UNIVERSITÄT ZU LÜBECK
SOCIAL NEUROSCIENCE LAB | SNL

CBBM | CENTER OF BRAIN, BEHAVIOR AND METABOLISM

Contextualizing Reproducibility in the Organization of the Academic Workforce

Frieder Michel Paulus

Social Neuroscience Lab, Department of Psychiatry and Psychotherapy
Open Science Initiative

Lübeck University

4. Helmholtz Reproducibility Workshop

Gaining reputation with replications?

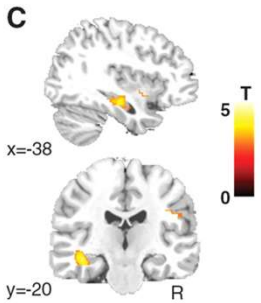
Neural Mechanisms of a Genome-Wide Supported Psychosis Variant

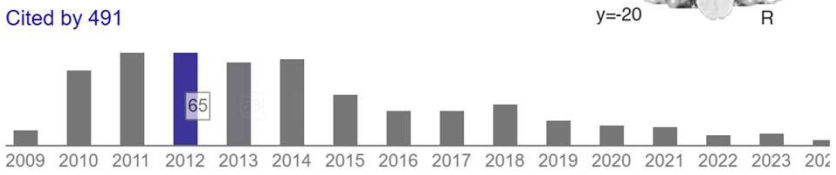
For over a century, disturbed interactions between brain areas have been proposed to underlie schizophrenia (*1*). Extensive work in patients (*1*, *2*) has demonstrated abnormal coupling between structures implicated in schizophrenia, dorsolateral prefrontal cortex (DLPFC) and hippocampal formation (HF), but the relevance for heritable risk was unclear. Through genome-wide association

Conversely, the HF was uncoupled from DLPFC in non–risk-allele homozygotes but showed dose-dependent increased connectivity in risk-allele carriers. Lastly, the risk allele predicted extensive increases of connectivity from amygdala (Fig. 1D and table S2), including to hippocampus, orbitofrontal cortex, and medial prefrontal cortex. Rs1344706 genotype had no impact on performance

netic mechanism, where reduced DLPFC connectivity could contribute to disturbed executive function (*1*) and increased coupling with HF to deficient interactions between prefrontal and limbic structures (*2*). Because amygdala connectivity is not implicated in genetic risk for schizophrenia (*6*), the observed effects on limbic connectivity might relate to bipolar disorder, where increased connectivity of amygdala has been observed and could contribute to emotional instability. More generally, our findings show that rs1344706, or genetic variant(s) in linkage disequilibrium (i.e., variants that are nonrandomly related), is functional in human brain. The molecular changes leading up to altered neural systems function remain to be elucidated. We speculate that, because genetic variation in dopaminergic and glutamatergic neurotransmission affects DLPFC or HF connectivity (*4*), examination of ZNF804A in those neurotransmitter

Science (2009)



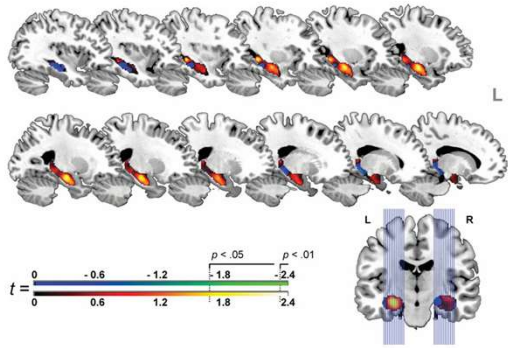


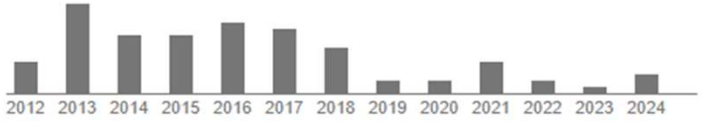
Partial Support for *ZNF804A* Genotype-Dependent Alterations in Prefrontal Connectivity

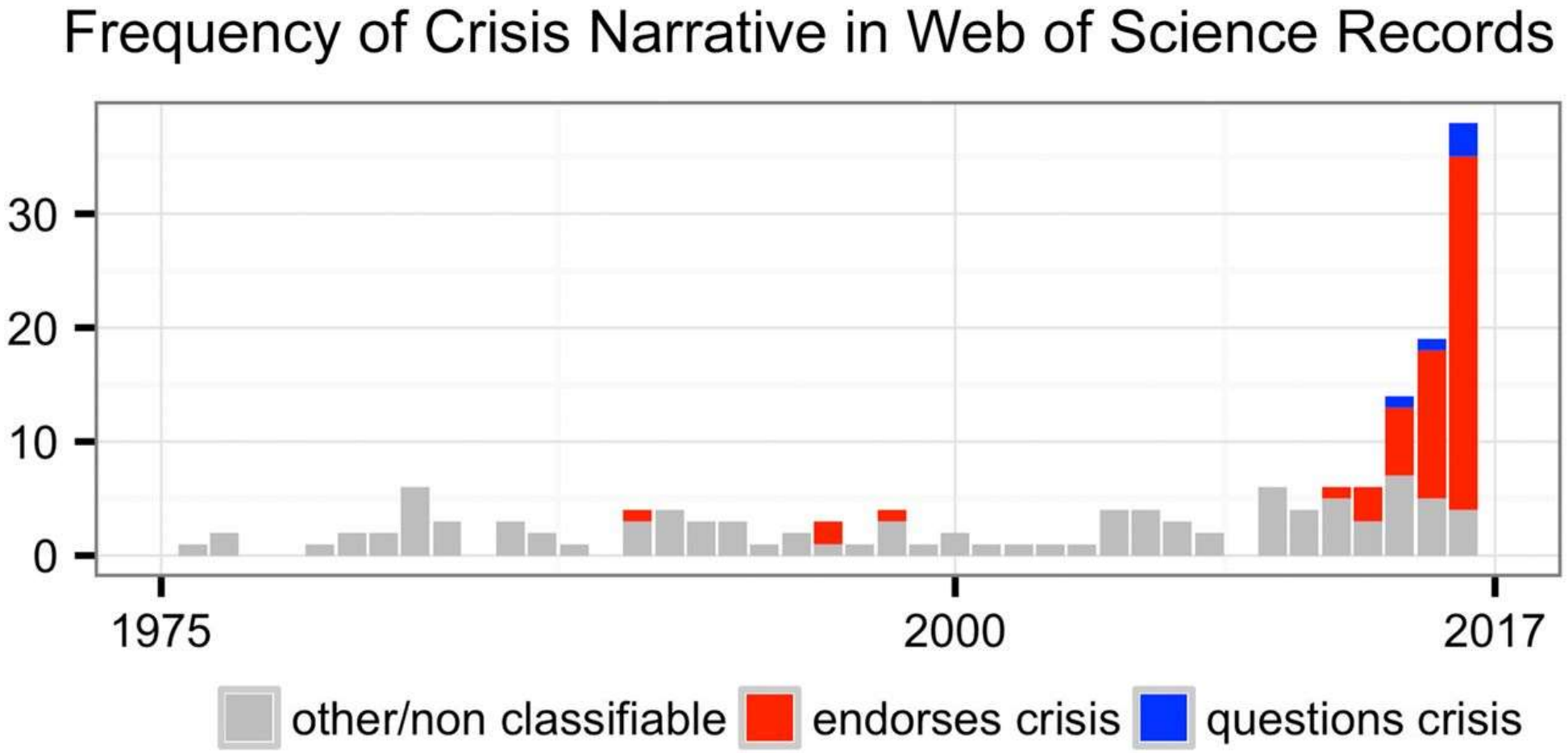
Frieder M. Paulus,[1*] Sören Krach,[1,2] Johannes Bedenbender,[1] Martin Pyka,[1] Jens Sommer,[1] Axel Krug,[1] Susanne Knake,[2] Markus M. Nöthen,[3] Stephanie H. Witt,[4] Marcella Rietschel,[4] Tilo Kircher,[1] and Andreas Jansen[1]

