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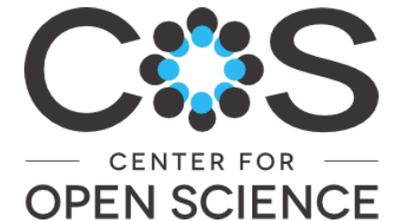
Preregistration Standards for Psychology

A collaborative effort between the American Psychological Association,
British Psychological Society, and German Psychological Society



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In partnership with the
Leibniz Institute for Psychology and Center for Open Science



Order of Events

- Introduction
- Dr. Simine Vazire: What is Transparency For?
- Dr. E.J. Wagenmakers: Problems and Promises of Preregistration
- Panel: Introduction of the Preregistration Standards for Quantitative Research in Psychology
- Q&A

Preregistration

pre·reg·is·tra·tion (*noun*)

- Plan more comprehensively before you start
- Get feedback before you invest the time in doing the research
- Increase the credibility of your research



OSF
PREREGISTRATION

What is transparency for?

Simine Vazire

Melbourne School of Psychological Sciences

University of Melbourne

Where are the self-correcting mechanisms of science?

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James Heathers
@jamesheathers

"Science is self-correcting" - sure, *when we correct it*, not because of Magical Progress (tm).

4:57 AM · Mar 26, 2017 · [Twitter Web Client](#)

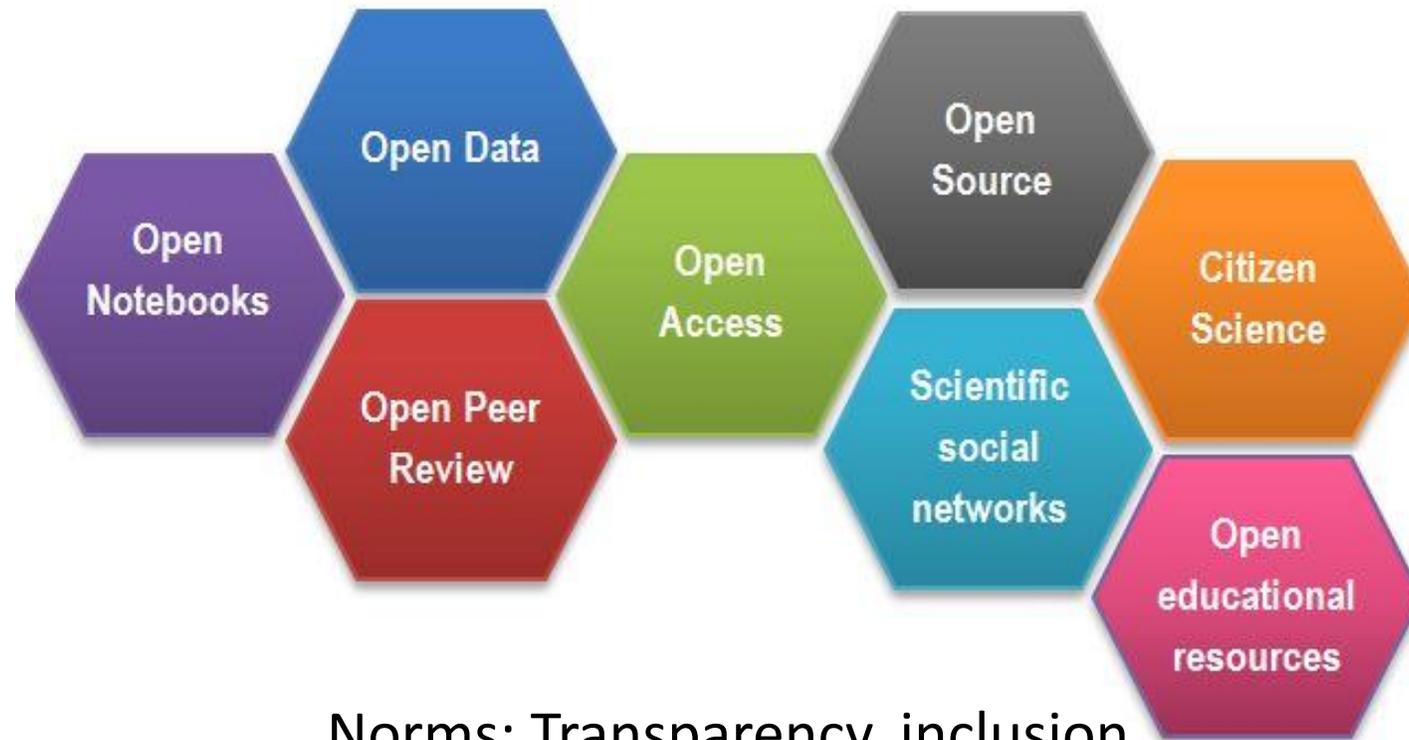
Where are the self-correcting mechanisms of science?

“When we observe scientists, we find that they have developed a variety of practices for vetting knowledge – for identifying problems in their theories and experiments and attempting to correct them.”

