



# Webinar on increasing openness and reproducibility

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# Today's webinar

## 1. Plan for reproducibility before you start

- Create a study plan
- Set-up a reproducible project
- Preregistration

## 2. Keep track of things

- Version control
- Documentation
- Connect your research services

## 3. Contain bias

- Reporting

## 4. Archive + share your materials

# What is the problem?

## CORRESPONDENCE

### Believe it or not: how much can we rely on published data on potential drug targets?

Florian Prinz, Thomas Schlange and Khusru Asadullah

A recent report by Arowsmith noted that the success rates for new development projects in Phase II trials have fallen from 28% to 18% in recent years, with insufficient efficacy being the most frequent reason for failure (Phase II failures: 2008–2010. *Nature Rev Drug Discov* 10, 328–329 (2011)). This indicates the limitations of the predictivity of disease models and also that the validity of the targets being investigated is frequently questionable, which is a crucial issue to address if success rates in clinical trials are to be improved.

to 'feasible/marketable', and the financial cost of pursuing a full-blown drug discovery a development programme for a particular target could ultimately be hundreds of millions of Euros. Even in the earlier stages, investment in activities such as high-throughput screening programmes are substantial, and thus the validity of published data on potential targets is crucial for companies when deciding to start novel projects.

To mitigate some of the risks of such investments ultimately being wasted, most ph

## Power failure: why small sample size undermines the reliability of neuroscience

Katherine S. Button<sup>1,2</sup>, John P. A. Ioannidis<sup>3</sup>, Claire Mokrysz<sup>1</sup>, Brian A. Nosek<sup>4</sup>, Jonathan Flint<sup>5</sup>, Emma S. J. Robinson<sup>6</sup> and Marcus R. Munafò<sup>1</sup>

**Abstract** | A study with low statistical power has a reduced chance of detecting a true effect, but it is less well appreciated that low power also reduces the likelihood that a statistically significant result reflects a true effect. Here, we show that the average statistical power of studies in the neurosciences is very low. The consequences of this include overestimates of effect size and low reproducibility of results. There are also ethical dimensions to this problem, as unreliable research is inefficient and wasteful. Improving reproducibility in neuroscience is a key priority and requires attention to well-established but often ignored methodological principles.

## LINK TO ORIGINAL ARTICLE

### Essay

## Why Most Published Research Findings Are False

John P.A. Ioannidis

### Summary

There is increasing concern that most current published research findings are false. The probability that a research claim is true may depend on study power and bias, the number of other studies on the same question, and, importantly, the ratio of true to no relationships among the relationships probed in each scientific field. In this framework, a research finding is less likely to be true when the studies conducted in a field are smaller; when effect sizes are smaller; when there is a greater number and lesser presentation of tested relationships; where there is greater flexibility in designs, definitions, outcomes, and analytical modes; when there is greater financial and other interest and prejudice; and when more teams are involved in a scientific field in chase of statistical significance.

factors that influence this problem and some corollaries thereof.

### Modeling the Framework for False Positive Findings

Several methodologists have pointed out [9–11] that the high rate of nonreplication (lack of confirmation) of research discoveries is a consequence of the convenient, yet ill-founded strategy of claiming conclusive research findings solely on the basis of a single study assessed by formal statistical significance, typically for a *p* value less than 0.05. Research is not most appropriately represented and summarized by *p* values, but, unfortunately, there is a widespread notion that medical research articles

### It can be proven that most claimed research findings are false.

should be interpreted based only on *p* values. Research findings are defined here as any relationship reaching formal statistical significance, e.g., effective interventions, informative predictors, risk factors, or associations. "Negative" research is also very useful. "Negative" is actually a misnomer, and the misinterpretation is widespread. However, here we will target relationships that investigators claim exist, rather than null findings. As has been shown previously, the probability that a research finding is indeed true depends on the prior probability of it being true (before doing the study), the statistical power of the study, and the level of statistical significance [10,11]. Consider a  $2 \times 2$  table in which research findings are compared against the gold standard of true relationships in a scientific field. In a research field both true and false hypotheses can be made about the presence of relationships. Let *R* be the ratio of the number of "true relationships" to "no relationships" among those tested in a field. *R*

