

Pre-Registration: What & Why

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Grand Valley State University
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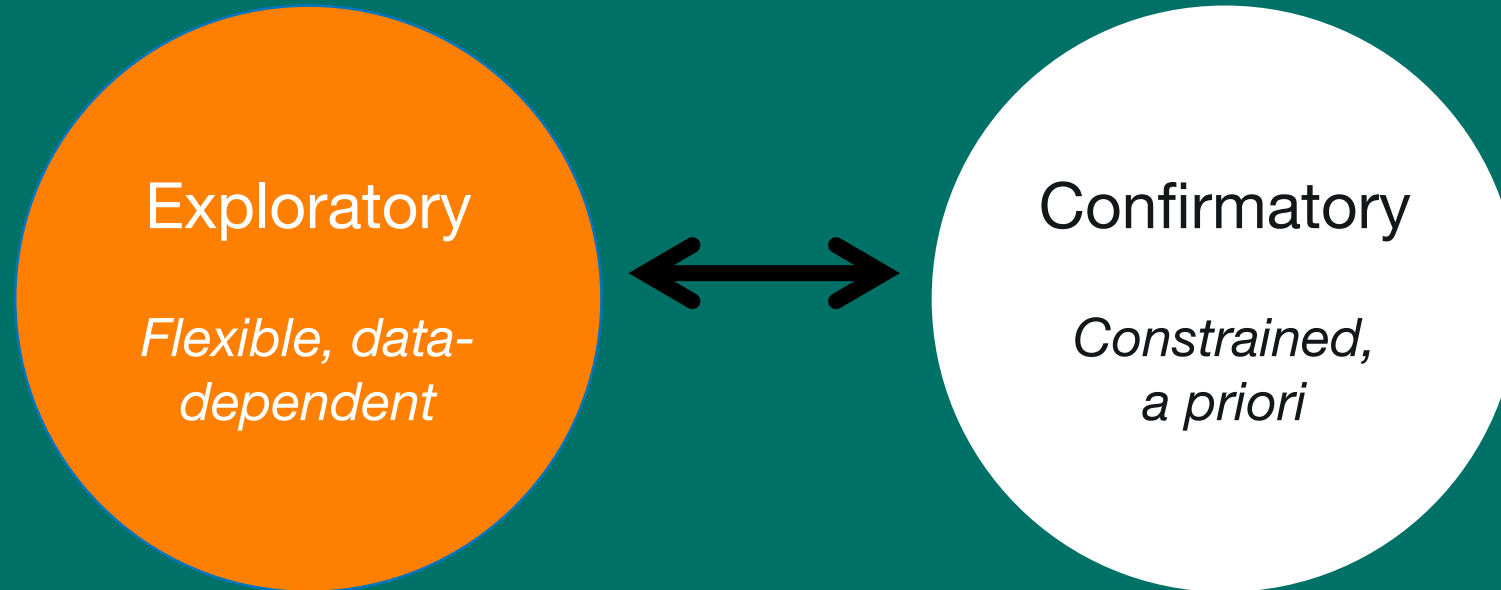
What is Pre-Registration?

commitment to

- study design (and/or)**
- data analysis plan (and/or)**
- study hypotheses**

prior to commencing the study

Pre-Registration



See De Groot (1956):