[1]*Department of Psychiatry and Psychotherapy, Philipps-University Marburg, Marburg, Germany*
[2]*Department of Neurology, Philipps-University Marburg, Marburg, Germany*
[3]*Department of Genetic Epidemiology in Psychiatry, Central Institute of Mental Health, Mannheim, Germany*
[4]*Department of Genomics, Life and Brain Center, University of Bonn, Bonn, Germany*

Human Brain Mapping: 2011 (online) 2013 (print)



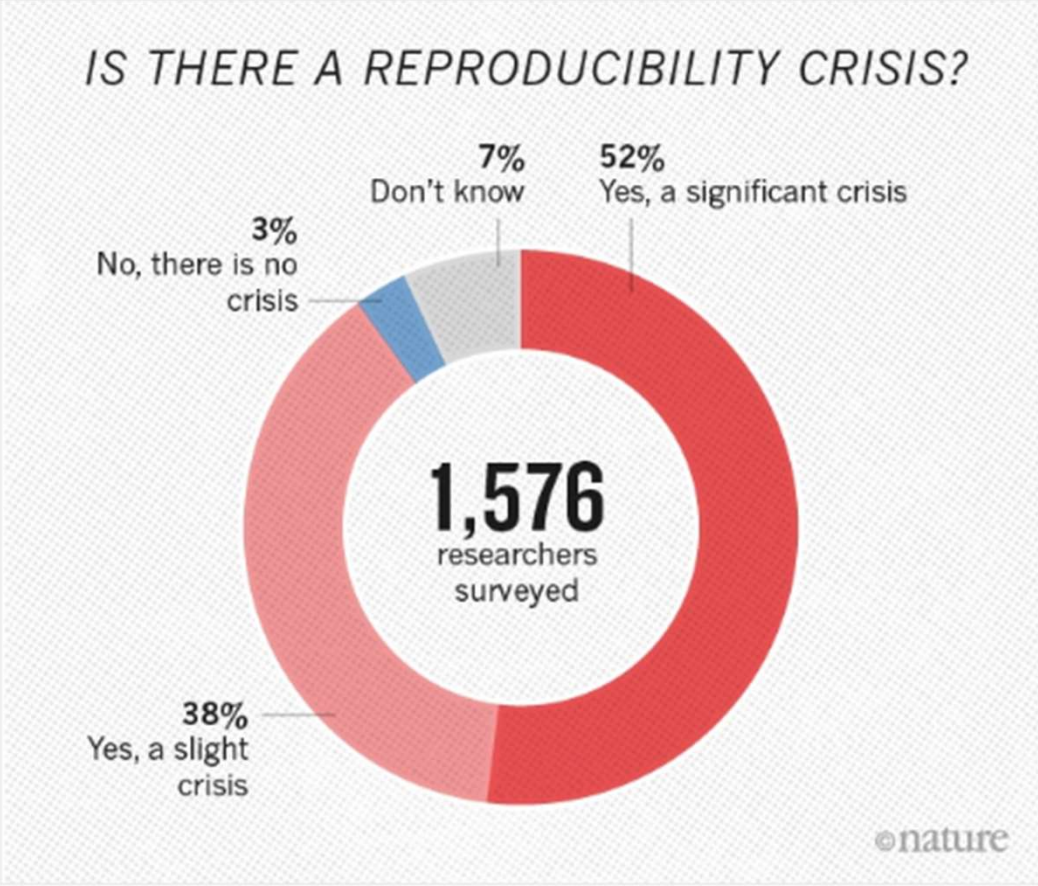


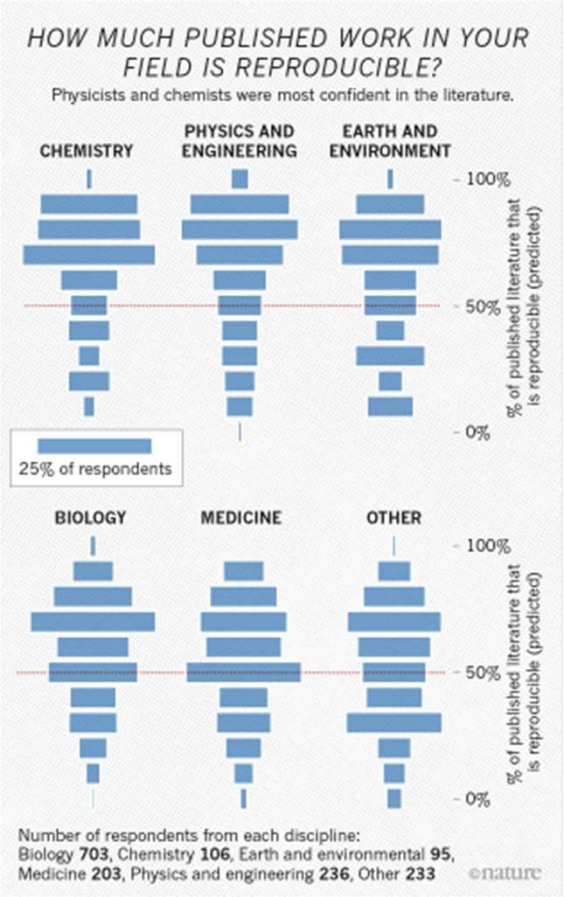


Daniele Fanelli PNAS 2018 ;115:11:2628-2631

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.” …

Reproducibility crisis became (not equally) recognized

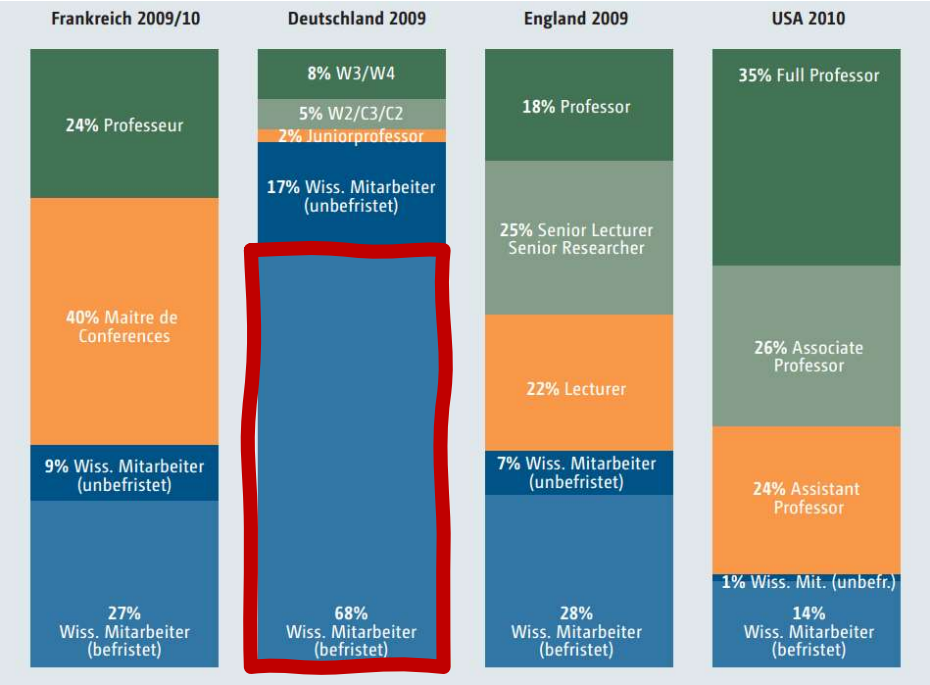




Baker, *Nature*, 2016, https://www.nature.com/news/1-500-scientists-lift-the-lid-on-reproducibility-1.19970

The context of the crisis...

Competitive, flexible, and insecure work environment



Forschung und Lehre (2012)

In 2023 90% of the early career personnel in German higher education with fixed-term contracts

BuWik (2025)

- 98% in <35 years of age
- 77% between 35-45 years of age
- Ø 22 months contract duration PhDs
- Ø 28 months contract duration PostDocs

BuWin (2021)

67% of the full-time personnel in German research and higher education were employed on fixed-term contracts in 2022.

https://www.destatis.de/DE/Presse/Pressemitteilungen/2023/10/PD23_397_213.html

Competitive, flexible, and insecure work environment

Better working conditions might contribute to more reproducible i.e. "higher quality" research (Rahal et al. 2023)

- Extreme competitiveness specifically for senior or tenured positions
- High-turnover disrupts long-term perspectives and results in loss of expertise
- Biases in selection procedures
- Focus on specific measures achievable in short-term leads to misaligned incentives:
  1. "Quality" publications
  2. Third-party funding

Publish or perish…

What´s best for science?

High quality research,
regardless of outcome.

Highly reproducible research,
regardless of outcome.

Chambers (2017), “Scientific Integrity”, https://issuu.com/fcohen/docs/lyon-chambers
Nosek et al. (2012), *Perspectives in Psychological Science*

Publish or perish…

What´s best for science?

High quality research, regardless of outcome.