Open access, freely available online

is characteristic of the field and can vary a lot depending on whether the field targets highly likely relationships or searches for only one or a few true relationships among thousands and millions of hypotheses that may be postulated. Let us also consider, for computational simplicity, circumscribed fields where either there is only one true relationship (among many that can be hypothesized) or the power is similar to find any of the several existing true relationships. The pre-study probability of a relationship being true is  $R/(R+1)$ . The probability of a study finding a true relationship reflects the power  $1 - \beta$  (one minus the Type II error rate). The probability of claiming a relationship when none truly exists reflects the Type I error rate,  $\alpha$ . Assuming that  $\epsilon$  relationships are being probed in the field, the expected values of the  $2 \times 2$  table are given in Table 1. After a research finding has been claimed based on achieving formal statistical significance, the post-study probability that it is true is the positive predictive value, PPV. The PPV is also the complementary probability of what Wacholder et al. have called the false positive report probability [10]. According to the  $2 \times 2$  table, one gets  $PPV = (1 - \beta)R / (R - \beta R + \alpha)$ . A research finding is thus

**Citation** Ioannidis JPA (2005) Why most published research findings are false. *PLoS Med* 2(8):e124.

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**Abbreviations** PPV: positive predictive value

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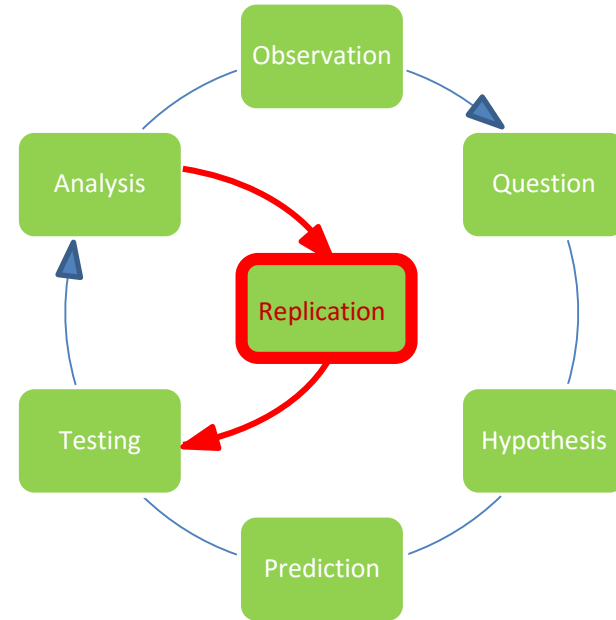
**Competing Interests** The author has declared that no competing interests exist.

DOI: 10.1371/journal.pmed.0020124

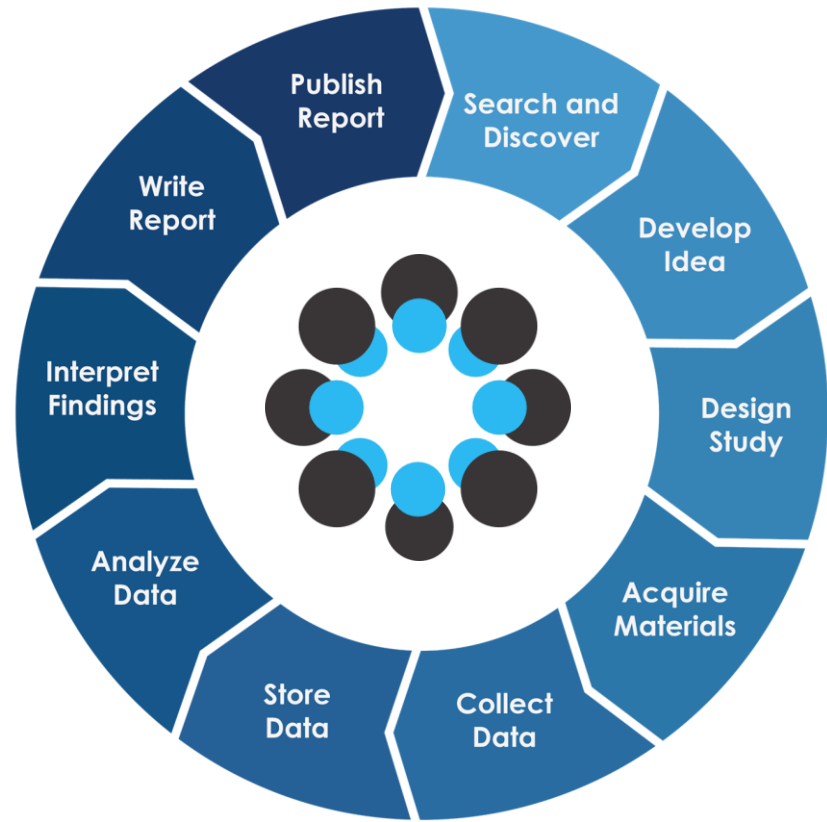
# What is reproducibility?