-Naomi Oreskes, 2019

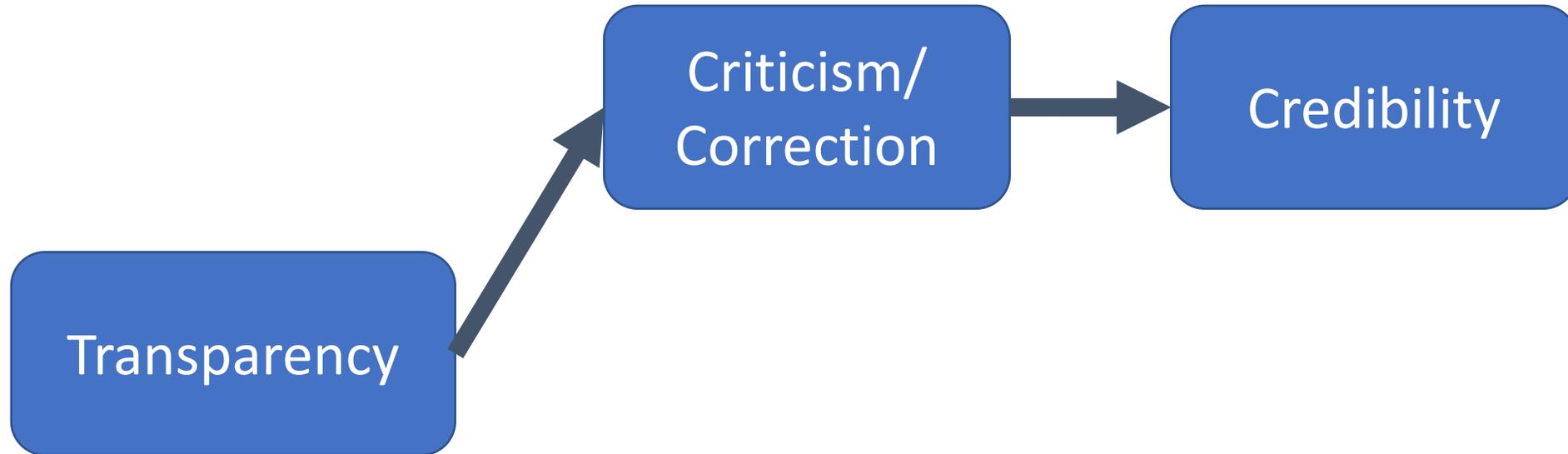
The credibility revolution

Transparency

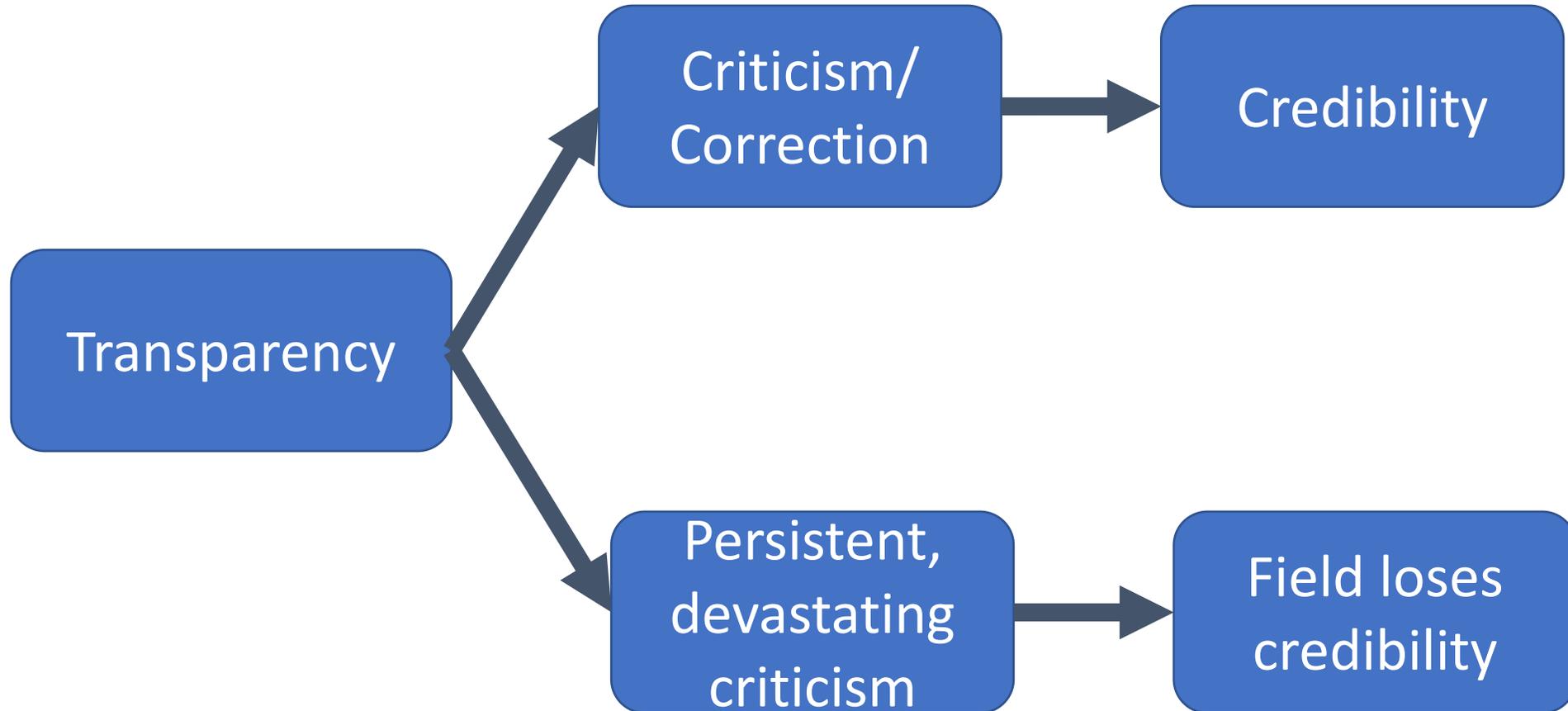


Norms: Transparency, inclusion
Anti-norms: Secrecy, elitism

