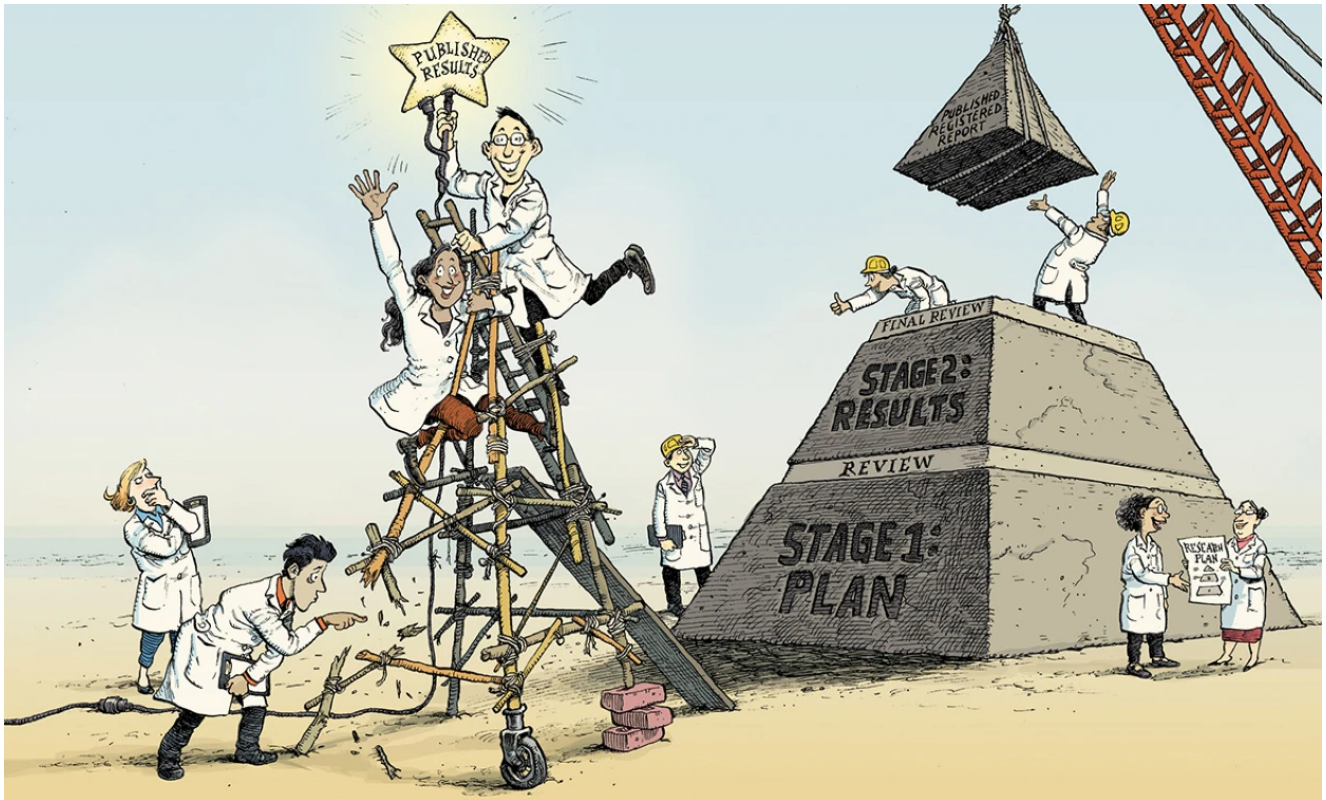


Illustration by David Parkins

Chambers (2019)

Das Replizierbarkeitskrisennarrativ

Psychologie – 64 von 100 Studien nicht replizierbar

- Open Science Collaboration (2015)

Nulleffekte in preregistrierten Replizierbarkeitsstudien

- Hagger et al. (2016), Wagenmakers et al. (2017), O'Donnell et al. (2018)

Vehaltensökonomie – 7 von 18 Studien nicht replizierbar

- Camerer et al. (2016)

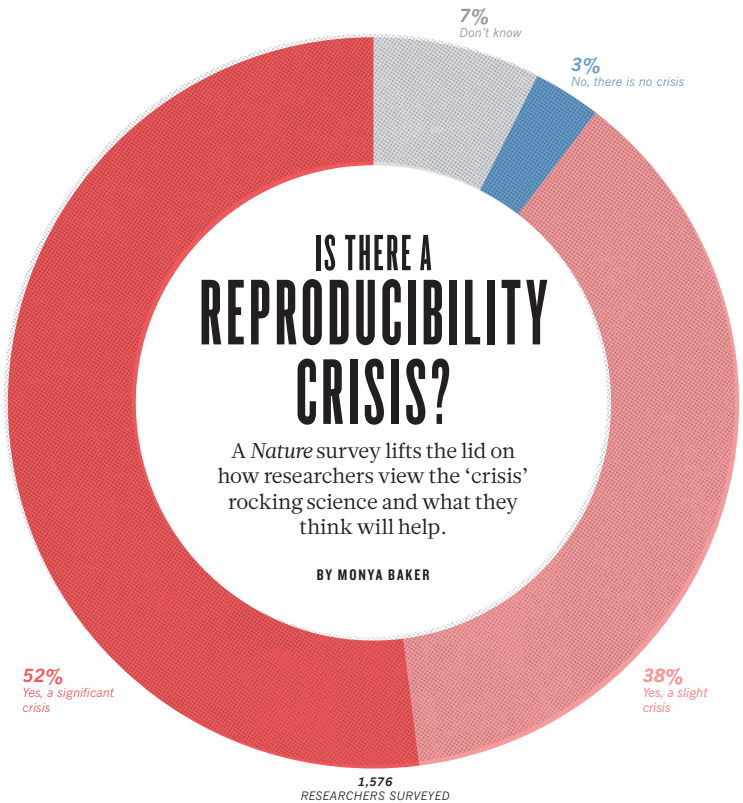
Biologie – 47 von 53 Studien nicht replizierbar

- Begley and Ellis (2012)

Reproduzierbarkeitskrise in Machine-Learning-basierter Wissenschaft

- Kapoor and Narayanan (2022)

Das Replizierbarkeitskrisennarrativ



Baker (2016)