- Computational reproducibility
- Empirical reproducibility
- Conceptual reproducibility

## Scientific method



# What are the barriers?



# Why practice reproducibility?

## The idealist

- **Shoulders of giants!**
- Validates scientific knowledge
- Allows others to build on your findings
- Improved transparency
- Increased transfer of knowledge
- Increased utility of your data + methods

## The pragmatist

- Increased efficiency
- Reduces false leads based on irreproducible findings
- Data sharing citation advantage (Piwowar 2013)
- “It takes some effort to organize your research to be reproducible... the **principal beneficiary is generally the author herself.**” - Schwab & Claerbout

# Today's webinar

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## 2. Keep track of things

- Version control
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## 3. Contain bias

- Reporting

## 4. Archive + share your materials

# 1. Plan for reproducibility before you start

## Create a study plan

- **Create a study plan** before you gather your data
- Begin documentation early
- Shows evolution of study

## How?

- Research questions + hypotheses
- Study design
  - Type of design
  - Sampling
  - Power and sample size
  - Randomization?
- Variables measured
  - Meaningful effect size
- Variables constructed
  - Data processing
- Data management
- Analyses
- Sharing



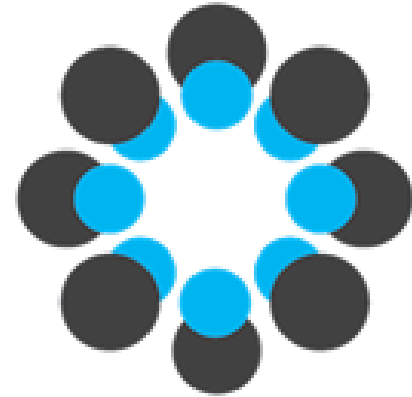
# 1. Plan for reproducibility before you start

## Set-up a reproducible project

- **Set-up a centralized location for project management**
- Organization is especially important for collaboration
- Easily find the most recent file version
- Eases transition between lab members
- Allows for back-up and version control

How?

<https://osf.io/>





GitHub



# Simplified scientific collaboration

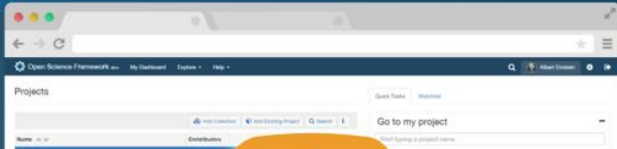
Powerful end-to-end support for your research.



FREE. GET STARTED TODAY.

Full Name

Contact Email



<http://osf.io>

free, open source

# 1. Set-up a reproducible project

The screenshot displays the OSF interface for a project named "Demo Project". At the top, a navigation bar includes tabs for "Demo Project", "Files", "Wiki", "Analytics", "Registrations", "Forks", "Contributors", and "Settings". To the right of the title are buttons for "Private", "Make Public", a plus icon, "0" views, "0" forks, and a chat icon.

