Open Science Fundamentals PNB 3EE3

Maya Flannery

2023-09-18

Outline

Objectives

- What is open science?
- Why care about open science?
- How do you do open science?
- Connection to this course!

Background: The Replication Crisis

The Replication Crisis

Feeling the future: Experimental evidence for anomalous retroactive influences on cognition and affect.

By Bem, Daryl J.
Journal of Personality and Social Psychology, Vol 100(3), Mar 2011, 407-425

Abstract

The term psi denotes anomalous processes of information or energy transfer that are currently unexplained in terms of known physical or biological mechanisms. Two variants of psi are *precognition* (conscious cognitive awareness) and premonition (affective apprehension) of a future event that could not otherwise be anticipated through any known inferential process. Precognition and *premonition* are themselves special cases of a more general phenomenon: the anomalous retroactive influence of some future event on an individual's current responses, whether those responses are conscious or nonconscious, cognitive or affective. This article reports 9 experiments, involving more than 1,000 participants, that test for retroactive influence by "time-reversing" well-established psychological effects so that the individual's responses are obtained before the putatively causal stimulus events occur. Data are presented for 4 time-reversed effects: precognitive approach to erotic stimuli and precognitive avoidance of negative stimuli; retroactive priming; retroactive habituation; and retroactive facilitation of recall. The mean effect size (d) in psi performance across all 9 experiments was 0.22, and all but one of the experiments yielded statistically significant results. The individual-difference variable of stimulus seeking, a component of extraversion, was significantly correlated with psi performance in 5 of the experiments, with participants who scored above the midpoint on a scale of stimulus seeking achieving a mean effect size of 0.43. Skepticism about psi, issues of replication, and theories of psi are also discussed. (PsycInfo Database Record (c) 2022 APA, all rights reserved)

Evidence for precognition—extraordinary claims! (Bem, 2011)

Issue

ESP is real — or science is broken…

Why Psychologists Must Change the Way They Analyze Their Data: The Case of Psi: Comment on Bem (2011)

Eric–Jan Wagenmakers, Ruud Wetzels, Denny Borsboom, and Han L. J. van der Maas
University of Amsterdam

Does psi exist? D. J. Bem (2011) conducted 9 studies with over 1,000 participants in an attempt to demonstrate that future events retroactively affect people's responses. Here we discuss several limitations of Bem's experiments on psi; in particular, we show that the data analysis was partly exploratory and that one-sided *p* values may overstate the statistical evidence against the null hypothesis. We reanalyze Bem's data with a default Bayesian *t* test and show that the evidence for psi is weak to nonexistent. We argue that in order to convince a skeptical audience of a controversial claim, one needs to conduct strictly confirmatory studies and analyze the results with statistical tests that are conservative rather than liberal. We conclude that Bem's *p* values do not indicate evidence in favor of precognition; instead, they indicate that experimental psychologists need to change the way they conduct their experiments and analyze their data.

Psychologists' methods become under extreme critique (Wagenmakers et al., 2011)

Follow up

nature human behaviour

PERSPECTIVE

PUBLISHED: 10 JANUARY 2017 | VOLUME: 1 | ARTICLE NUMBER: 0021

OPEN

A manifesto for reproducible science

Marcus R. Munafò[1,2*], Brian A. Nosek[3,4], Dorothy V. M. Bishop[5], Katherine S. Button[6], Christopher D. Chambers[7], Nathalie Percie du Sert[8], Uri Simonsohn[9], Eric-Jan Wagenmakers[10], Jennifer J. Ware[11] and John P. A. Ioannidis[12,13,14]

Improving the reliability and efficiency of scientific research will increase the credibility of the published scientific literature and accelerate discovery. Here we argue for the adoption of measures to optimize key elements of the scientific process: methods, reporting and dissemination, reproducibility, evaluation and incentives. There is some evidence from both simulations and empirical studies supporting the likely effectiveness of these measures, but their broad adoption by researchers, institutions, funders and journals will require iterative evaluation and improvement. We discuss the goals of these measures, and how they can be implemented, in the hope that this will facilitate action toward improving the transparency, reproducibility and efficiency of scientific research.