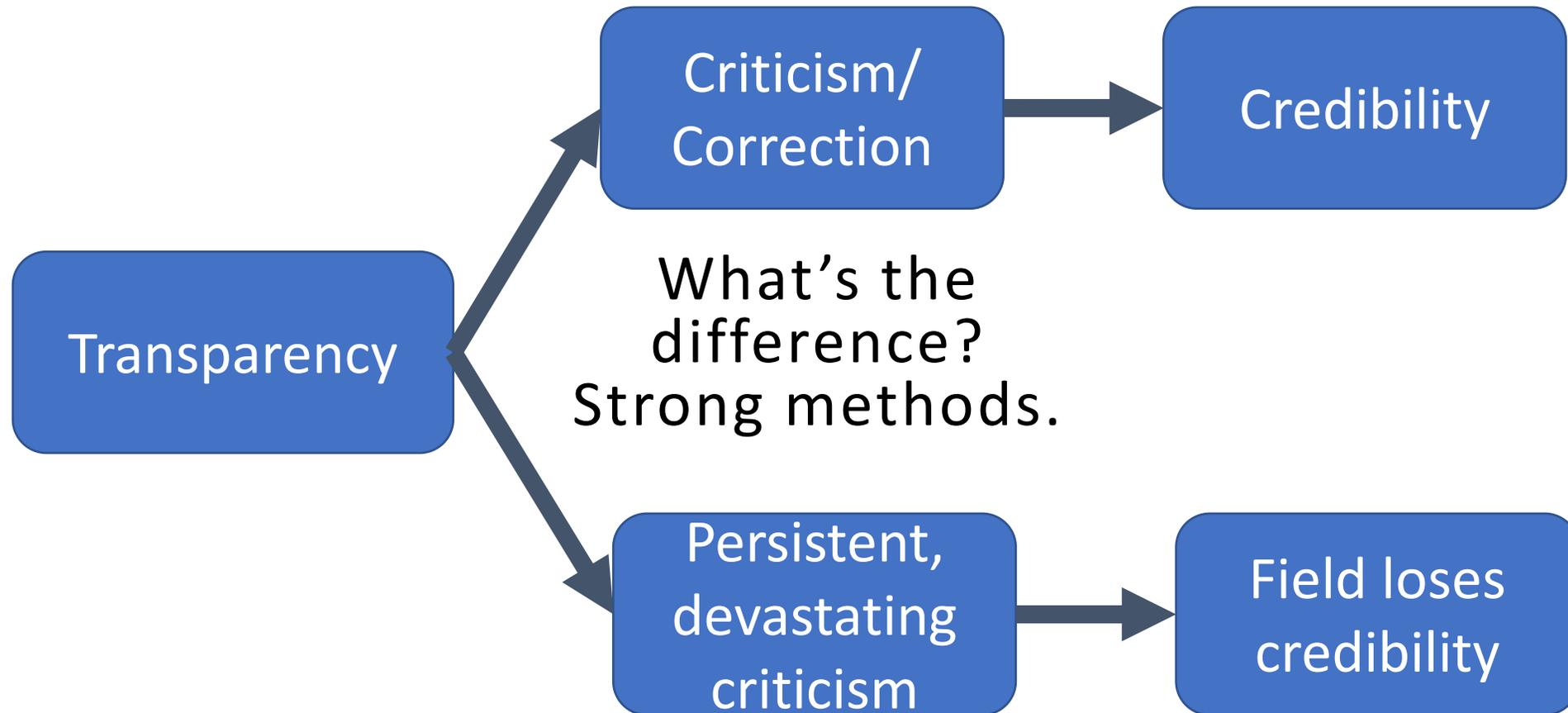
The credibility revolution



The credibility revolution

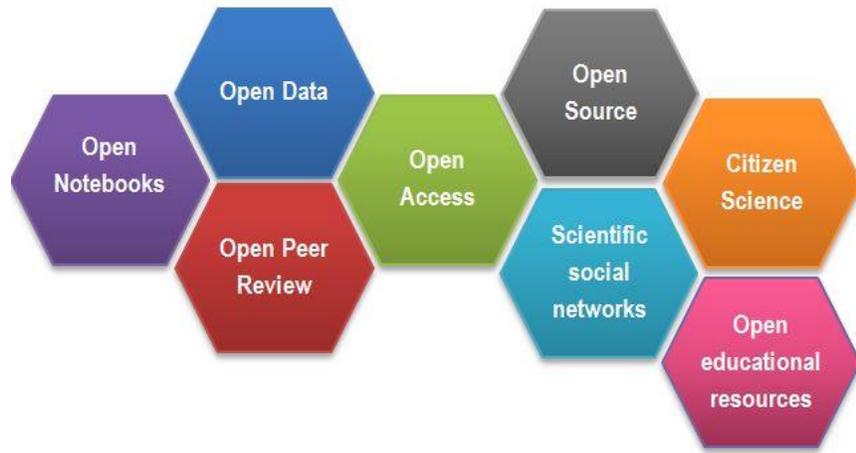


The credibility revolution



The credibility revolution

Transparency