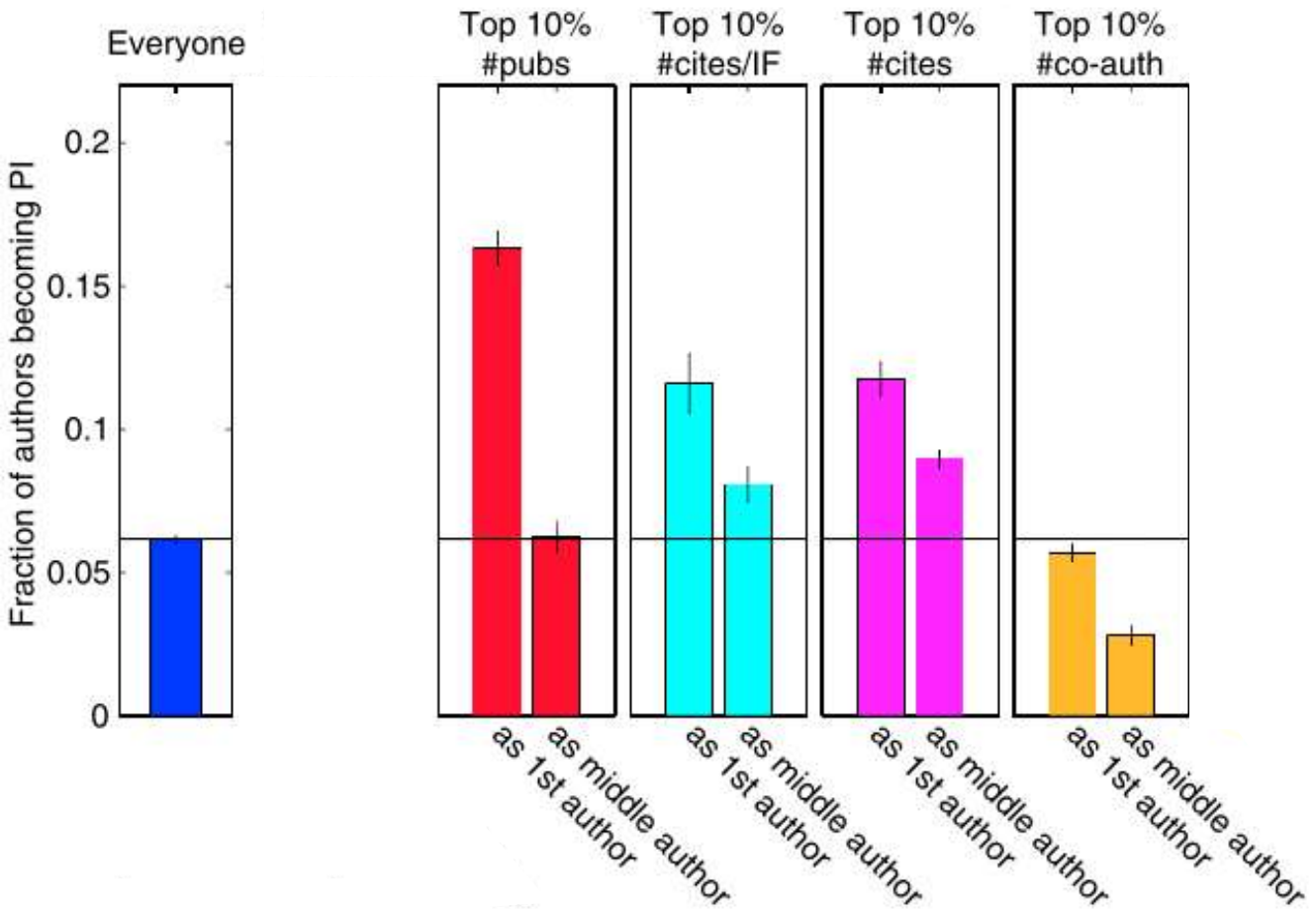
Highly reproducible research, regardless of outcome.

What´s best for scientists?

Producing a lot of publishable results.

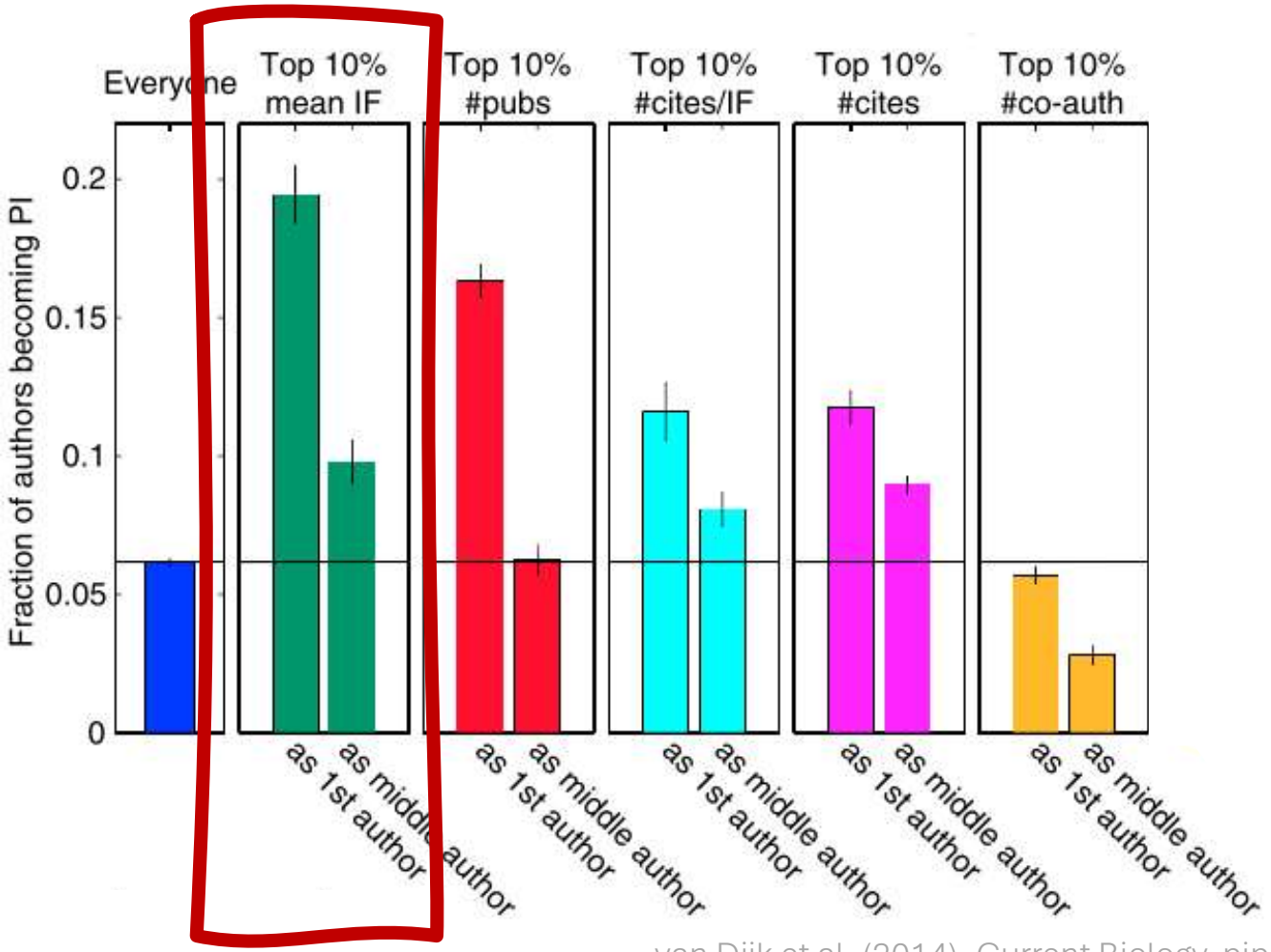
Chambers (2017), “Scientific Integrity”, https://issuu.com/fcohen/docs/lyon-chambers
Nosek et al. (2012), *Perspectives in Psychological Science*

...is not necessarily sufficient.