(Munafò et al., 2017)

Many Labs 2: Investigating Variation in Replicability Across Samples and Settings

Richard A. Klein ✉, Michelangelo Vianello, Fred Hasselman, Byron G. Adams, Reginald B. Adams, Jr., Sinan Alper, Mark Aveyard, Jordan R. Axt, Mayowa T. Babalola, Štěpán Bahník, Rishtee Batra, Mihály Berkics, Michael J. Bernstein, Daniel R. Berry, Olga Bialobrzeska, Evans Dami Binan, Konrad Bocian, Mark J. Brandt, Robert Busching, Anna Cabak Rédei, Huajian Cai, Fanny Cambier, Katarzyna Cantarero, Cheryl L. Carmichael, Francisco Ceric, Jesse Chandler, Jen-Ho Chang, Armand Chatard, Eva E. Chen, Winnee Cheong, David C. Cicero, Sharon Coen, Jennifer A. Coleman, Brian Collisson, Morgan A. Conway, Katherine S. Corker, Paul G. Curran, Fiery Cushman, Zubairu K. Dagona, Ilker Dalgar, Anna Dalla Rosa, William E. Davis, Maaike de Bruijn, Leander De Schutter, Thierry Devos, Marieke de Vries, Canay Doğulu, Nerisa Dozo, Kristin Nicole Dukes, Yarrow Dunham, Kevin Durrheim, Charles R. Ebersole, John E. Edlund, Anja Eller, Alexander Scott English, Carolyn Finck, Natalia Frankowska, Miguel-Ángel Freyre, Mike Friedman, Elisa Maria Galliani, Joshua C. Gandi, Tanuka Ghoshal, Steffen R. Giessner, Tripat Gill, Timo Gnambs, Ángel Gómez, Roberto González, Jesse Graham, Jon E. Grahe, Ivan Grahek, Eva G. T. Green, Kakul Hai, Matthew Haigh, Elizabeth L. Haines, Michael P. Hall, Marie E. Heffernan, Joshua A. Hicks, Petr Houdek, Jeffrey R. Huntsinger, Ho Phi Huynh, Hans IJzerman, Yoel Inbar, Åse H. Innes-Ker, William Jiménez-Leal, Melissa-Sue John, Jennifer A. Joy-Gaba, Roza G. Kamiloğlu, Heather Barry Kappes, Serdar Karabati, Haruna Karick, Victor N. Keller, Anna Kende, Nicolas Kervyn, Goran Knežević, Carrie Kovacs, Lacy E. Krueger, German Kurapov, Jamie Kurtz, Daniël Lakens, Ljiljana B. Lazarević, Carmel A. Levitan, Neil A. Lewis, Jr., Samuel Lins, Nikolette P. Lipsey, Joy E. Losee, Esther Maassen, Angela T. Maitner, Winfrida Malingumu, Robyn K. Mallett, Satia A. Marotta, Janko Međedović, Fernando Mena-Pacheco, Taciano L. Milfont, Wendy L. Morris, Sean C. Murphy, Andriy Myachykov, Nick Neave, Koen Neijenhuijs, Anthony J. Nelson, Félix Neto, Austin Lee Nichols, Aaron Ocampo, Susan L. O'Donnell, Haruka Oikawa, Masanori Oikawa, Elsie Ong, Gábor Orosz, Malgorzata Osowiecka, Grant Packard, Rolando Pérez-Sánchez, Boban Petrović, Ronaldo Pilati, Brad Pinter, Lysandra Podesta, Gabrielle Pogge, Monique M. H. Pollmann, Abraham M. Rutchick, Patricio Saavedra, Alexander K. Saeri, Erika Salomon, Kathleen Schmidt, Felix D. Schönbrodt, Maciej B. Sekerdej, David Sirlopú, Jeanine L. M. Skorinko, Michael A. Smith, Vanessa Smith-Castro, Karin C. H. J. Smolders, Agata Sobkow, Walter Sowden, Philipp Spachtholz, Manini Srivastava, Troy G. Steiner, Jeroen Stouten, Chris N. H. Street, Oskar K. Sundfelt, Stephanie Szeto, Ewa Szumowska, Andrew C. W. Tang, Norbert Tanzer, Morgan J. Tear, Jordan Theriault, Manuela Thomae, David Torres, Jakub Traczyk, Joshua M. Tybur, Adrienn Ujhelyi, Robbie C. M. van Aert, Marcel A. L. M. van Assen, Marije van der Hulst, Paul A. M. van Lange, Anna Elisabeth van 't Veer, Alejandro Vásquez- Echeverría, Leigh Ann Vaughn, Alexandra Vázquez, Luis Diego Vega, Catherine Verniers, Mark Verschoor, Ingrid P. J. Voermans, Marek A. Vranka, Cheryl Welch, Aaron L. Wichman, Lisa A. Williams, Michael Wood, Julie A. Woodzicka, Marta K. Wronska, Liane Young, John M. Zelenski, Zeng Zhijia, and Brian A. Nosek (-187) View all authors and affiliations