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Quality Control



Norms: Organized skepticism
Anti-norms: Dogmatism, deference, credulity

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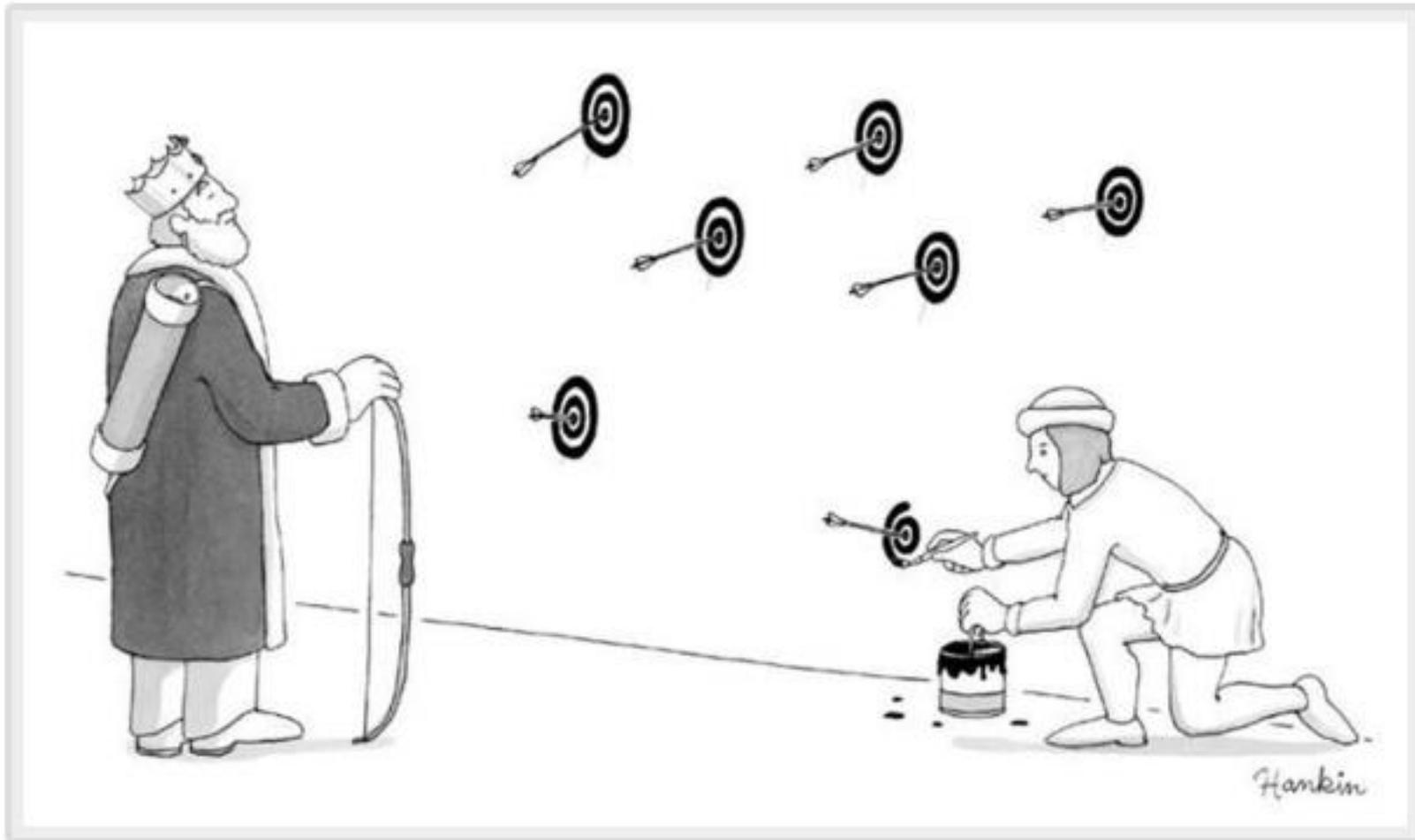