Das Replizierbarkeitskrisennarrativ

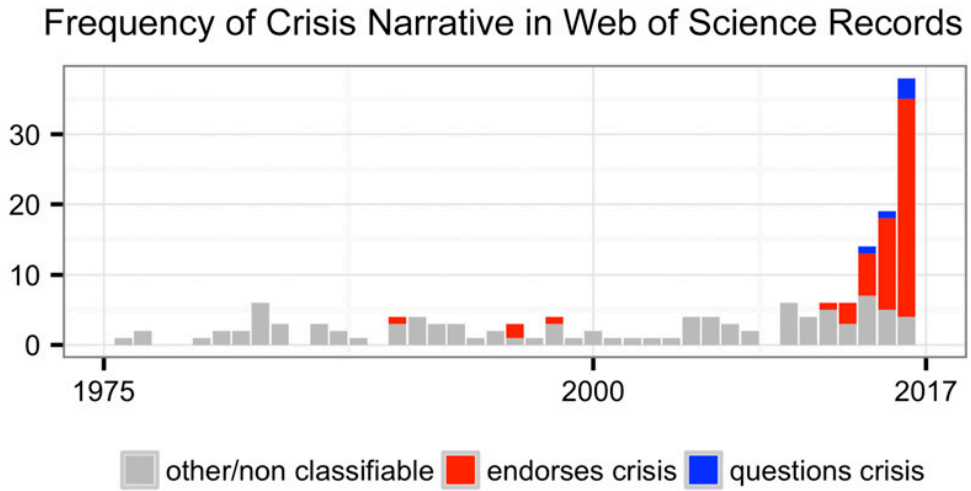
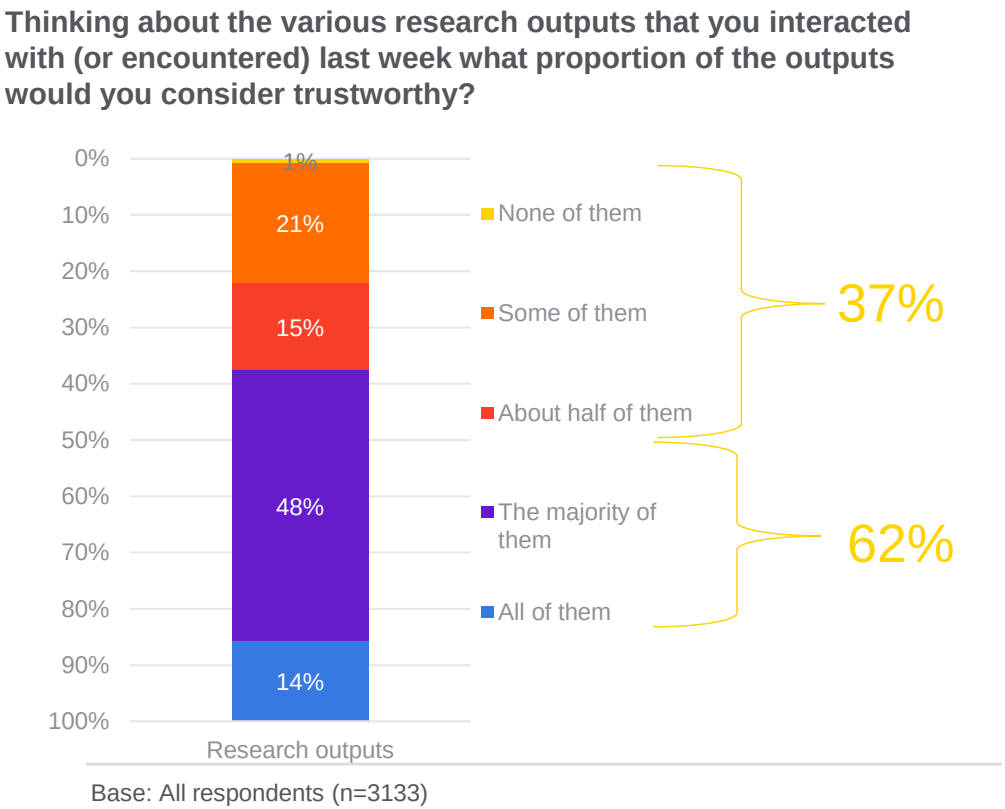


Fig. 1. Number of Web of Science records that in the title, abstract, or keywords contain one of the following phrases: "reproducibility crisis," "scientific crisis," "science in crisis," "crisis in science," "replication crisis," "replicability crisis." Records were classified by the author according to whether, based on title and abstracts, they implicitly or explicitly endorsed the crisis narrative described in the text (red), or alternatively questioned the existence of such a crisis (blue), or discussed "scientific crises" of other kinds or could not be classified due to insufficient information (gray). The complete dataset, which includes all titles and abstracts and dates back to the year 1933, is available in Dataset S1. This sample is merely illustrative, and does not include the numerous recent research articles and opinion articles that discuss the "science is in crisis" narrative without including any of the above sentences in the title, abstract, or keywords.

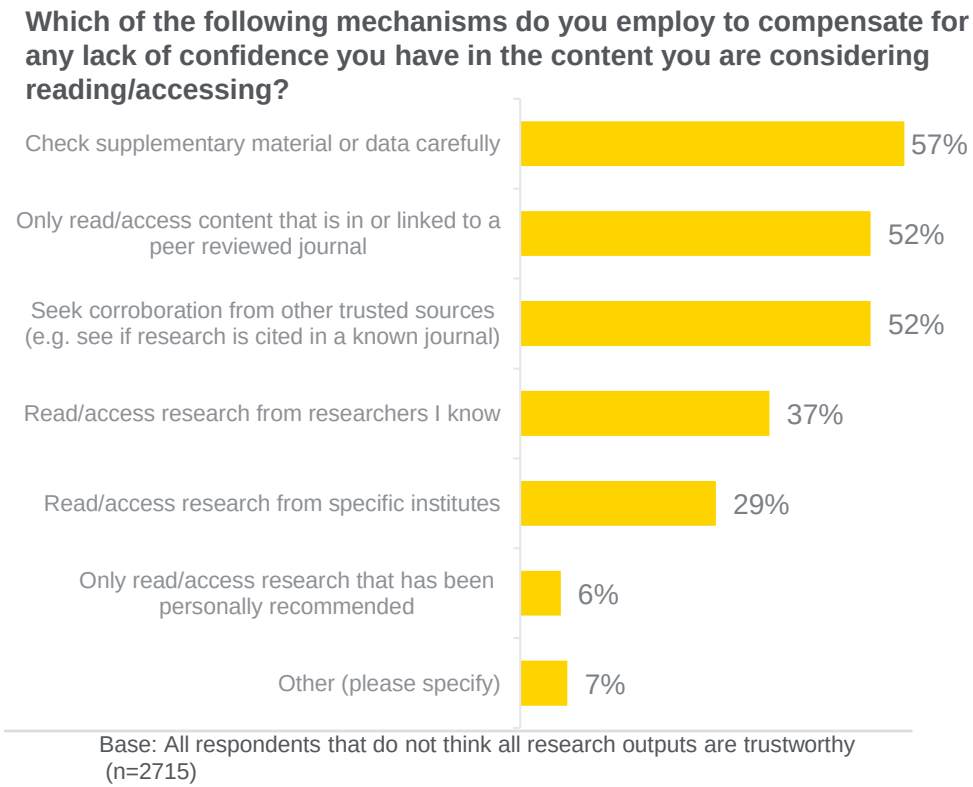
Fanelli (2018)

Das Replizierbarkeitskrisennarrativ



https://senseaboutscience.org/wp-content/uploads/2019/09/Quality-trust-peer-review.pdf

Das Replizierbarkeitskrisennarrativ



https://senseaboutscience.org/wp-content/uploads/2019/09/Quality-trust-peer-review.pdf