**Demo Project**  
Contributors: [Courtney Soderberg](#)  
Date created: 2015-12-10 10:08 AM | Last Updated: 2015-12-10 10:08 AM  
Category: Project   
Description: A project created to learn how to use the OSF.  
License: No license

**Wiki**   
No wiki content

**Files**   
Search   
Name   
Project: Demo Project   
- OSF Storage

**Citation**   
osf.io/pg563

**Components**   
Add Component Add Links   
No components have been added to this project.

**Tags**   
add a tag

**Recent activity**   
All times displayed at -0500 UTC offset.   
2015-12-10 10:08 AM [Courtney Soderberg](#) created [Demo Project](#)



<https://osf.io/wx7ck/>

# Persistent Citable Identifiers

**Citation:** osf.io

**APA**

Klein, R. A., Ratliff, K., et al. "Investigating Variation in Replicability: A "Many Labs" Replication Project." Open Science Framework (2014). [osf.io/wx7ck](https://osf.io/wx7ck/)

**MLA**

Klein, R. A., Ratliff, K., et al. "Investigating Variation in Replicability: A "Many Labs" Replication Project." Open Science Framework (2014). [osf.io/wx7ck](https://osf.io/wx7ck/)

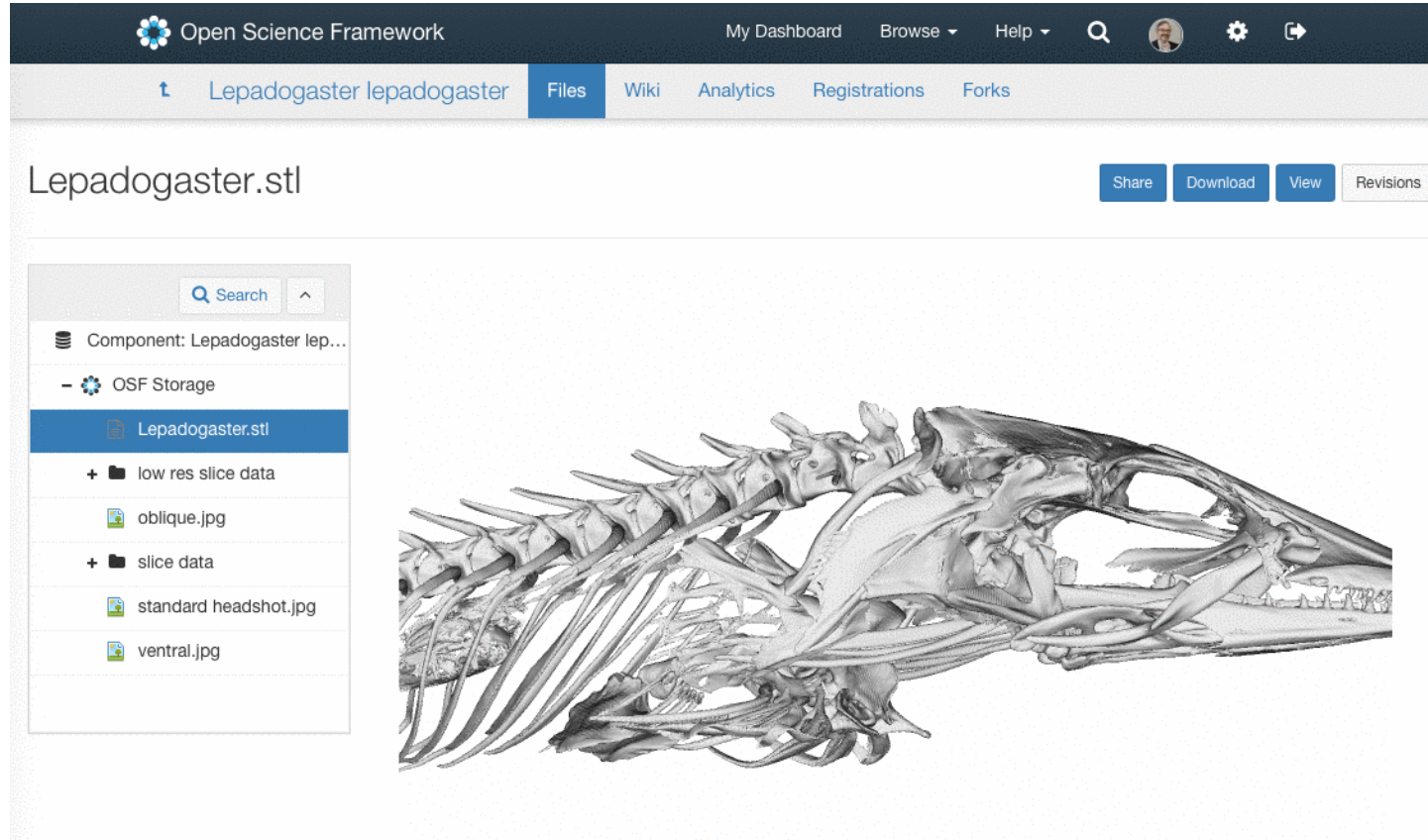
**Chicago**

Klein, R. A., Ratliff, K. A., Vianello, M., Adams, R. B., Bahník, , Bernstein, M. J., Bocian, K., et al. "Investigating Variation in Replicability: A "Many Labs" Replication Project." Open Science Framework (2014). [osf.io/wx7ck](https://osf.io/wx7ck/)

M. J., Bocian, "Many Labs" Replication

M. J., Bocian, "Many Labs" Replication

# 1. Put data, materials, and code on the OSF



The image shows a screenshot of the Open Science Framework (OSF) interface. At the top, the navigation bar includes the OSF logo and the text "Open Science Framework". To the right of the logo are links for "My Dashboard", "Browse", "Help", a search icon, a user profile icon, a settings gear icon, and a share icon. Below the navigation bar is a secondary menu with tabs for "Lepadogaster lepadogaster", "Files", "Wiki", "Analytics", "Registrations", and "Forks". The "Files" tab is currently selected.

The main content area displays the file name "Lepadogaster.stl" in a large font. To the right of the file name are four buttons: "Share", "Download", "View", and "Revisions".