http://www.ejwagenmakers.com/inpress/DeGroot1956_TA.pdf

van't Veer & Giner-Sorolla (2016): <https://psyarxiv.com/4frms/>

Key Features: Pre-Registration

**Time
stamped**

**Read
only**

**Before the
study**

**In a
repository**

Why Pre-Register? Distinct Goals

**constrain
flexibility,
avoid
overfitting**

**Increase
transparency,
rigor**

**falsify, test
theories**

Decisional Flexibility at Every Stage

Methods

- Stopping rule
- Power planning
- Unique scoring

Analysis

- Subgroups
- Outliers
- Choice of test
- Data cleaning

Reporting

- Focus on $p < .05$
- Selective omission
- Outcome switching



**One Step at
a Time**

**New Habits
Need to
Form**

Options for Pre-Registration

1

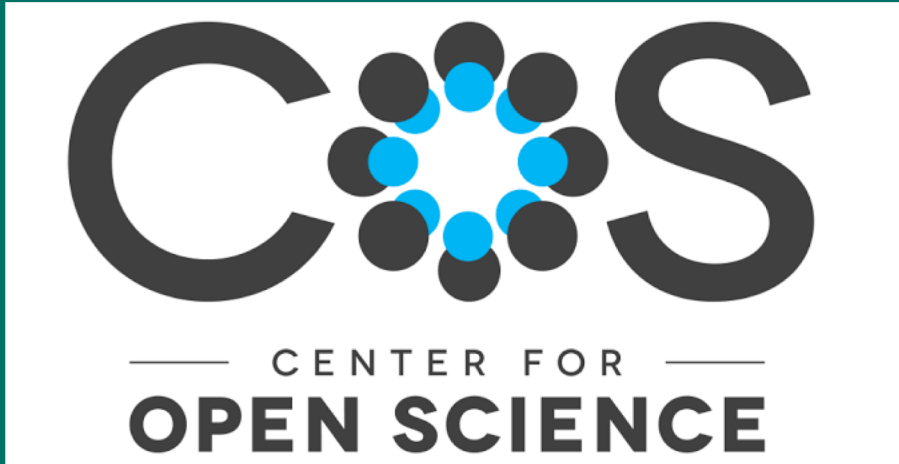
An internal/non-public system

2

Simple templates (aspredicted.org)

3

Full fledged registries



Open Science Framework:

<https://cos.io/prereg/>



Economics:

<https://www.socialscienceregistry.org/>



Poli Sci:

<http://egap.org/content/registration>



Biomedicine:

<https://www.who.int/ictrp/network/en/>

<https://clinicaltrials.gov/>



The Open Science Framework

OSF REGISTRIES Help Donate

Pre-Registered Replication of Study 3: Americans Overestimate Social Class Mobility

Public 0

- Overview
- Files
- Wiki 0
- Components 0
- Links 0
- Analytics
- Comments 0

The Nature of the Effect

Verbal description of the effect I am trying to replicate
(optional)

I am attempting to replicate three effects%3A %0A%0A%281%29 Participants will significantly over-estimate the extent that people can move up%2Fdown the social class hierarchy--relative to other overestimates and to actual data on mobility.%0A%0A%282%29 Participants will provide larger overestimates when those estimates are about people similar to them%2C relative to estimates in general. %0A%0A%283%29 Participants reporting higher scores on subjective social class will provide larger overestimates of this effect than will participants reporting lower scores%2C even after accounting for reported income%2C education%2C age%2C self-rated knowledge about mobility%2C and political ideology.

It is important to replicate this effect because
(optional)

I wrote about the paper for the New York Times%2C so it has been widely publicized. There is likelihood that the effect may be used to inform social and political policies.

The effect size of the effect I am trying to replicate is
(optional)

Contributors

Michael Kraus

Description

This project is a pre-registered replication of the research reported in Study 3 of the 2015 manuscript by Kraus & Tan titled "Americans Overestimate Social Class Mobility."

Registration type

Replication Recipe (Brandt et al., 2013): Pre-Registration

Date registered

June 1, 2015

Date created

June 1, 2015

Registered from

osf.io/pk7wz

Category

Project

Registration DOI

[10.17605/OSF.IO/TBW3N](https://doi.org/10.17605/OSF.IO/TBW3N)

Affiliated institutions

Tips for Successful Pre-Registration

1 Use a template

4 Be specific

2 Peer review pre-study

5 Know how you'll draw a conclusion

3 Plan for power

6 Peer review post-study

Tools for Pre-Registration

Templates

- <https://osf.io/zab38/wiki/home/>

Power Analysis

- *pwr* package in R: <https://cran.r-project.org/web/packages/pwr/vignettes/pwr-vignette.html>
- Power simulation: Lane & Hennes (2018) <https://doi.org/10.1177/0265407517710342>

Basic Pre-Reg Questions

1. Main research question
2. Key variables & their measurement
3. Hypotheses**
4. Conditions & randomization**
5. Sample size & stopping rule
6. Study inclusion criteria
7. Data exclusion criteria
8. Positive controls
9. Analysis plan (code?)
10. Provisions for existing data

<https://osf.io/93znh/>

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Positive Controls

Outcome neutral tests

Verify validity of manipulation or measurement

NOT the study's main outcome

Ambiguous Preregistration Case

*We expect to collect
data from 100
subjects.*

Ambiguities

- Before or after exclusions?
- Individually or in groups?
- What happens if you can't get 100?