Das Replizierbarkeitskrisennarrativ

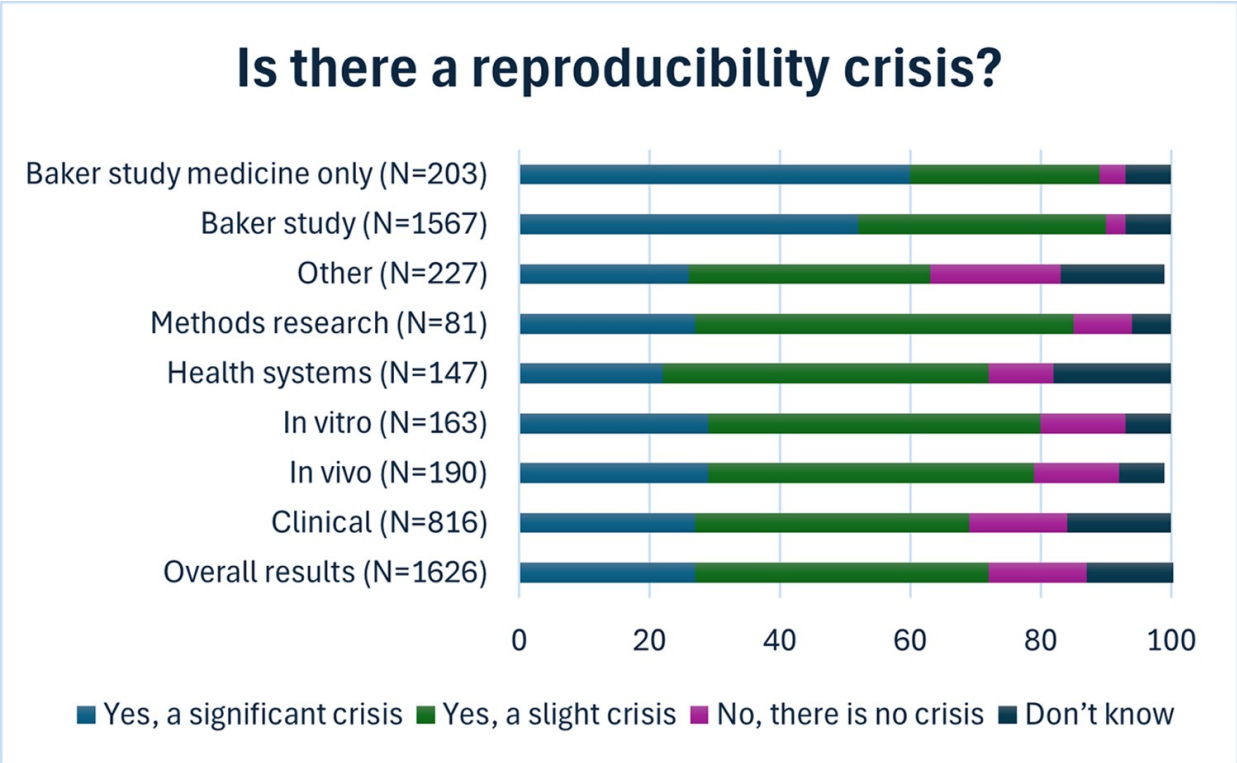


Fig 1. Participant perceptions of a reproducibility crisis. Data is presented overall for all participants in the current study and is broken down by research focus area in medicine. Results are presented in context to the overall Nature study findings and specifically to participants from this study indicating they worked in medicine. The underlying data for this figure can be found at https://osf.io/dbh2a.

https://doi.org/10.1371/journal.pbio.3002870.g001

Cobey et al. (2024)

Das Replizierbarkeitskrisennarrativ

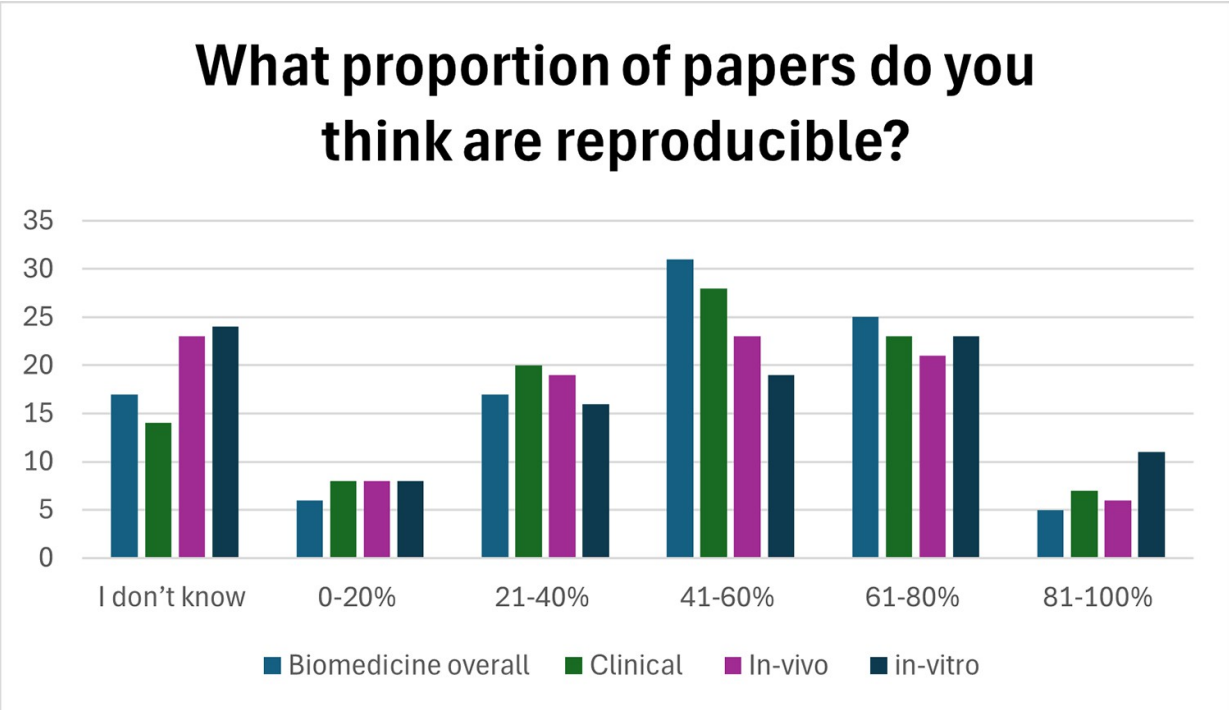


Fig 2. Participants perceptions of the proportion of papers they think are reproducible in biomedicine overall and by biomedical research area. The underlying data for this figure can be found at https://osf.io/dbh2a.

https://doi.org/10.1371/journal.pbio.3002870.g002

Cobey et al. (2024)

Das Replizierbarkeitskrisennarrativ

Table 2. Participant perceptions of the causes of irreproducibility.

	N(%)					
	Always contributes	**Very often Contributes**	**Sometimes Contributes**	**Does not Contribute**	**Unsure**	**Missing data**
Selective reporting of the published literature	131 (8)	638 (40)	714 (45)	43 (3)	73 (5)	31
Selective publication of entire studies	182 (11)	698 (44)	577 (36)	71 (4)	71 (4)	31
Pressure to publish	300 (19)	693 (43)	473 (30)	75 (5)	57 (4)	32
Low statistical power	185 (12)	706 (44)	579 (36)	76 (5)	48 (3)	36
Poor statistical analysis	197 (12)	615 (38)	649 (41)	99 (6)	44 (3)	26
Not enough internal replication (E.g., by the original lab/authors)	132 (8)	539 (34)	697 (44)	93 (6)	142 (9)	27
Insufficient study oversight	86 (5)	376 (24)	799 (50)	194 (12)	143 (9)	32
Lack of training in reproducibility	153 (10)	522 (33)	622 (39)	168 (11)	135 (8)	30
Failure to make materials openly available	141 (9)	449 (28)	722 (45)	191 (12)	99 (6)	28
Failure to make original study data openly available	137 (9)	476 (30)	685 (43)	205 (13)	94 (6)	33
Poor study design	208 (13)	584 (36)	678 (42)	96 (6)	38 (2)	26
Fraud	185 (12)	120 (8)	624 (40)	320 (20)	330 (21)	51
Poor quality peer review	140 (9)	437 (27)	755 (47)	192 (13)	72 (5)	34
Problems in the design of replication studies	103 (6)	406 (25)	809 (51)	162 (10)	123 (8)	27
Technical expertise required for replication	96 (6)	429 (27)	743 (46)	190 (12)	144 (9)	28
Variability of standard reagents	82 (5)	288 (18)	617 (39)	229 (14)	380 (24)	34
Bad luck	23 (1)	70 (4)	461 (29)	568 (36)	466 (29)	42

https://doi.org/10.1371/journal.pbio.3002870.t002

Cobey et al. (2024)

SCORE Project

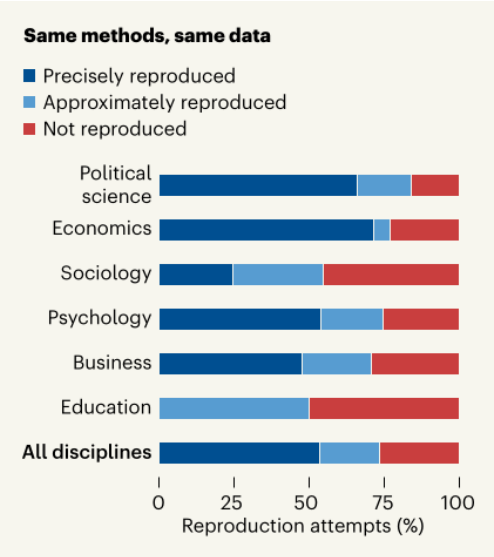


Figure 1 | Reproducibility. Miske *et al.*[1] attempted to reproduce claims across the social and behavioural sciences by applying the same analytical methods to the same data as in the original study. The graph reports whether the results could be precisely reproduced, approximately reproduced (statistical outcomes were within a certain margin of those in the original report) or could not be reproduced. (Adapted from Fig. 5b of ref. 1.)