On the left side of the main content area, there is a sidebar with a search bar and a list of files and folders. The list includes:

- Component: Lepadogaster lep...
- OSF Storage
  - Lepadogaster.stl (highlighted)
  - low res slice data
  - oblique.jpg
  - slice data
    - standard headshot.jpg
    - ventral.jpg

The main content area features a large 3D rendering of a lepadogaster skull, showing the complex structure of the jaw and the surrounding bone structure.

# 1. Giving contributors access

Demo Project

Files

Wiki

Analytics

Registrations

Forks

Contributors

Settings

Filter by name

Contributors

+ Add

Drag and drop contributors to change listing order.

Permissions ?

Administrator

Read + Write

Read

Bibliographic Contributor ?

Bibliographic

Non-Bibliographic

Name

Permissions ?

Bibliographic Contributor ?



Courtney Soderberg

Administrator



Remove

View-only Links

+ Add

Create a link to share this project so those who have the link can view—but not edit—the project.

# 1. Creating a wiki

The screenshot displays a web-based wiki interface. At the top, a navigation bar includes 'Demo Project', 'Files', 'Wiki' (highlighted), 'Analytics', 'Registrations', 'Forks', 'Contributors', and 'Settings'. Below this, a 'Home' link is visible. The main content area is divided into three panels:

- Left Panel:** A sidebar with a '+ New' button and a list of 'Project Wiki Pages'. The 'Home' page is selected and highlighted in blue.
- Middle Panel:** A 'View' window showing the rendered content of the page. It features two sections: 'Research Question' with the text 'The purpose of this project is to explore what factors are associated with people's beliefs that they can influence government policy.' and 'Hypothesis' with the text 'This research is exploratory, so we have no a priori hypotheses.'
- Right Panel:** An 'Edit' window in 'Live editing mode'. It includes a rich text editor toolbar with icons for bold, italic, link, unlink, list, and table. The text in the editor is formatted with double asterisks: '\*\*Research Question\*\*' and '\*\*Hypothesis\*\*'. The text for the hypothesis is partially visible: 'This research is exploratory, so we have no a priori hypotheses.' At the bottom of the edit window are 'Revert' and 'Save' buttons.