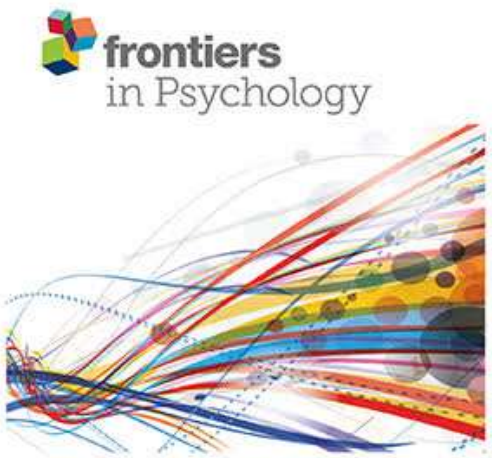
van Dijk et al. (2014). Current Biology, pipredictor.com (☹ side is down)

...is not necessarily sufficient.



van Dijk et al. (2014). Current Biology, pipredictor.com (☹ side is down)

2022 IF: 3.8



2022 IF: 8.2

2022 IF: 22.4

2022 IF: 56.9

Average number of citations the journal‘s articles receive within one year.

IF as a measure for the quality the science?

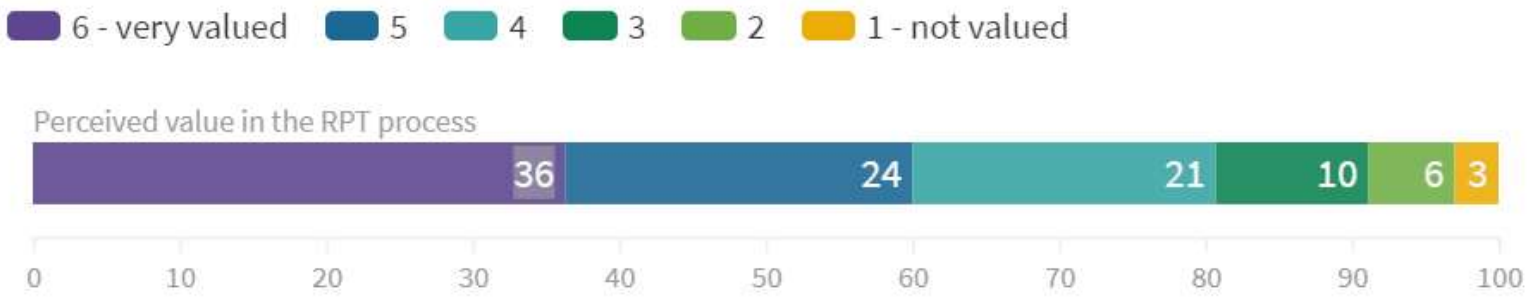
Journal citations as measure for „quality“ of an article?

- Citations of individual articles are not very well reflected by the IF Callaway (2016), Lariviere et al. (2016)
- IF can be easily manipulated McVeigh & Mann (2009), Tort, Targino, & Amaral (2012)
- Number of citations are associated with IF regardless of quality Callaham et al, (2002), Cantrill (2016)
- …

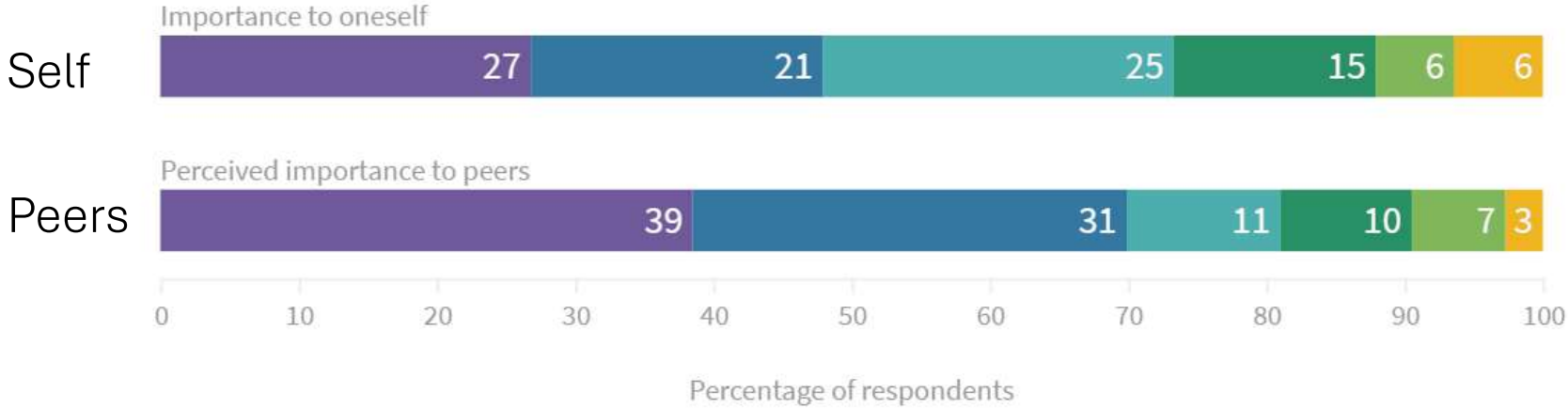
IF as objective measures for “quality”? see Brembs (2018), Paulus et al. (2018)

- No clear associations with statistical power Brembs et al. (2013), Szucs & Ioannidis (2017)
- No signs of more frequent randomization or blinding Macleod et al. (2015)
- Overestimation of effect sizes in gene-trait associations with higher IF Munafò et al. (2009)
- Mixed associations with quality indicators and negative with replicability (Dougherty & Horne, 2022)
- …

Perceived value of impact factors for review, promotion, and tenure



Importance of impact factors when deciding where to submit academic work for publication



338 researchers, 55 universities USA & Canada

Niles et al. (2020) PlosOne, https://doi.org/10.1371/journal.pone.0228914

https://www.nature.com/nature-index/news/allure-journal-impact-factor-holds-firm-despite-flaws

eLIFE elifesciences.org

FEATURE ARTICLE

META-RESEARCH

Use of the Journal Impact Factor in academic review, promotion, and tenure evaluations

Abstract We analyzed how often and in what ways the Journal Impact Factor (JIF) is currently used in review, promotion, and tenure (RPT) documents of a representative sample of universities from the United States and Canada. 40% of research-intensive institutions and 18% of master's institutions mentioned the JIF, or closely related terms. Of the institutions that mentioned the JIF, 87% supported its use in at least one of their RPT documents, 13% expressed caution about its use, and none heavily criticized it or prohibited its use. Furthermore, 63% of institutions that mentioned the JIF associated the metric with quality, 40% with impact, importance, or significance, and 20% with prestige, reputation, or status. We conclude that use of the JIF is encouraged in RPT evaluations, especially at research-intensive universities, and that there is work to be done to avoid the potential misuse of metrics like the JIF.