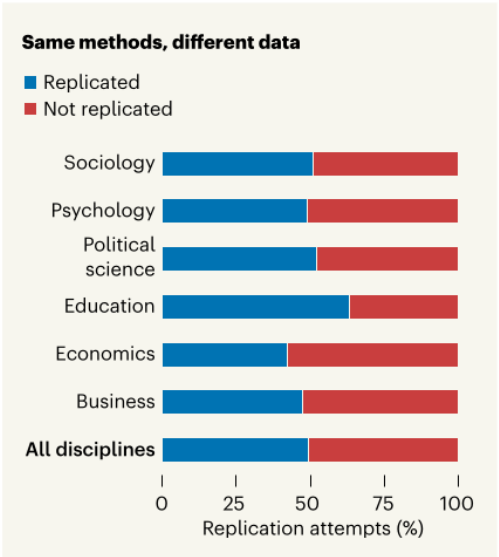


Figure 3 | Replicability. Tyner *et al.*[3] assessed replicability in the social and behavioural sciences by using independent evidence to test earlier claims. The graph reports the percentage of papers with successful replications, in which findings achieved statistical significance in the same direction (positive or negative) as the original result.

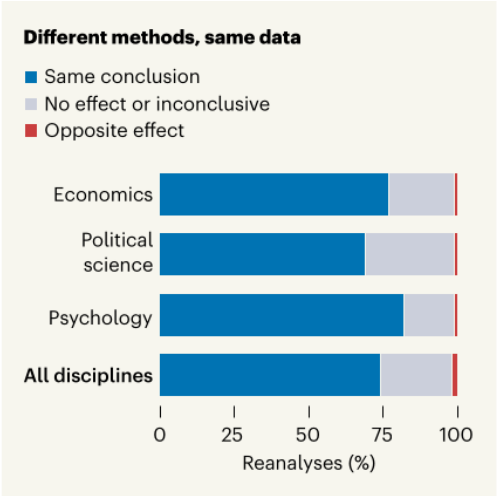


Figure 2 | Robustness. Aczel *et al.*[2] assessed the robustness of findings across the social and behavioural sciences by applying fresh analytical approaches to the same data. The graph reports whether the conclusions of the reanalyses were the same as those originally reported. The figure only shows fields with more than ten studies in the sample. (Adapted from Fig. 4c of ref. 2.)

Sánchez-Tójar, Wicherts, and Willer (2026)

SCORE Project

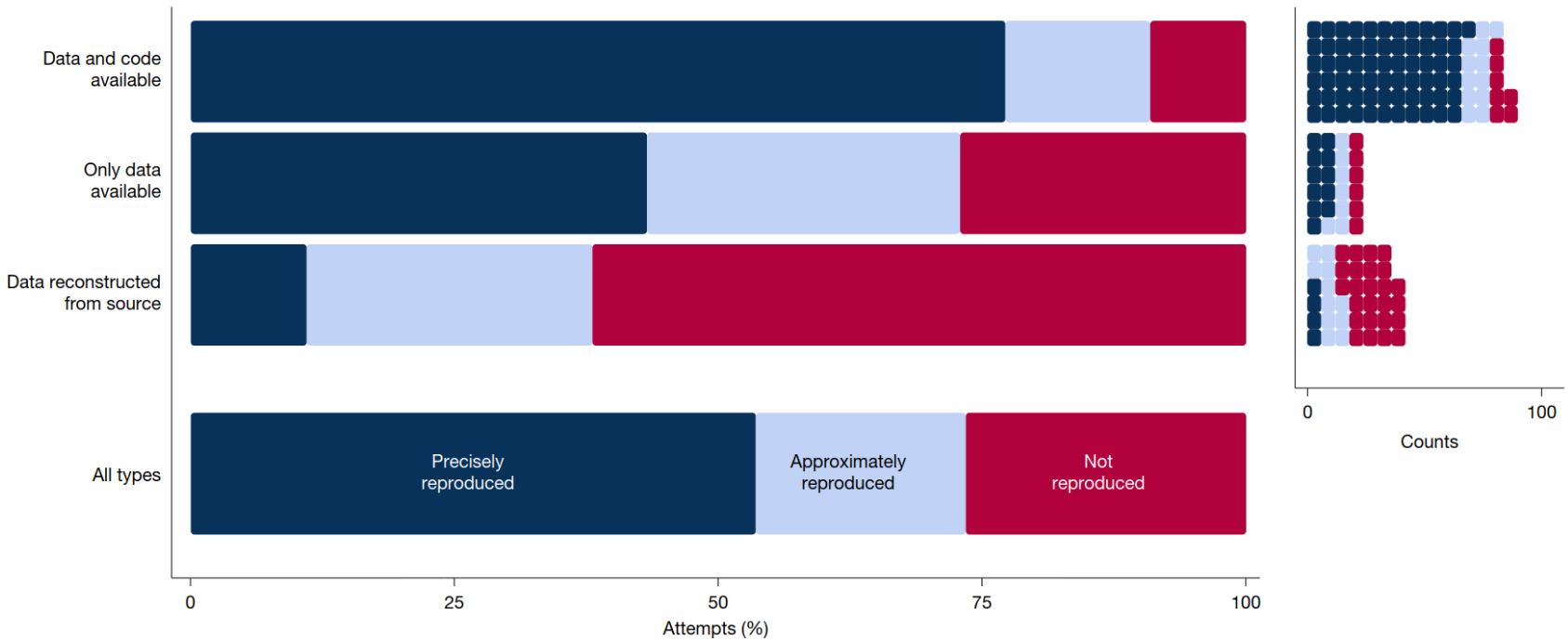


Fig. 3 | Reproducibility by data and code availability. Reproducibility as a percentage of attempts (left) and reproducibility as counts (right).

Miske et al. (2026)

SCORE Project

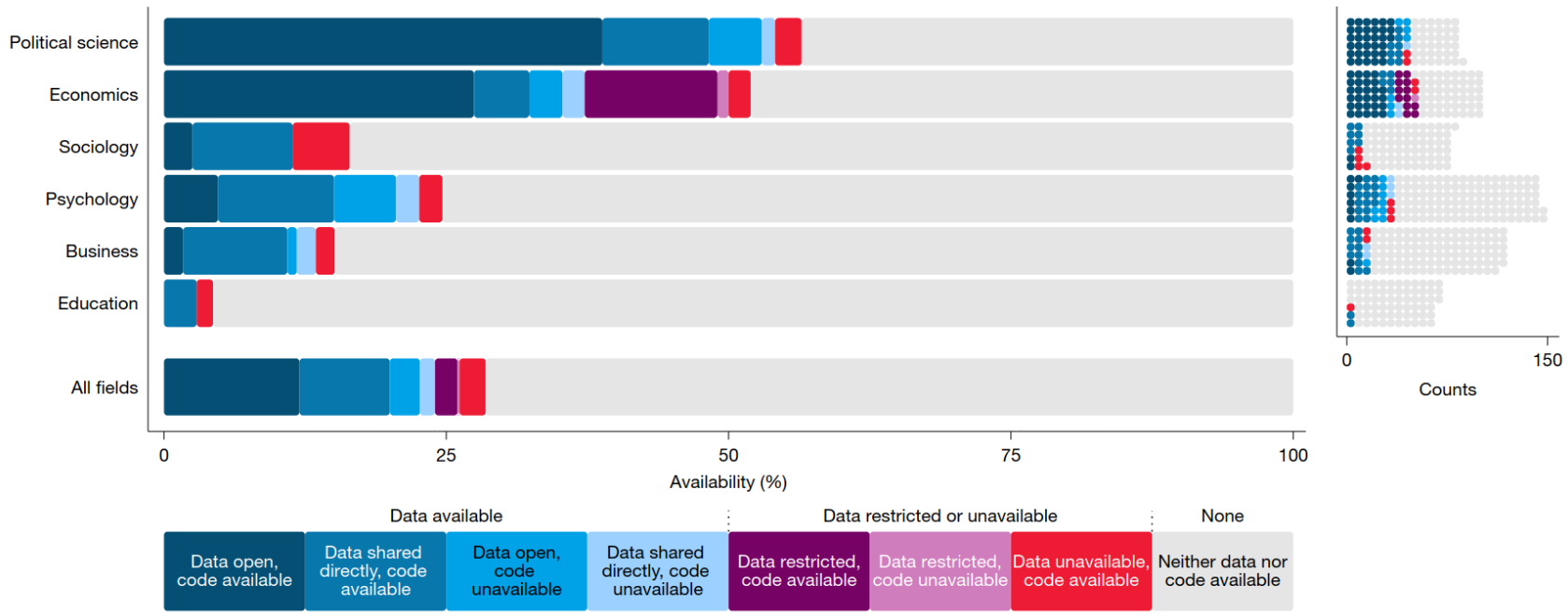


Fig. 2 | Data and code availability by field. Left, data and code availability as a percentage of papers. Right, the raw counts of papers with data and code available and not available. Restricted data (purple) did not count as available data, but might be accessible in principle.