All Articles | https://doi.org/10.1177/2515245918810225

Many studies do not replicate! (Klein et al., 2018)

Problems: Questionable Practices (QRPs and QMPs)

Questionable research practices (John et al., 2012)

Questionable measurement practices (Flake & Fried, 2020)

Failing to report

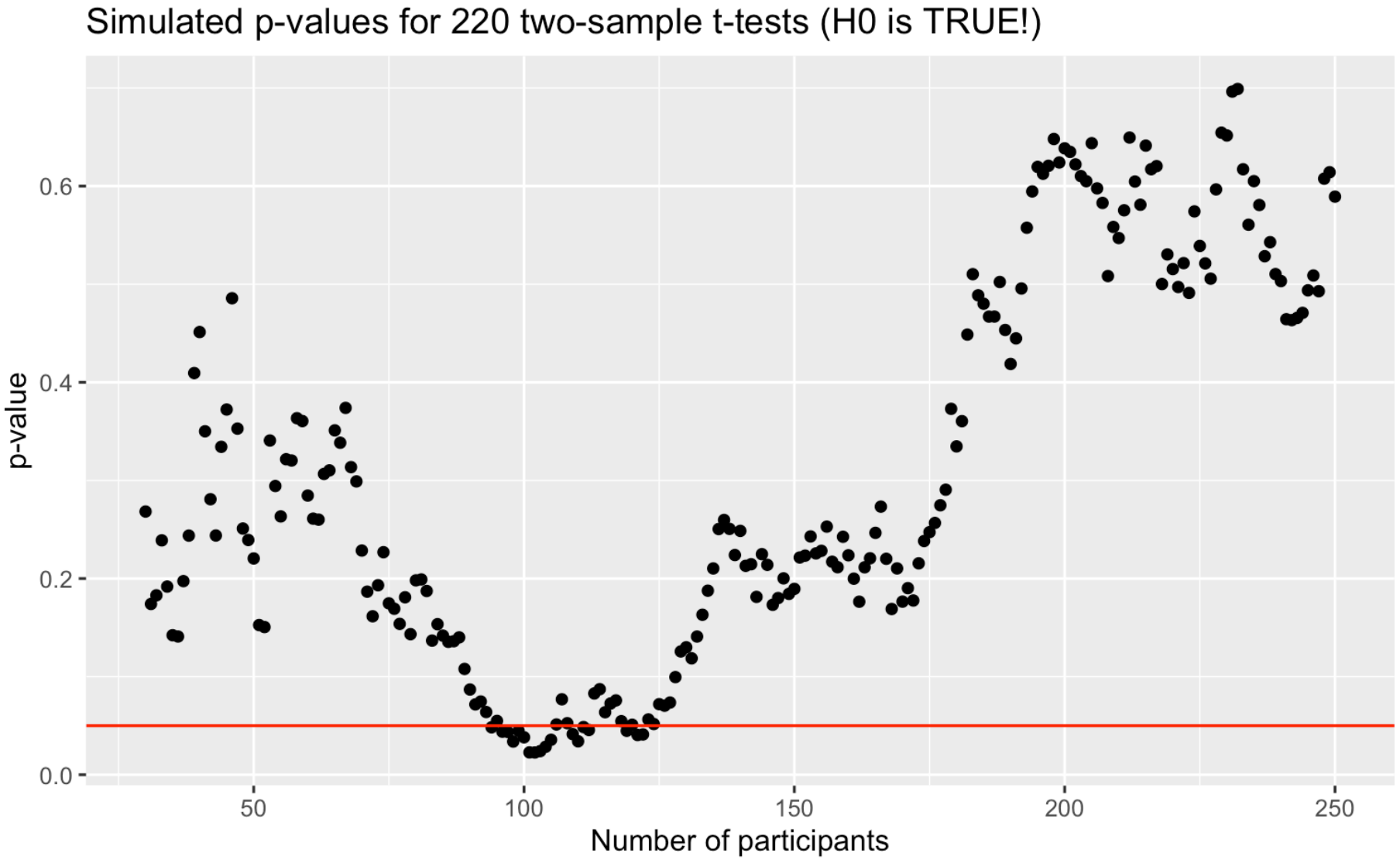
- all dependent measures
- all conditions