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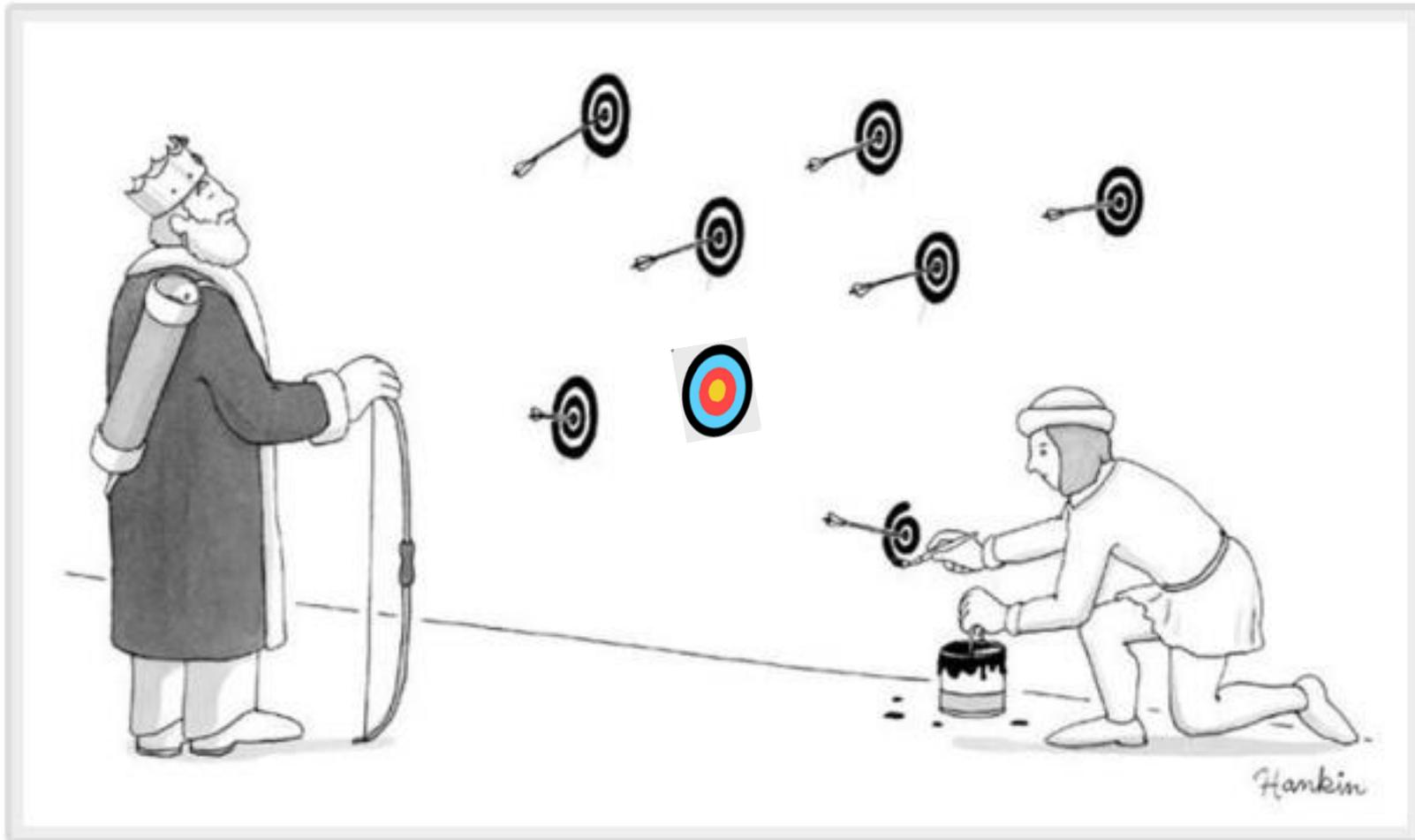
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- Pre-registration makes it easier for readers to identify these threats to validity