Ambiguous Preregistration Case

A two by three mixed ANOVA will be the designated statistical analysis.

Ambiguities

- Which planned comparison tests the hypothesis?
- Any assumption checks before analysis?
- Any follow up tests/ contrasts?



 **Transparency**

 **Rigor/Quality**

 **QRPs/overfitting**

Eight Myths about Pre-Registration

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1 Stifles creativity

2 Mandates guarantee quality

3 Mostly addresses *p*-hacking

4 Solves *p*-hacking

5 Not suitable for exploration

6 Doesn't work for all areas

7 Solves file drawer problem

8 It's easy!

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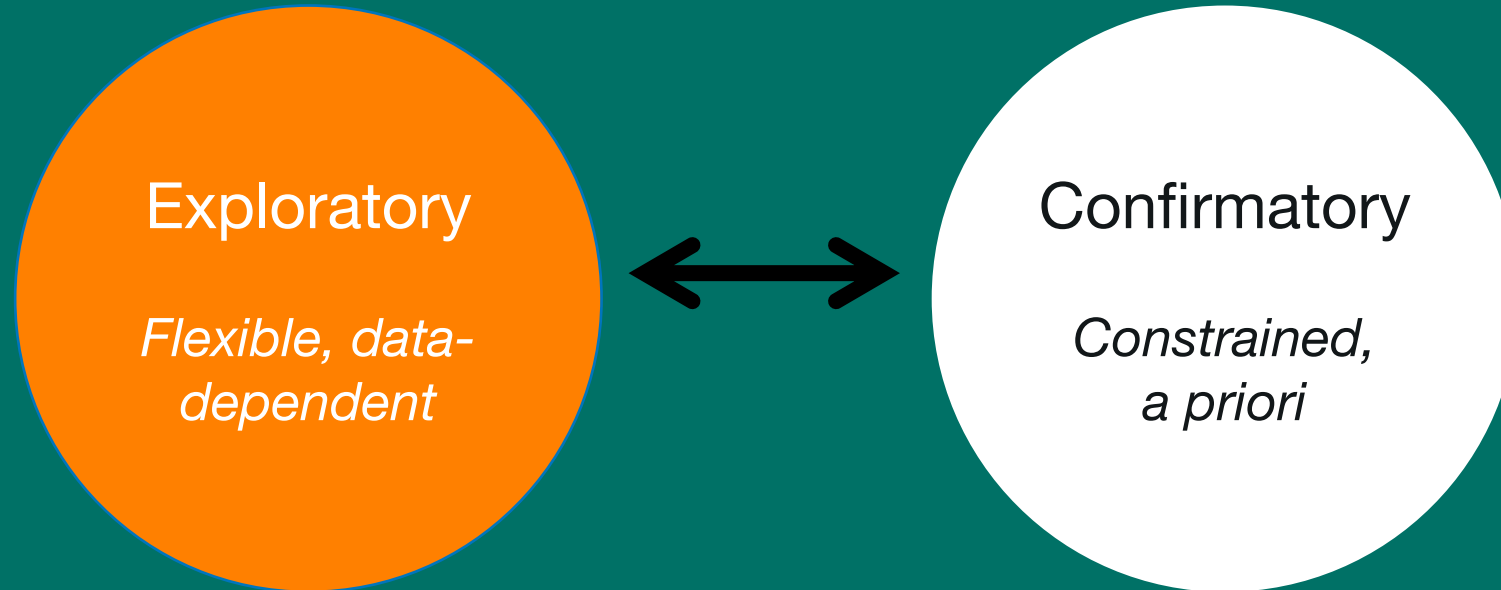
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**Mandates
incentivize.**

**Mandates
signal.**



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Not just about p -hacking

Specifying design and analysis plan ahead of time prevents data dependent decisions later

If hypotheses are specified a priori, also have a chance to falsify

If thorough, also a chance to improve your design, catch problems early

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Doesn't always solve *p*-hacking