DOI: https://doi.org/10.7554/eLife.47338.001

ERIN C MCKIERNAN†*, LESLEY A SCHIMANSKI, CAROL MUÑOZ NIEVES, LISA MATTHIAS, MEREDITH T NILES AND JUAN P ALPERIN†*

Senior positions or tenure…

Name and shame: who uses journal rank in evaluations?

This document aims to collect random examples of institutions using journal rank in evaluation procedures More examples are listed and described in "Research Counts, Not the Journal".

Brembs, https://docs.google.com/document/d/1vWPssX-WmzRCd8mbzFZl-mvfxySeXY72RYJ8U3Uyl1I/

“When we believe that we will be judged by silly criteria we will adapt and behave in silly ways.”

Werner, R. (2015). The focus on bibliometrics makes papers less useful. *Nature*, 517(7534), 245.

How to gain reputation with replications?

IF: 21.1

ARTICLES

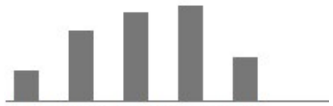
nature neuroscience

Retrieval induces adaptive forgetting of competing memories via cortical pattern suppression

Remembering a past experience can, surprisingly, cause forgetting. Forgetting arises when other competing traces interfere with retrieval and inhibitory control mechanisms are engaged to suppress the distraction they cause. This form of forgetting is considered to be adaptive because it reduces future interference. The effect of this proposed inhibition process on competing memories has, however, never been observed, as behavioral methods are 'blind' to retrieval dynamics and neuroimaging methods have not isolated retrieval of individual memories. We developed a canonical template tracking method to quantify the activation state of individual target memories and competitors during retrieval. This method revealed that repeatedly retrieving target memories suppressed cortical patterns unique to competitors. Pattern suppression was related to engagement of prefrontal regions that have been implicated in resolving retrieval competition and, critically, predicted later forgetting. Thus, our findings demonstrate a cortical pattern suppression mechanism through which remembering adaptively shapes which aspects of our past remain accessible.

2015

Zitiert von: 110



IF: 4.3

CORTEX 104 (2018) 26–45

Available online at www.sciencedirect.com

ScienceDirect

Journal homepage: www.elsevier.com/locate/cortex

Research report

Does inhibition cause forgetting after selective retrieval? A reanalysis and failure to replicate

Kevin W. Potter, Lucas D. Huszar and David E. Huber*

University of Massachusetts Amherst, Amherst, MA, USA

2018

CORTEX 113 (2019) 347–349

Available online at www.sciencedirect.com

ScienceDirect

Journal homepage: www.elsevier.com/locate/cortex

Discussion forum

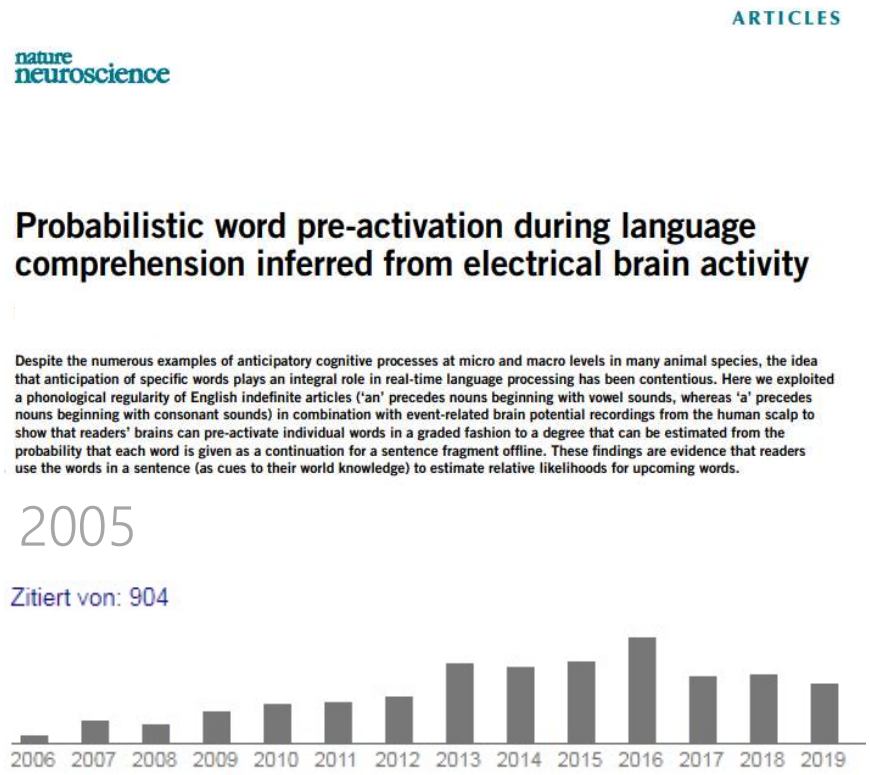
Less "story" and more "reliability" in cognitive neuroscience

David E. Huber, Kevin W. Potter and Lucas D. Huszar*

University of Massachusetts, Amherst, USA

How to gain reputation with replications?

IF: 21.1



ARTICLES

nature neuroscience

Probabilistic word pre-activation during language comprehension inferred from electrical brain activity

Despite the numerous examples of anticipatory cognitive processes at micro and macro levels in many animal species, the idea that anticipation of specific words plays an integral role in real-time language processing has been contentious. Here we exploited a phonological regularity of English indefinite articles ('an' precedes nouns beginning with vowel sounds, whereas 'a' precedes nouns beginning with consonant sounds) in combination with event-related brain potential recordings from the human scalp to show that readers' brains can pre-activate individual words in a graded fashion to a degree that can be estimated from the probability that each word is given as a continuation for a sentence fragment offline. These findings are evidence that readers use the words in a sentence (as cues to their world knowledge) to estimate relative likelihoods for upcoming words.