Hidden threats to validity



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What's wrong with reporting unexpected findings?

- Scientific progress depends on serendipity to generate new hypotheses
- Presenting serendipitous results as if they were pre-planned tests harms science – gives readers the impression that a more stringent test was done
- Readers need to know what was planned and what wasn't

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- Pre-registered \neq High quality
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What does high quality research look like?
(Assuming good design, measurement, etc.)

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Presented as new evidence
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(Assuming good design, measurement, etc.)

Results of an unplanned test

Presented as provisional

Hypothesis generation

Results of a planned test

Presented as new evidence

Hypothesis testing

Pre-registration:

Putting flexibility front & center

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 - Flexibility should be disclosed
 - Flexibility should temper conclusions
- Earlier stage research: More flexibility, more provisional claims
- Eliminating flexibility is a worthy goal, but we can't skip the early steps

Pre-registration:
Giving your critics ammunition

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Pre-registration: Giving your critics ammunition

- Pre-registering will not protect you from criticism
- It'll make it *easier* for readers to detect p -hacking etc.
- This is one of things that makes pre-registration admirable
- Also why we shouldn't expect readers to give us the benefit of the doubt when we don't pre-register
 - Penalizes researchers who pre-register & can be checked

Pre-registration:
Why do it then?

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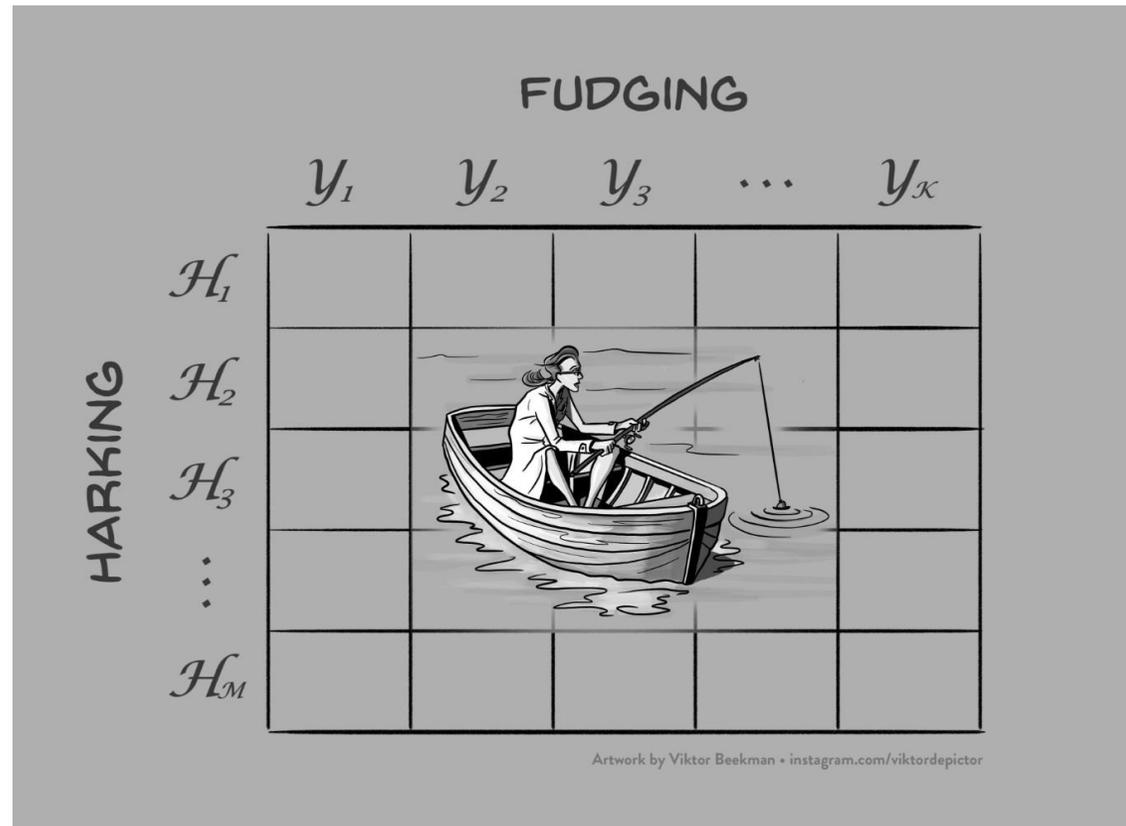
- Early-stage research:
 - Constrain what you can
 - Commit to being upfront about remaining flexibility
 - Tie yourself to the mast

Pre-registration: Why do it then?

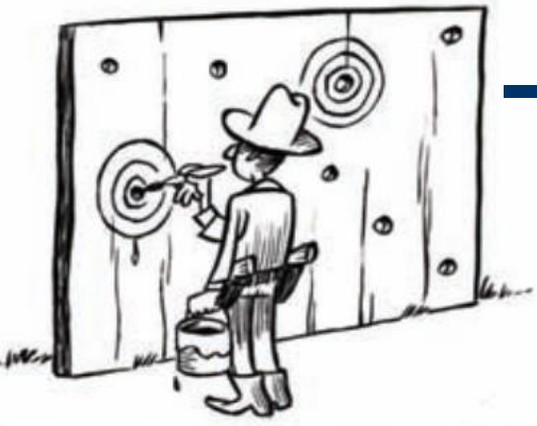
- Early-stage research:
 - Constrain what you can
 - Commit to being upfront about remaining flexibility
 - Tie yourself to the mast
- Late-stage research:
 - Plan your test
 - If it works, make strong claims
 - Let others evaluate for themselves if you achieved this

The end

Problems, and Promises of Preregistration

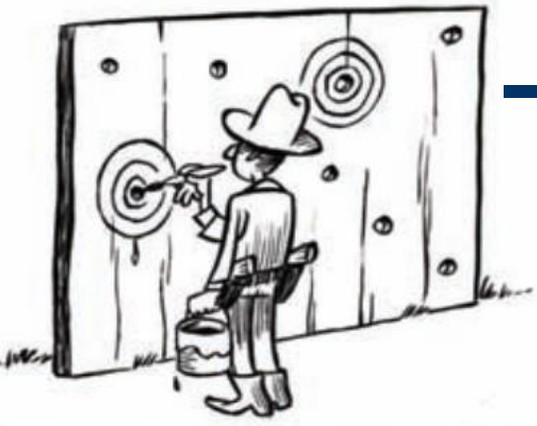


Eric-Jan Wagenmakers



Overview

- ◆ Disease
- ◆ Symptoms
- ◆ Cure



Overview

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The Main Dilemma

- ◆ Dr. X has a favorite theory that she has worked on and published about previously.
- ◆ Dr. X designs an experiment to test a prediction from her theory.
- ◆ Dr. X collects the data, a painstaking and costly process. Part of her career and those of her students ride on the outcome.



The Main Dilemma

- ◆ Now the data need to be analyzed.
- ◆ If $p < .05$, the experiment is deemed a *success*;
if $p > .05$, it is deemed a *failure*.

Who is, without a shadow of a doubt, the most biased analyst in the entire galaxy, past, present, and future?

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X



Richard Feynman

“The first principle is that you must not fool yourself—and you are the easiest person to fool”





The Main Dilemma

- ◆ So the world's most biased analyst, Dr. X, the easiest person to fool, proceeds to analyze the data.
- ◆ Dr. X can do this alone, without any oversight whatsoever. In most cases, the data and analysis code never leave the lab.