Miske et al. (2026)

SCORE Project

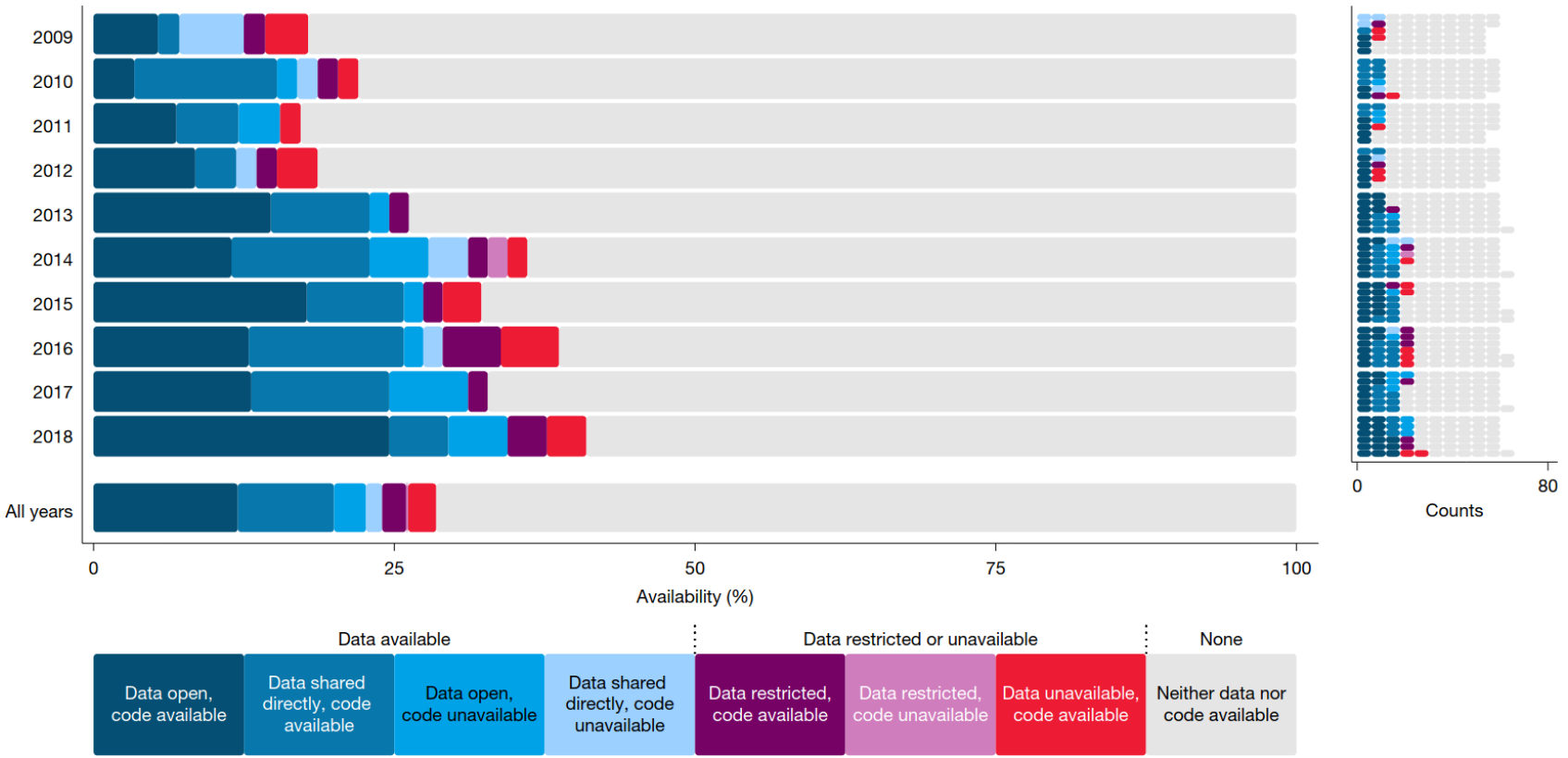


Fig. 1 | Data and code availability by year of publication. Left, data and code availability as a percentage of papers. Right, raw counts of papers with author-provided data and code available and not available. Restricted data (purple) did not count as available data, but might be accessible in principle.

Miske et al. (2026)

SCORE Project

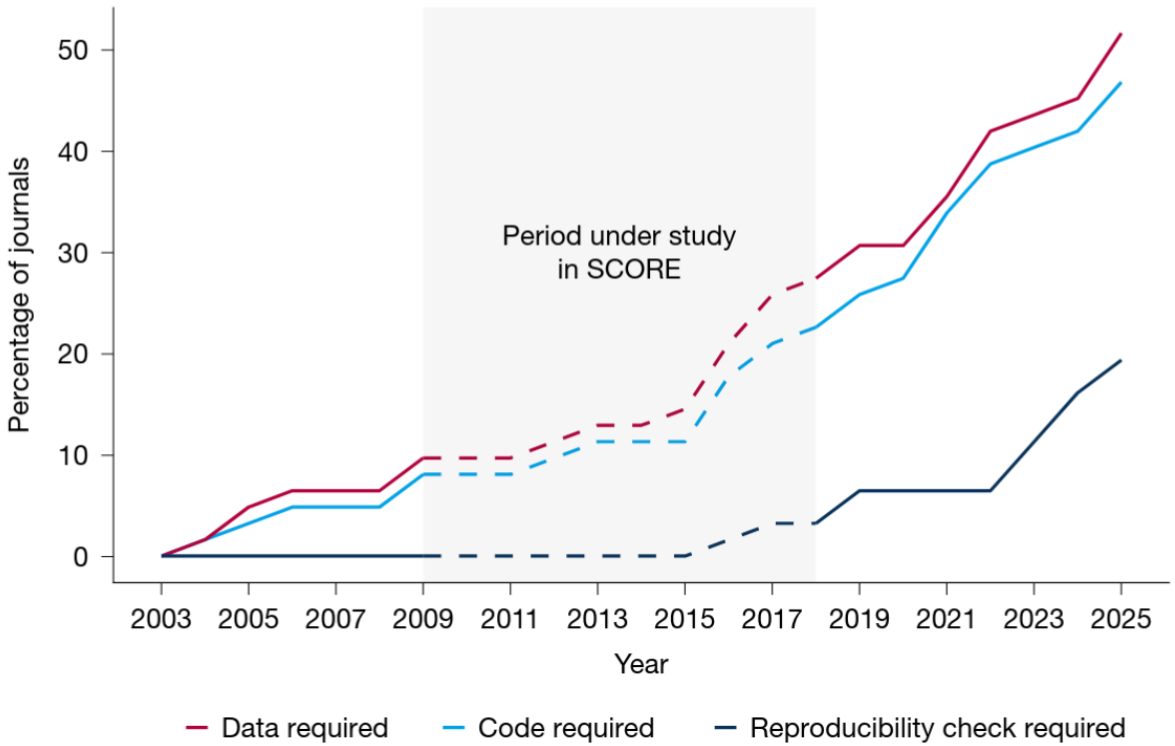
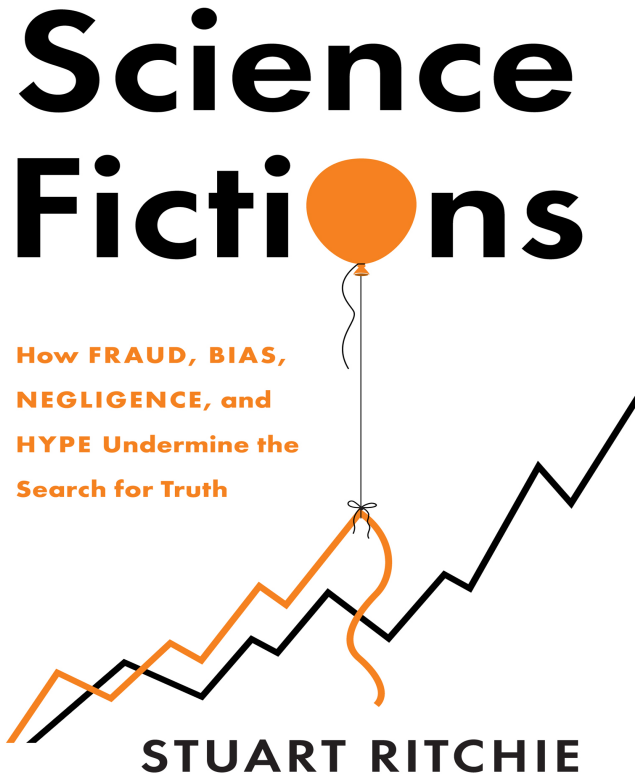