Probability of rejecting null hypothesis increases with the number of tests.

Selective reporting

Collecting data

- After seeing whether results are significant
- Stopping after achieving desired result
- Excluding data after seeing impact of doing do


Simulated p-values for 220 two-sample t-tests (H0 is TRUE!)
p-value
0.0
0.2
0.4
0.6
50
100
150
200
250
Number of participants

Analysis

- Rounding down p-values
- Falsifying data
- Claim results are unaffected by demographics
  - Western Educated Industrialized Rich Democratic (WEIRD) populations

Claim to have predicted an unexpected finding

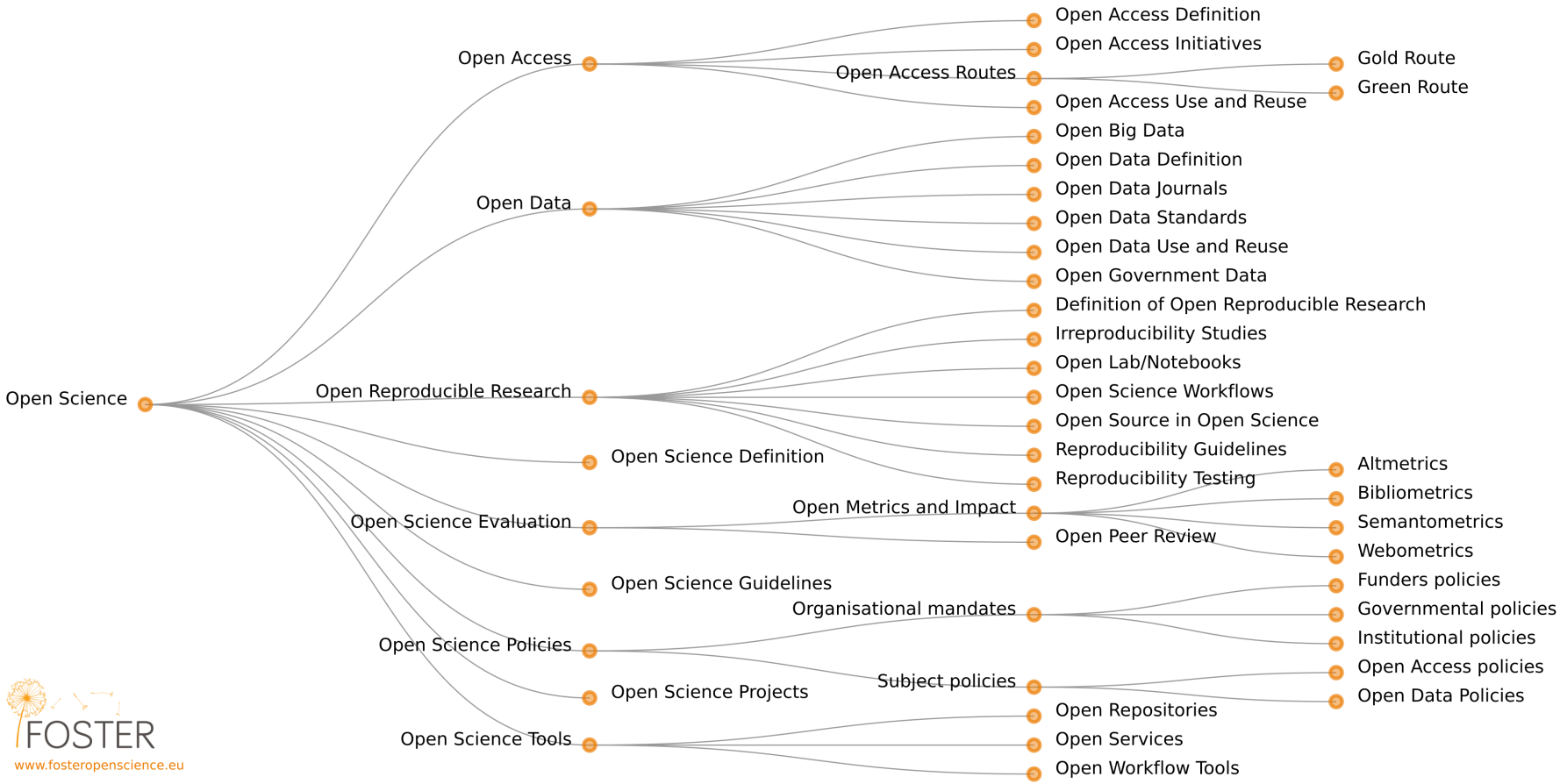
HARKing (Kerr, 1998)

Why do researchers do this?

- Career depends on ability to “publish or perish”
  - It is *very* difficult to publish null results

Solution: Open Science

Open Science Taxonomy



FOSTER Open Science

Open Access

Open Data

- Promotes reproducibility
- Saves resources
- Must be prepared carefully

	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T
1	failed_image	failed_audio	failed_video	trial_type	trial_index	time_elapse	internal_nod	rt	url	consent	view_history	response	accuracy	stimulus	question_orc	sound		