A Perfect Storm

- ◆ Data are analyzed with no accountability, by the person who is easiest to fool, often with limited statistical training, who has every incentive imaginable to produce $p < .05$.
- ◆ When $p < .05$, the result is declared “significant” and any further doubt is frowned upon, as it violates an implicit social contract [at least in psychology].



What Researchers Want

- ◆ To discover the ‘truth’, but also:
 - To present compelling data that leave no room for doubt or dissent;
 - To develop a coherent theoretical framework;
 - To publish papers that make interesting claims.



What Does Psychology Say?



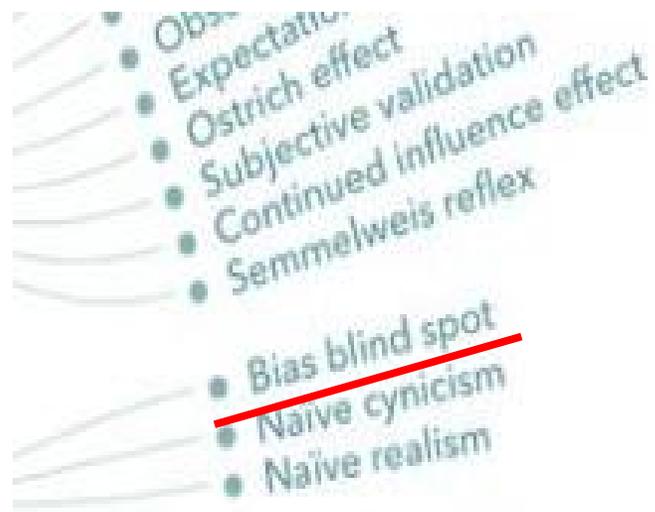
What Does Psychology Say?

- ◆ Hindsight bias
- ◆ Motivated reasoning
- ◆ Anchoring
- ◆ Survivorship bias
- ◆ Etc.

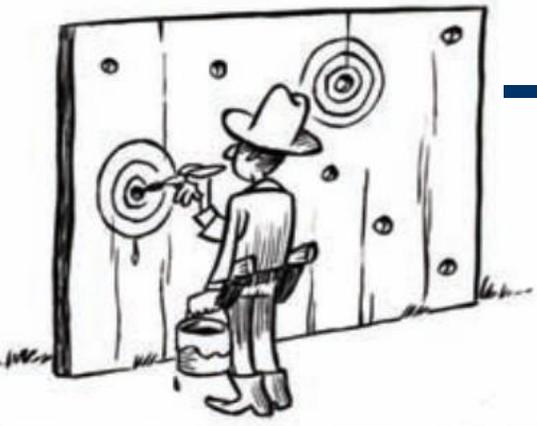


No, Researchers Are Probably Not Immune

◆ Bias blind spot



We notice flaws in others
more easily than flaws in ourselves



Overview

- ◆ Disease
- ◆ Symptoms
- ◆ Cure



Symptoms of a Systemic Problem

- ◆ Publication bias
- ◆ Fudging
- ◆ HARKing



Publication Bias

- ◆ Unflattering findings are rarely published.
- ◆ So the literature is populated mostly by flattering findings.
- ◆ Consequence: literature stops being a reliable guide to knowledge.



The Brady Rule

- ◆ In criminal law, the prosecution is required to share exculpatory evidence with the defense.
- ◆ If exculpatory evidence is suppressed, a fair trial is impossible.
- ◆ [This “Brady rule” requirement is regularly flouted.]



Symptoms of a Systemic Problem

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MESSAGING THE DATA ('FUDGING')



VARIABLES, TRANSFORMATIONS,
ANALYSIS PIPELINES

y_1 y_2 y_3 ... y_x

FINDING YOUR HYPOTHESIS
IN THE DATA ('HARKING')



HYPOTHESES

\mathcal{H}_1

\mathcal{H}_2

\mathcal{H}_3

⋮

\mathcal{H}_M



MESSAGING THE DATA ('FUDGING')



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y_1 y_2 y_3 ... y_x



This Fishing is Problematic
for Frequentists
AND
Bayesians

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MESSAGING THE DATA ('FUDGING')



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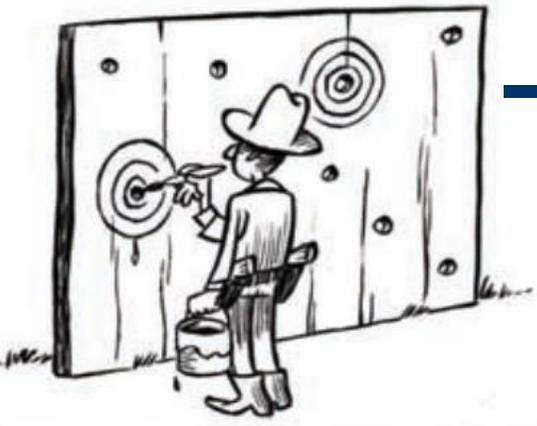
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HYPOTHESES

Consequence:
Overconfident Claims and
Spurious Results
That Do Not
Replicate

\mathcal{H}_M



Overview

- ◆ Disease
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Preregistration of Analysis Plans

- ◆ Separates what was post-hoc from what was pre-planned.
- ◆ Prevents researchers from fooling themselves and others.
- ◆ Does not rule out exploratory expeditions; just labels them as such.