Fig. 6 | The percentage of 62 journals with data sharing, code sharing and reproducibility check requirements from 2003 to 2025. Policies for all 62 journals are included, although three had no reproduction attempts (*Journal of Finance*, *Journal of Public Administration Research and Theory* and *Law and Human Behavior*).

Miske et al. (2026)



Ritchie (2020)

Motivation

Methodentransparenz

Datentransparenz

Selbstkontrollfragen

Methodentransparenz

Ausgangslage

- Academia wertet spannende Resultate höher als sorgfältige Arbeit
- Academia interessiert sich wenig für die eigentliche Arbeit, sondern die Resultate
- Academia liebt komplexe Analysen ohne den Anspruch, sie verstehen zu wollen
- Academia mag keine Nullergebnisse

Konsequenzen

- Publizierte Resultate sind oft nicht reproduzierbar und aufbaufähig
- Ressourcenverschwendung
- Geringes innerakademisches Vertrauen in publizierte Resultate
- Gefahr des geringen extraakademischen Vertrauens in publizierte Resultate

Lösung

- Gewährleistung von Reproduzierbarkeit durch Methoden- und Datentransparenz

Reproduzierbarkeit, Replizierbarkeit und analytische Robustheit

Reproduzierbarkeit

Andere Wissenschaftler:innen nutzen die gleichen Daten und die gleichen Datenanalysemethoden und erhalten die gleichen Resultate (cf. Peng (2011))

- Abhängig von der Sorgfältigkeit der wissenschaftlichen Arbeit
- Beeinflussbar
- Menschen machen Fehler

Replizierbarkeit

Andere Wissenschaftler:innen nutzen andere (neue) Daten und potentiell andere Methoden und kommen zur gleichen Schlussfolgerung wie eine Originalstudie

- Abhängig von den wahren, aber unbekannten, Parametern
- Unbeinflussbar

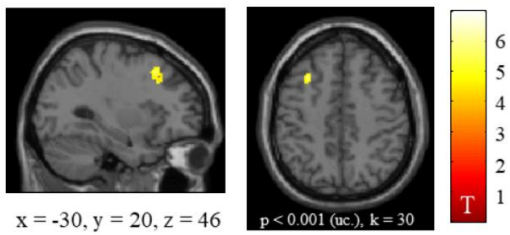
Analytische Robustheit

Verschiedene Wissenschaftler:innen nutzen gleiche Daten, aber verschiedene vertretbare Analysemethoden und kommen zur gleichen Schlussfolgerung.

- Abhängig von der methodischen Flexibilität (Researcher Degrees of Freedom)
- Beeinflussbar durch Multiverse-Analysen und Multi-Analyst-Ansätze

Replizierbarkeit und Reproduzierbarkeit

Wissenschaftlicher Bericht



Left medial frontal cortex
T = 6.32, MNI: x = -30, y = 20, z = 46
Voxel-level: $p_{uncorr} < 0.001$, $p_{FWE-corr} = 0.991$
Cluster-level: $p_{uncorr} = 0.003$, $p_{FWE-corr} = 0.062$

Figure 4. Exemplary application of the RFT-based power, PPV, and sample size calculation framework. (**A**) The upper panel depicts the results of a perceptual decision-making pilot study with $n = 10$ participants for contrasting perceptual choices based on high and low visual sensory evidence. The T-values from the identified cluster in the left medial frontal gyrus were averaged to obtain a raw effect size estimate, which was then adjusted based on the effect size bias estimates reported in Figure 7 of Geuter et al. (2018) and reproduced in the lower subpanel of panel (A). (**B**) Sample size calculations for voxel-level minimal and maximal power and PPV based on the effect size estimates of the pilot fMRI study. (**C**) Sample size calculations for cluster-level minimal and maximal power and PPV based on the effect size estimates of the pilot fMRI study. For implementational details, please see rftp_figure_4.m.

revealed a cluster of activity in the left medial frontal gyrus, as shown in the upper panel of Figure 4A (for further details about the experimental and data-analytical procedures, please see Supplement S.5). Our aim was to use the effect size estimate derived from this cluster to calculate the sample sizes necessary to achieve minimal and maximal power and PPV levels of 0.8 for corrected voxel- and cluster-level inference at a significance level of $\alpha'_{FWE} = 0.05$, a partial alternative hypothesis parameter of $\lambda = 0.1$, and a prior hypothesis parameter of $\pi = 0.2$. To this end, we evaluated the average T-values of the cluster, yielding $T = 4.65$, which translates into an effect size estimate of $\hat{d} = 4.65/\sqrt{10} = 1.47$. However, it is well known that effect size estimates resulting from the thresholding of mass-univariate statistical parametric maps exhibit biases (e.g., Vul et al., 2009; Poldrack et al., 2017). To correct our effect size estimate for this bias, we capitalized on recent results by Geuter et al. (2018), which are depicted in the lower panel of Figure 4A. Specifically, using task-related fMRI data from the Human Connectome Project 500 (Van Essen et al., 2013), Geuter et al. (2018) estimated the effect size bias exhibited by activations detected in random data subsets of 10 to 100 participants from the approximately 500 participants. As reported in Figure 7A of Geuter et al. (2018) and visualized in the lower

Hyperlink

Reproduktion

Online Repositorium

Roh- und Metadaten

Datenanalyseskripte

Datenakquisitionskripte

...

```
function rfp_2

% This function implements the sampling of Gaussian random fields with
% Gaussian covariance functions as visualized in Figure 2 of Ostwald et al.
% (2018) 'On parametric p-values'.
%
%   Author - Dirk Ostwald
% ------------------------------------------------------------------------

% initialization
% ------------------------------------------------------------------------
clc
close all

% random number generator setting for reproducible results
rng(4)

% utilities
addpath(genpath(fullfile(pwd, 'Utilities')))                    ; % RFP utilities
addpath(genpath(fullfile(pwd, 'SPM')))                          ; % add SPM

% figure management
figures                                                         ; % defaults
fdir =  fullfile(fileparts(pwd), 'Figures')                     ; % figure directory

% discrete domain D = [x_1_1,..,x_1_n] x [x_2_1,...,x_2_n]
% ------------------------------------------------------------------------
K       = 2^6                                                   ; % number of discrete realizations per dimension
n       = K^2                                                   ; % number of discrete realizations
D_min   = 0                                                     ; % domain minimum
D_max   = 1                                                     ; % domain maximum
x_1     = linspace(D_min,D_max,K)                               ; % x ordinates
x_2     = linspace(D_min,D_max,K)                               ; % y ordinates
D       = NaN(2,K)                                              ; % discrete domain initialization
```

sub-005_con_0001.nii	2019-03-26 01:51 PM
sub-006_con_0001.nii	2019-03-26 01:51 PM
sub-007_con_0001.nii	2019-03-26 01:51 PM
sub-008_con_0001.nii	2019-03-26 01:51 PM
sub-009_con_0001.nii	2019-03-26 01:51 PM
sub-010_con_0001.nii	2019-03-26 01:51 PM