2	[]	[]	[]	preload	0	2289	0.0-0.0											
3				pavlovia	1	2292	0.0-1.0											
4				external-htm	2	5189	0.0-2.0	2720	resources/text/welcome.html									
5				external-htm	3	11414	0.0-3.0	6049	resources/te	complete								
6				instructions	4	89244	0.0-4.0	77828			[{"page_index":0,"viewing_time":1808},{"page_index":1,"viewing_time":11538},{"page_index":2,"viewir							
7				survey	5	277290	0.0-5.0	187931				{"q00_age":'	[]					
8				instructions	6	296350	0.0-6.0	19059			[{"page_index":0,"viewing_time":2135},{"page_index":1,"viewing_time":3456},{"page_index":2,"viewing							
9				html-keyboa	7	312359	0.0-7.0-0.0	null				null		Please listen carefully.				
10				survey-likert	8	360552	0.0-7.0-1.0	48189				{"rate_classical":4,"rate_dance":3}			[0,1]	resources/music/st4_dn_pn_dc.mp3		
11				html-keyboa	9	376578	0.0-7.0-0.1	null				null		Please listen carefully.				
12				survey-likert	10	391652	0.0-7.0-1.1	15071				{"rate_dance":1,"rate_classical":2}			[1,0]	resources/music/st1_cl_el_dc.mp3		
13				html-keyboa	11	407658	0.0-7.0-0.2	null				null		Please listen carefully.				
14				survey-likert	12	417804	0.0-7.0-1.2	10144				{"rate_classical":4,"rate_dance":2}			[0,1]	resources/music/st1_dn_pn_dc.mp3		