Pre-registration prevents

1. *p*-hacking
2. data dependent decisions

ONLY to the extent that the pre-reg
constrains later flexibility

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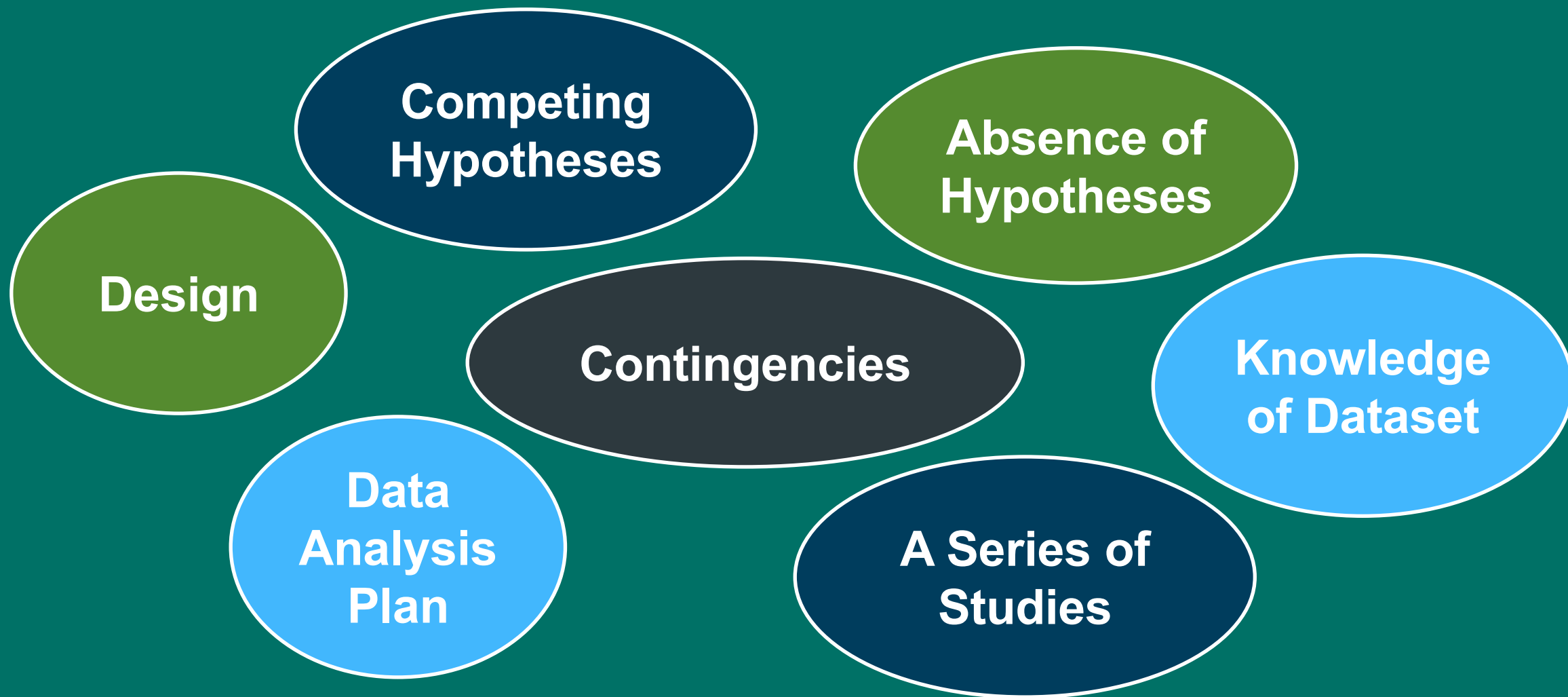
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**Theory-derived
hypotheses are
not required for
pre-registration**

Things You Can Pre-Register



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Pre-reg for everyone? Yes!

Practices will look different in different communities.

Some fields analyze large secondary data sets.