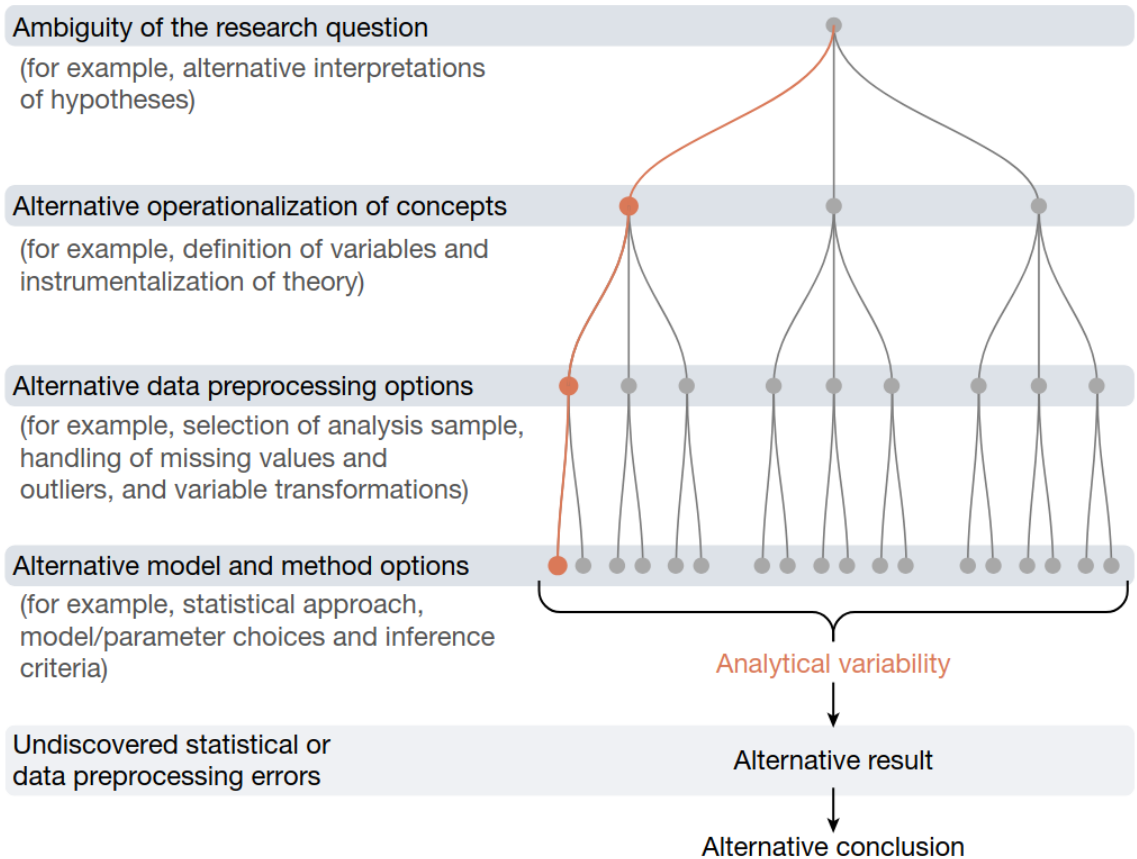


Fig. 1 | Main sources of analytical variability. Analytical variability can arise from the ambiguity of the research question, alternative operationalizations of concepts, variations in data preprocessing options, model and method choices and undiscovered statistical or data processing errors.

Aczel et al. (2026)

Aspekte von Methodentransparenz und Datentransparenz

Wissenschaftliche Qualitätssicherung

- Pre- und Postpublikations-Mehraugenprinzip
- Reproduzierbarkeit bei identischen Daten und Analysen gesichert
- Replikationspotential für neue Daten und Analysen erhöht

Nachhaltigkeit

- Möglichkeit der Datenwiederverwendung in neuen Kontexten
- Maximierung der Anzahl experimenteller Einheiten
- Ermöglichung automatisierter Metaanalysen

Ethischer Imperativ

- Respekt im Umgang mit öffentlichen Geldern
- Respekt für die Beiträge von Forschungspersonen
- Minimierung von Forschungsrisiken

Kernaspekte der Methodentransparenz

Maßnahmen

- Computercode als ausführlichste Form der Dokumentation
- Referenzierung datenanalytischer Skripte in Methods und Results Sections
- Verfügbarkeit zum Zeitpunkt der Veröffentlichung (Preprint/Journal Submission)

Voraussetzungen

- Automatisierte Datenanalyse von Rohdaten zu Abbildungen und Tabellen
- Lesbarer, gut-strukturierter und extensiv kommentierter Code
- Verzicht auf Variablennamen mit persönlichkeitsrelevanten Merkmalen

Motivation

Methodentransparenz

Datentransparenz

Selbstkontrollfragen

Kernaspekte der Datentransparenz

Maßnahmen

- Digitale Rohdaten als ausführlichste Form der Datengrundlage
- Formatierung anhand akzeptierter Datenstandards
- Verfügbarkeit zum Zeitpunkt der Veröffentlichung (Preprint/Journal Submission)

Voraussetzungen

- Vorliegen digitaler Rohdaten
- Verfügbarkeit von Speicherplatz
- Respekt datenschutzrechtlicher Belange

Repositorien

Open Science Framework

- Nichtkommerzielles Datenrepositorium
- Projektarchivierung bei Preprint/Journal Submission/Revision
- Seit 2020 beschränkter Speicherplatz pro Projekt

GitHub

- Kommerzieller Dienst zur Versionsverwaltung für Software-Entwicklungsprojekte.
- Kollaborative Softwareentwicklung (Track Changes)
- Oft irrtümlich zur Analysecodearchivierung benutzt

Forschungsdatenzentrum des ZPID

- Digitales Forschungsdatenzentrum für die psychologische Forschung
- Teil der öffentlich finanzierten Leibniz-Gemeinschaft
- Unterstützung bei Dokumentation und Archivierung als kostenpflichtige Services

Brain Imaging Data Structure

- Datenstandard für Neuroimaging- und Verhaltensdaten
- Stetige Weiterentwicklung auf weitere Datenmodalitäten
- Gorgolewski et al. (2016)

PsyCuraDat

- Datenstandard für psychologische Daten
- Zur Zeit noch in der Entwicklung
- Blask, Gerhards, and Jalynskij (2021)

Datenschutzrechtliche Aspekte

Psychologische Daten sind in aller Regel sensible humane Daten

Datenschutzrechtliche Belange müssen respektiert werden

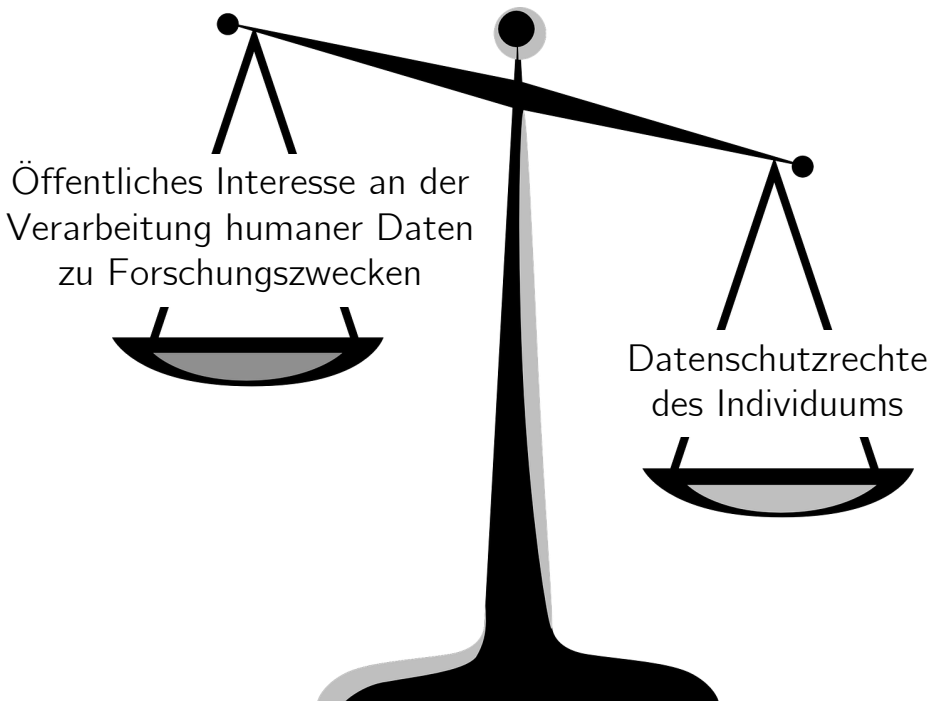
Das Datenschutzrecht gliedert sich in

- EU Datenschutzgrundverordnung (DSGVO) [EU2016/679]
- Bundesdatenschutzgesetz (BDSG)
- Datenschutzgesetze der Bundesländer