Open Reproducible Research

- Data stored, organized, formatted appropriately
- Code is clean, readable, well-documented
- Instructions for reproduction

Open Science Tools

- Git
- Open Science Framework
  - Example

Incentives

Table 1 | A manifesto for reproducible science.

Theme	Proposal	Examples of initiatives/potential solutions (extent of current adoption)	Stakeholder(s)
Methods	Protecting against cognitive biases	All of the initiatives listed below (* to ****) Blinding (**)	J, F
	Improving methodological training	Rigorous training in statistics and research methods for future researchers (*) Rigorous continuing education in statistics and methods for researchers (*)	I, F
	Independent methodological support	Involvement of methodologists in research (**) Independent oversight (*)	F
	Collaboration and team science	Multi-site studies/distributed data collection (*) Team-science consortia (*)	I, F
Reporting and dissemination	Promoting study pre-registration	Registered Reports (*) Open Science Framework (*)	J, F
	Improving the quality of reporting	Use of reporting checklists (**) Protocol checklists (*)	J
	Protecting against conflicts of interest	Disclosure of conflicts of interest (***) Exclusion/containment of financial and non-financial conflicts of interest (*)	J
Reproducibility	Encouraging transparency and open science	Open data, materials, software and so on (* to **) Pre-registration (**** for clinical trials, * for other studies)	J, F, R
Evaluation	Diversifying peer review	Preprints (* in biomedical/behavioural sciences, **** in physical sciences) Pre- and post-publication peer review, for example, Publons, PubMed Commons (*)	J
Incentives	Rewarding open and reproducible practices	Badges (*) Registered Reports (*) Transparency and Openness Promotion guidelines (*) Funding replication studies (*) Open science practices in hiring and promotion (*)	J, I, F

Estimated extent of current adoption: *, <5%; **, 5–30%; ***, 30–60%; ****, >60%. Abbreviations for key stakeholders: J, journals/publishers; F, funders; I, institutions; R, regulators.

(Munafò et al., 2017)

Resources

- FOSTER Open Science

More Things to Think About

Metametascience

(Whitaker & Guest, 2020)

Knowledge?

Decolonization of knowledge, epistemicide, participatory research and higher education

Budd L. Hall* and Rajesh Tandon – *Co-Holders, UNESCO Chair in Community-Based Research and Social Responsibility in Higher Education, School of Public Administration, University of Victoria, Canada and the Society for Participatory Research in Asia*

Abstract

This article raises questions about what the word 'knowledge' refers to. Drawn from some 40 years of collaborative work on knowledge democracy, the authors suggest that higher education institutions today are working with a very small part of the extensive and diverse knowledge systems in the world. Following from de Sousa Santos, they illustrate how Western knowledge has been engaged in epistemicide, or the killing of other knowledge systems. Community-based participatory research is about knowledge as an action strategy for change and about the rendering visible of the excluded knowledges of our remarkable planet. Knowledge stories, theoretical dimensions of knowledge democracy and the evolution of community-based participatory research partnerships are highlighted.