2005

Zitiert von: 904

IF: 7.6

eLIFE elifesciences.org

RESEARCH ARTICLE

Large-scale replication study reveals a limit on probabilistic prediction in language comprehension

Mante S Nieuwland[1,2]*, Stephen Politzer-Ahles[3,4], Evelien Heyselaar[5], Katrien Segaert[5], Emily Darley[6], Nina Kazanina[6], Sarah Von Grebmer Zu Wolfsthurn[6], Federica Bartolozzi[2], Vita Kogan[2], Aine Ito[2,4], Diane Mézière[2], Dale J Barr[7], Guillaume A Rousselet[7], Heather J Ferguson[8], Simon Busch-Moreno[9], Xiao Fu[9], Jyrki Tuomainen[9], Eugenia Kulakova[10], E Matthew Husband[4], David I Donaldson[11], Zdenko Kohút[12], Shirley-Ann Rueschemeyer[12], Falk Huettig[1]

2018

Retraction Watch

Tracking retractions as a window into the scientific process

Nature says it wants to publish replication attempts. So what happened when a group of authors submitted one to Nature Neuroscience?

Over the past few years, Nature has published editorials extolling the virtues of replication, concluding in one that "We welcome, and will be glad to help disseminate, results that explore the validity of key publications, including our own." Mante Nieuwland, of the Max Planck Institute for Psycholinguistics, and colleagues were encouraged by that message, and submitted one such replication attempt to Nature Neuroscience. In a three-part guest post, Nieuwland will describe what happened when they did, and discusses whether reality lives up to the rhetoric.

Mante Nieuwland

How to gain reputation with replications?

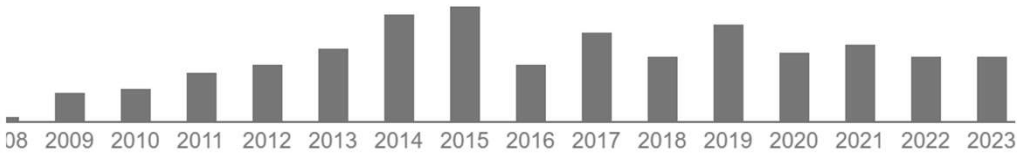
IF: 29.8

Political Attitudes Vary with Physiological Traits

Although political views have been thought to arise largely from individuals' experiences, recent research suggests that they may have a biological basis. We present evidence that variations in political attitudes correlate with physiological traits. In a group of 46 adult participants with strong political beliefs, individuals with measurably lower physical sensitivities to sudden noises and threatening visual images were more likely to support foreign aid, liberal immigration policies, pacifism, and gun control, whereas individuals displaying measurably higher physiological reactions to those same stimuli were more likely to favor defense spending, capital punishment, patriotism, and the Iraq War. Thus, the degree to which individuals are physiologically responsive to threat appears to indicate the degree to which they advocate policies that protect the existing social structure from both external (outgroup) and internal (norm-violator) threats.

2009

Cited by 952

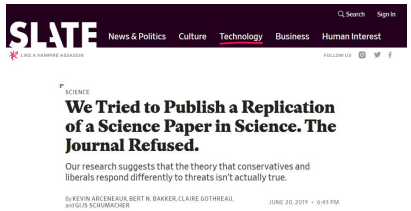


Preprint - not sent out to review in Science

Conservatives and Liberals have Similar Physiological Responses to Threats: Evidence from Three Replications

Bert N. Bakker,[1*] Gijs Schumacher,[2] Claire Gothreau,[3] Kevin Arceneaux[4]

2019, 10.31234/osf.io/vdpyt



2022

Higher impact factor publications…

1. …are used as selection criteria for senior positions and receiving tenure.
2. …lead to more funding from institutions.
3. …increase competitiveness in grant applications.

ANKE BILL
Says that her *Cell* paper helped her job search.

YINGJIE PENG
Says that astronomers do not generally care where papers appear.

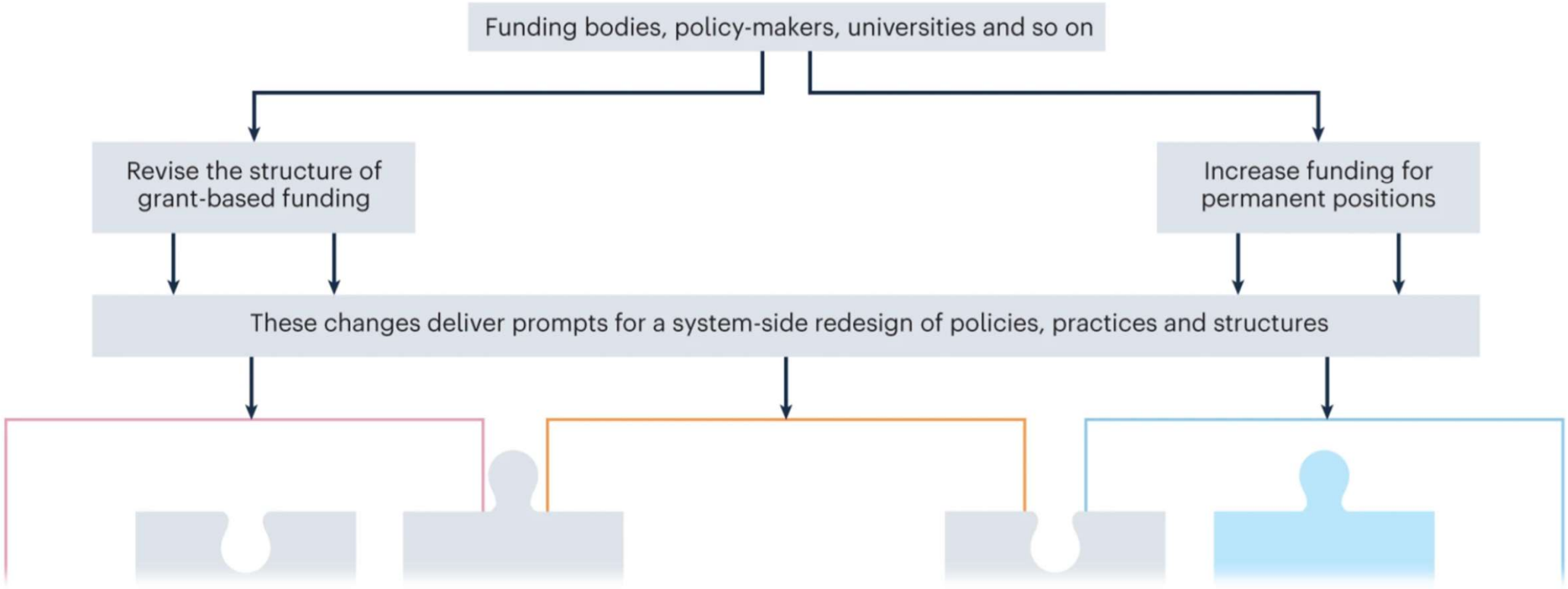
ANNELE VIRTANEN
Says that her *Nature* paper opened doors outside her field.