- See [Weston et al.](#) (in press)
- [Template](#)

Open research notebooks: alternative technique; focus on transparency

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Key Terms & Concepts

- **Pre-registration vs. registered report**
- **Registration vs. pre-registration**
 - **clinicaltrials.gov**

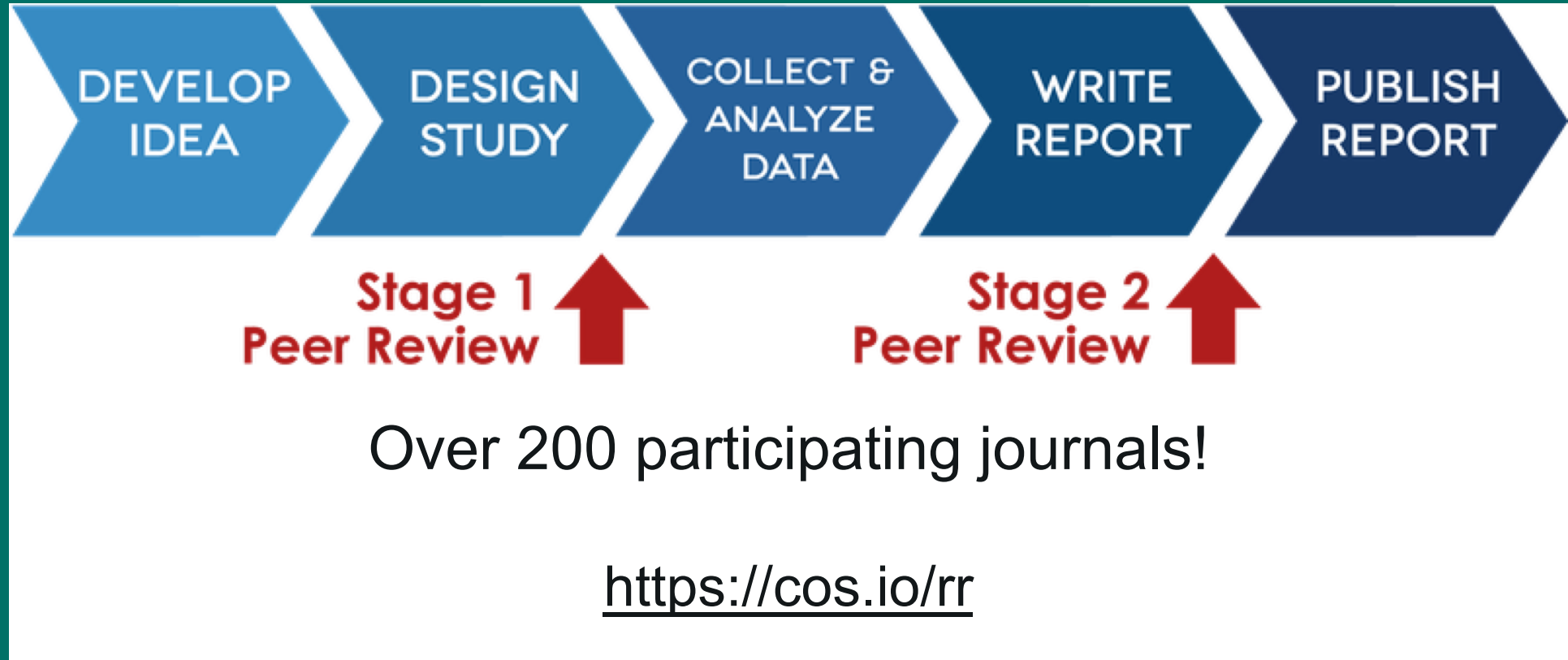
Study Registries vs. Pre-Reg

Study registries track the existence of studies.

If all studies are registered, and all results are reported, file drawer problem is solved.

Pre-reg needs to be public and findable to solve file drawer.

Registered Reports



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**Anyone can pre-
register, but doing
it well is
challenging.**

National Science Foundation: Science Hard

INDIANAPOLIS—The National Science Foundation's annual symposium concluded Monday, with the 1,500 scientists in attendance reaching the consensus that science is hard.

"For centuries, we have embraced the pursuit of scientific knowledge as one of the noblest and worthiest of human endeavors, one leading to the enrichment of mankind both today and for future generations," said keynote speaker and NSF

chairman Louis Farian. "However, a breakthrough discovery is challenging our long-held perceptions about our discipline—the discovery that science is really, really hard."

"My area of expertise is the totally impossible science of particle physics," Farian continued, "but, indeed, this newly

see **SCIENCE** page 10

Right: Farian explains the NSF findings.

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Thank You!

Slides: <https://osf.io/p82tu/>

Email: k.corker@gmail.com



SOCIETY FOR THE
IMPROVEMENT OF
PSYCHOLOGICAL SCIENCE



Center for Open Science
<http://cos.io> | <http://osf.io>
<https://www.psyarxiv.org>