Keywords: decolonization of knowledge; epistemicide; community-based participatory research; knowledge democracy

(Hall & Tandon, 2017)

University of Oxford

Open Science in PNB 3EE3

Reproducible Research and Open Science Tools

Open repositories

- GitHub

Open source/notebooks

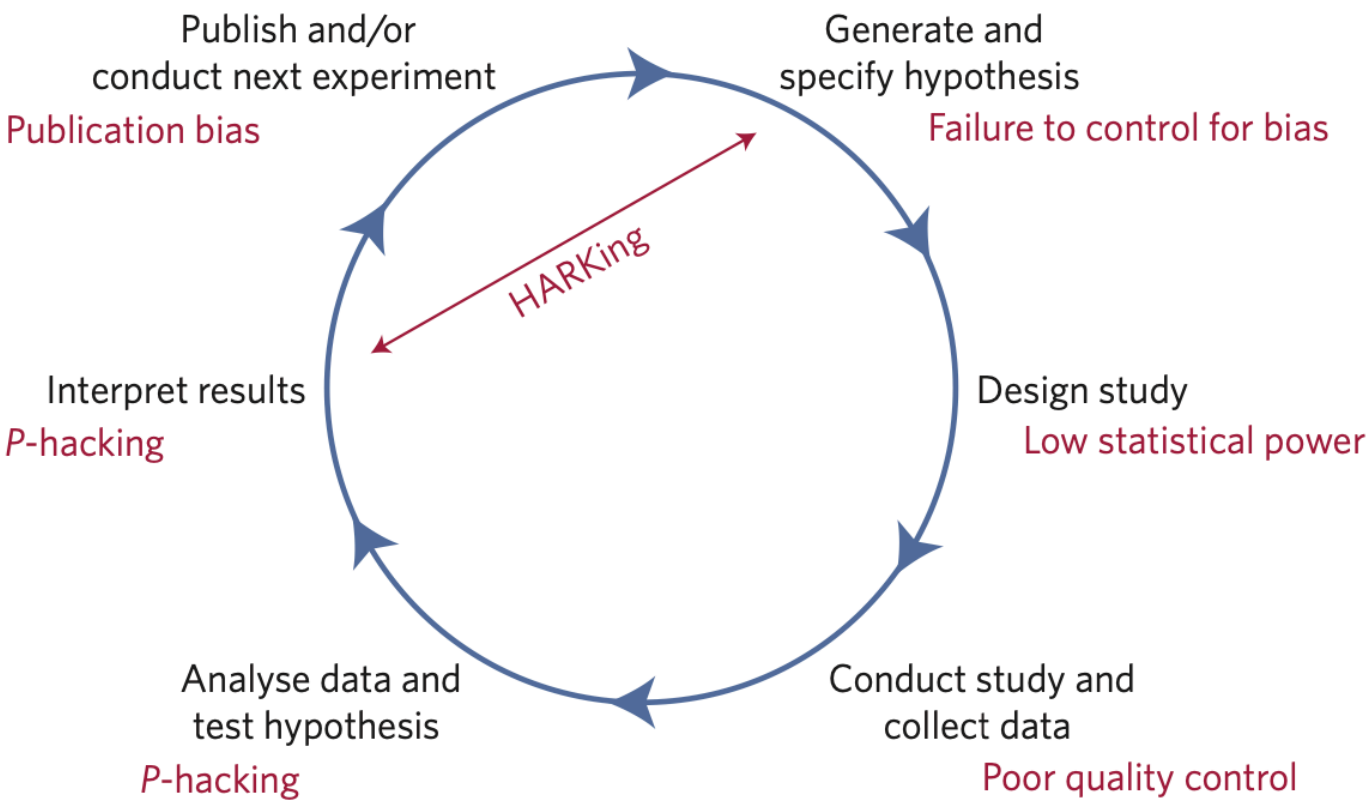
- jsPsych
- R
- Python

Preregistration

OSF Prereg Template

Assignment

Summary



(Munafò et al., 2017)

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