Psychologische Daten fallen in aller Regel unter *personenbezogene Daten*

"Alle Informationen, die sich auf eine identifizierte oder identifizierbare natürliche Person beziehen; als identifizierbar wird eine natürliche Person angesehen, die direkt oder indirekt, insbesondere mittels Zuordnung zu einer Kennung wie einem Namen, zu einer Kennnummer, zu Standortdaten, zu einer Online-Kennung oder zu einem oder mehreren besonderen Merkmalen, die Ausdruck der physischen, physiologischen, genetischen, psychischen, wirtschaftlichen, kulturellen oder sozialen Identität dieser natürlichen Person sind, identifiziert werden kann"

Datenschutzrechtliche Aspekte

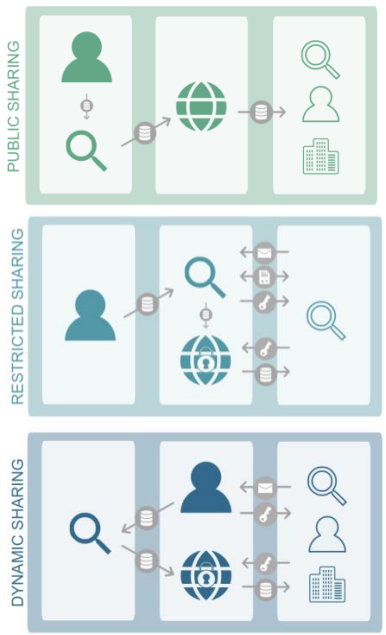


Möglichkeiten der Datentransparenz beim Umgang mit humanen Daten

Public sharing
- Open data platforms

Restricted sharing
- Peer-to-peer data sharing

Dynamic sharing
- Participant-centred platforms



Public Sharing

Datenbereitstellung auf weltweit frei zugänglichen Datenplattformen

- Allgemeiner Datenzugang für alle Formen der Datennutzung

Vorteile

- Einfach
- Etabliert
- Ressourcen sensibel

Nachteile

- Unwiderruflich
- Gefahr des Datenmissbrauchs
- Unklarer datenschutzrechtlicher Stand (DSGVO)

Restricted sharing

- Datenzugangsregelung mithilfe von Data Use Agreements

Vorteile

- Risikominimierung
- Klare Verantwortlichkeiten
- Teilweise etabliert

Nachteile

- Restriktiv
- Verantwortlichkeit auf Seiten der Wissenschaftler:innen
- Paternalistisch

Restricted sharing

Restricted sharing

The Sharing level concept

In order to authorize the use of research data for different purposes and to determine the access criteria that need to be met, research data objects and their constituting files are assigned to three different access categories. While all metadata associated with a research data object – including the codebook – is generally publicly accessible (unless legal concerns speak against publication), research data and associated materials subject to data protection law may be accessed and retrieved according to the following access categories:

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Restricted sharing

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Dynamic sharing

- Proband:innenzentrierte Datenplattformen
- Datenzugangsregulation und Monetarisierung durch Proband:innen

Vorteile

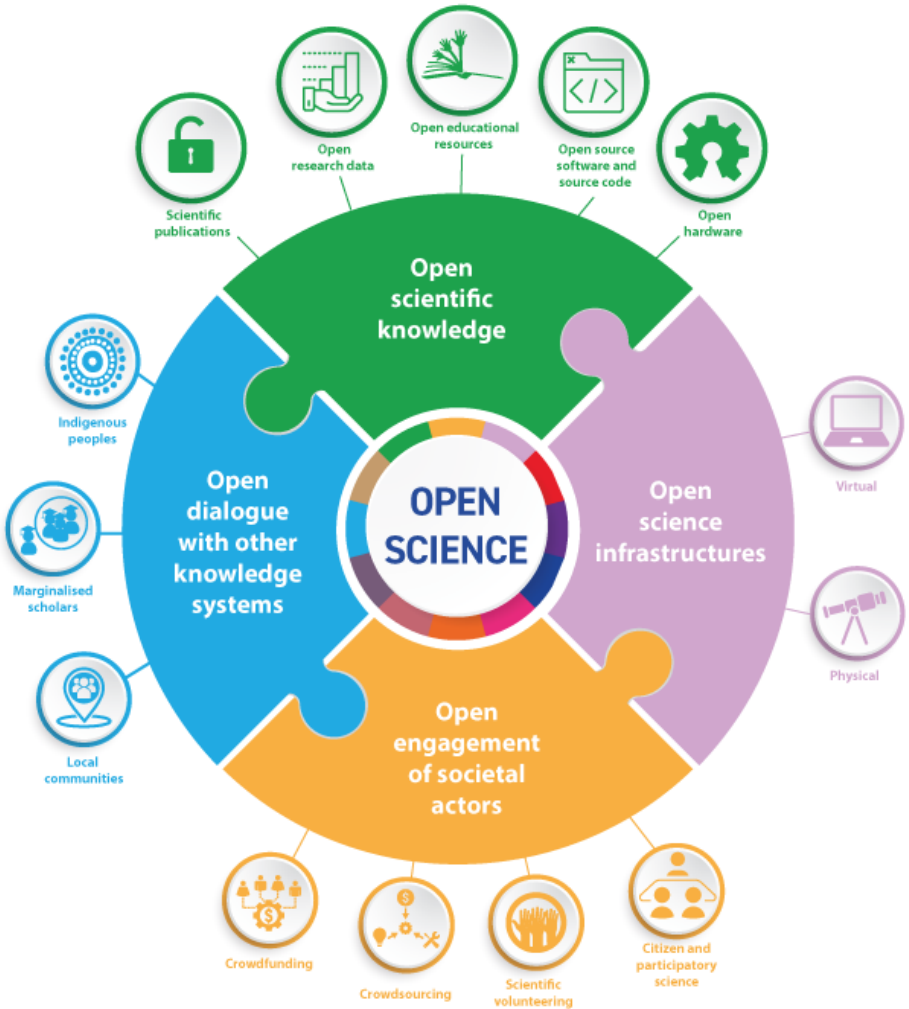
- Digitales Empowerment
- Klare Verantwortlichkeiten
- Zukunftsorientiert

Nachteile

- Drop-out
- Nicht etabliert
- Ressourceintensiv

Dynamic sharing

Die elektronische Patientenakte (?)



Pillars of Open Science, UNESCO (2021)

Motivation

Methodentransparenz

Datentransparenz

Selbstkontrollfragen

Selbstkontrollfragen

1. Begründen Sie die Wichtigkeit, die Reproduzierbarkeit von Forschung durch Methoden- und Datentransparenz zu fördern.
2. Erläutern und differenzieren Sie die Begriffe Replizierbarkeit und Reproduzierbarkeit.
3. Nennen und erläutern Sie den Nutzen von Methoden- und Datentransparenz.
4. Nennen Sie die Kernaspekte und Voraussetzungen für Methodentransparenz.
5. Nennen Sie die Kernaspekte und Voraussetzungen für Datentransparenz.
6. Nennen Sie drei Online-Repositorien, die in der Forschung verwendet werden.
7. Nennen Sie zwei Datenstandards, die für die psychologische Forschungs relevant sind.
8. Distkutieren Sie die Vor- und Nachteile verschiedener Formen von Data Sharing.

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