Preregistration of Analysis Plans

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Beware of the Nirvana Fallacy

- ◆ Preregistration does *not* improve the underlying theoretical framework, the research question, or the experimental design. *It does not transform frogs into princes.*



Beware of the Nirvana Fallacy

- ◆ Preregistration does *not* improve the underlying theoretical framework, the research question, or the experimental design. *It does not transform frogs into princes.*
- ◆ However, the extra thought that goes into the planning stage may increase the quality of the research.



Beware of the Nirvana Fallacy

- ◆ Preregistration alone does *not* prevent publication bias.



Beware of the Nirvana Fallacy

- ◆ Preregistration alone does *not* prevent publication bias.
- ◆ However, it is a small step from preregistration to Registered Reports, a format that *does* prevent publication bias.



Beware of the Nirvana Fallacy

- ◆ Preregistration is not the only cure.
- ◆ Preregistration is not meant to stop fraud.
- ◆ Preregistration can be ignored.



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- ◆ Preregistration is not the only cure.
- ◆ Preregistration is not meant to stop fraud.
- ◆ Preregistration can be ignored. This merely underscores its value.



Beware of the Nirvana Fallacy

- ◆ Preregistration does not apply to all research endeavors.
- ◆ Preregistration does not imply that confirmatory research is superior to exploratory research.



Concluding Comments



- ◆ The goal of preregistration is to *inoculate* researchers against the biases that beset *all* human beings.
- ◆ At its core, preregistration is about furthering the core scientific values of transparency and honesty.



Concluding Comments

- ◆ Preregistration does not forbid any particular analysis from being carried out or reported.
- ◆ What it forbids is the presentation of a cherry-picked, data-inspired analysis as if it were pre-planned.



Concluding Comments

- ◆ In medicine, preregistration is a *requirement* for clinical trials.
- ◆ It is encouraging to see the field of psychology promote preregistration as well.

Thanks for Your Attention



Acta Psychologica
Volume 148, May 2014, Pages 188-194



The meaning of “significance” for different types of research [translated and annotated by Eric-Jan Wagenmakers, Denny Borsboom, Josine Verhagen, Rogier Kievit, Marjan Bakker, Angelique Cramer, Dora Matzke, Don Mellenbergh, and Han L. J. van der Maas] ☆

An Agenda for Purely Confirmatory Research

**Eric-Jan Wagenmakers, Ruud Wetzels, Denny Borsboom,
Han L. J. van der Maas, and Rogier A. Kievit**

University of Amsterdam, The Netherlands

Perspectives on Psychological Science
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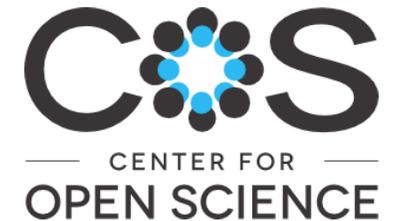
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"Establishing common open science standards for Psychology" panel session at the German Psychological Society Congress, Frankfurt, September 2018
L-R: Mario Gollwitzer, Aljoscha Neubauer, Rose Sokol-Chang, Conny Antoni, Nicola Gale, Daryl O'Connor, Jan Theeuwes & Michael Bosnjak

Preregistration Template for Quantitative Research in Psychology

6 Sections:

- T Title and Title Page
- A Abstract
- I Introduction
- M Method
- AP Analysis Plan
- O Other Information (Optional)



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Multiple Items per Section, e.g.:

- I1 Theoretical Background
- I2 Objectives and Research Question(s)
- I3 Hypothesis (H1, H2, ...)
- I4 Exploratory Research Questions
(if applicable: E1, E2, ...)

... 44 items in total

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2 Sub-sections for Method:

M3-M9	Sampling Procedure and Data Collection
M10-M14	Conditions and Design

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6 Sections:		Multiple Items per Section, e.g.:		2 Sub-sections for Method:	
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A	Abstract	I2	Objectives and Research Question(s)	M10-M14	Conditions and Design
I	Introduction	I3	Hypothesis (H1, H2, ...)		
M	Method	I4	Exploratory Research Questions (if applicable: E1, E2, ...)		
AP	Analysis Plan				
O	Other Information (Optional)		... 44 items in total		

Each item has a description with instructions, e.g.:

I3	Hypothesis (H1, H2, ...)	Provide hypothesis for predicted results. If multiple hypotheses, uniquely number them (e.g. H1, H2a, H2b, ...) and refer to them the same way at other points in the registration document and in the manuscript.
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Preregistration Template for Quantitative Research in Psychology

- Partly taking the APA Style Journal Article Reporting Standards (**JARS**) as reference
- Stressing **flexibility**
 - Not every item relevant for every study
 - Journals, editors, registries, researchers may adjust as needed
 - Template will be made available under CC-BY license
- Promoting the explicit use of **item labels** throughout the template and – optimally – also in later manuscript



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Thank you for attending!

You will receive a link to the recorded webinar later today.

A link to the preregistration template as well as these slides are available on the Resources window on your screen.



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