JEFFREY RIMER
Says that his *Science* paper helped him to win a grant.

PING CHI
Says that her *Nature* paper helped to start a clinical trial.

see Reich (2013), Nature.

Revising grant-based funding to improve “quality”



Rahal et al. (2023) https://doi.org/10.1038/s41562-022-01508-2

Third-party funding: A flawed cornerstone

Background on TPF

– OECD countries currently allocate around 2.7% of their GDP to scientific research in higher education – approximately 1.7$ trillion p.a.

– 28% of the total German research budget was distributed through competitive TPF in 2022

– TPF is implemented as critical instrument for steering and quality control

Criticism of current TPF models

- Significant investment on top of doing “actual” science
- Errors and biases in review process
- Entry-biases for applications
- Low success rates with extremes as low as 7%
- Significant societal (sunk) costs


Comment

https://doi.org/10.1038/s41562-023-01649-y

Rethink funding by putting the lottery first

Finn Luebber, Sören Krach, Marina Martinez Mateo, Frieder M. Paulus, Lena Rademacher, Rima-Maria Rahal & Jule Specht

Check for updates

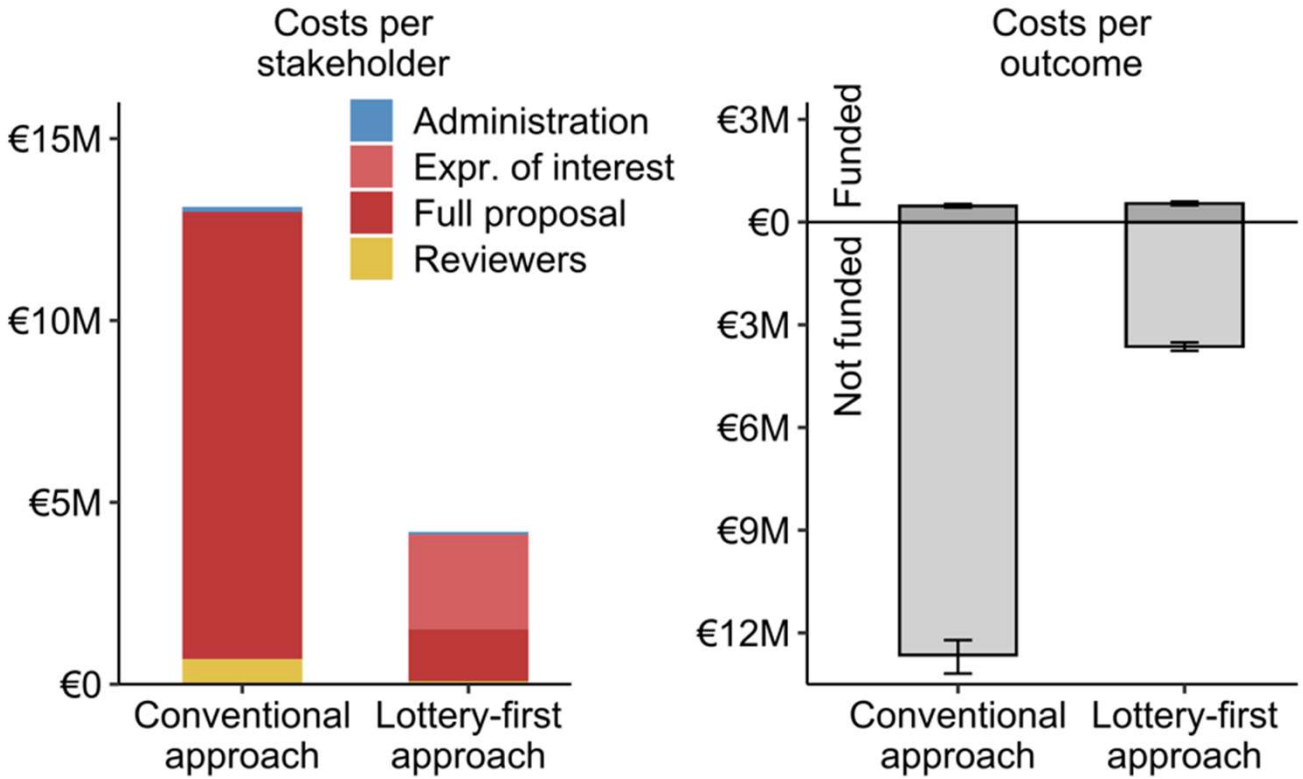
https://doi.org/10.1038/s41562-023-01649-y

#RethinkFunding: primary data on a lottery-first approach

Stiftung
Innovation in der
Hochschullehre

- €300 million budget p.a. from BMBF for (managing) different funding lines in German higher education
- "Freiraum": €50 million funding for the implementation and evaluation of ideas for enhancing teaching practices ~150 projects funded
  - >280.000 people working in German institutions eligible for funding
  - Aim for reducing costs both at the foundation and for the academic workforce

#RethinkFunding: primary data on a lottery-first approach



financial costs reduced by 68% and sunk costs by a factor of ~27

“When we believe that we will be judged by silly criteria we will adapt and behave in silly ways.”

- Systematic issues in the organization of the academic workforce sets the context for the “quality” of our research
- Motivating behaviour through journal-based metrics is dysfunctional for reproducibility efforts
- Structure of grant-based funding can be changed and should be reconsidered

Thank you…

Lübeck

Sören Krach

Finn Lübber

Lena Rademacher

Berlin

Jule Specht

Wien

Rima-Maria Rahal

https://osi-luebeck.de/

@osi-luebeck.bsky.social

OSI Lübeck

UNIVERSITÄT ZU LÜBECK

Stiftung Innovation in der Hochschullehre