# 1. Adding organizational structure - components

Add component ×

---

Data

Data

Add contributors from **Demo Project**

# How can you make your research reproducible?

## 1. Plan for reproducibility before you start

- Create a study plan
- Set-up a reproducible project
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## 2. Keep track of things

- Version control
- Documentation
- Connect your research services

## 3. Contain bias

- Reporting

## 4. Archive + share your materials

# 1. Plan for reproducibility before you start

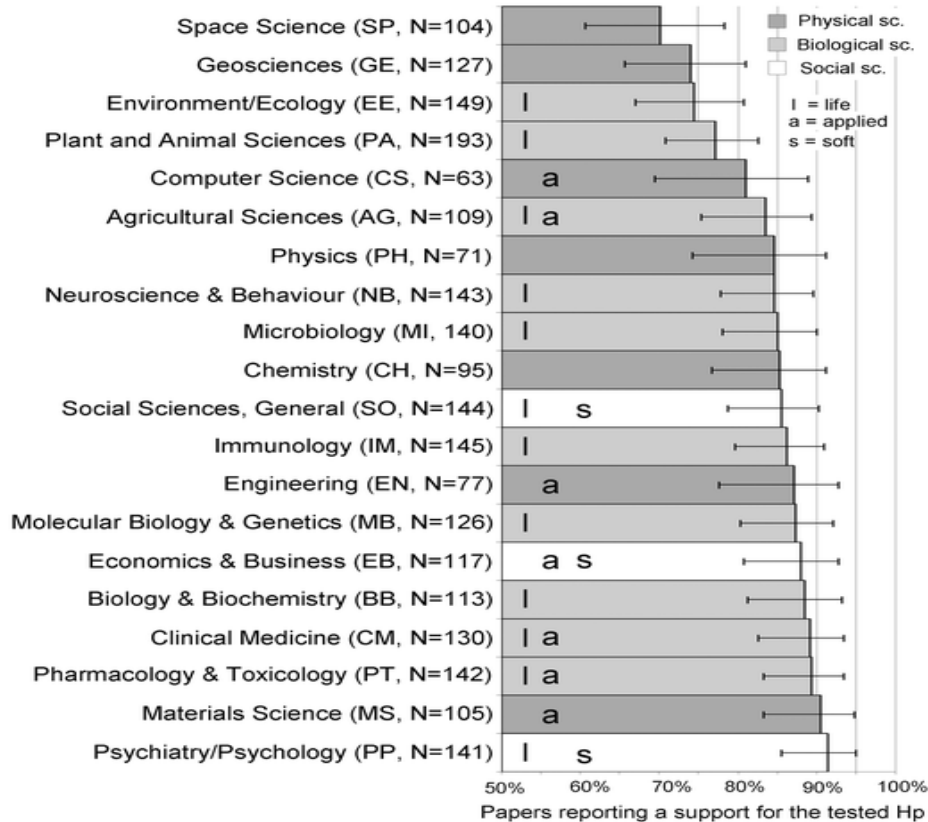
## Preregister your study plan

- **Preregister your study plan** before you look at your data
- Distinguishes *a priori* design decisions from *post hoc*
- Counters selective reporting and outcome reporting bias
- Preregistration of all study plans helps counter publication bias

## Preregister your analysis plan

- **Preregister your analysis plan** before you look at your data
- Defines your confirmatory analyses
- Decreases researcher degrees of freedom

# Publication bias



# Researcher degrees of freedom

**Table 1.** Likelihood of Obtaining a False-Positive Result

Researcher degrees of freedom	Significance level		
	$p < .1$	$p < .05$	$p < .01$
Situation A: two dependent variables ( $r = .50$ )	17.8%	9.5%	2.2%
Situation B: addition of 10 more observations per cell	14.5%	7.7%	1.6%
Situation C: controlling for gender or interaction of gender with treatment	21.6%	11.7%	2.7%
Situation D: dropping (or not dropping) one of three conditions	23.2%	12.6%	2.8%
Combine Situations A and B	26.0%	14.4%	3.3%
Combine Situations A, B, and C	50.9%	30.9%	8.4%
Combine Situations A, B, C, and D	81.5%	60.7%	21.5%

# 1. How to preregister

Open Science Framework

My Dashboard Browse Help Q April Clyburne-Sherin

An island at risk: geographic epidemiolo... Files Wiki Analytics Registrations Forks Contributors Settings

Registrations

There have been no completed registrations of this project. For a list of the most viewed and most recent public registrations on the Open Science Framework, click [here](#). You can start a new registration by clicking the "New registration" button, and you have the option of saving as a draft registration before submission.

New registration



<https://osf.io/wx7ck/>



<https://osf.io/c97pd/>

Register

# Pregistration

after registration. Please be sure the project is complete and comprehensive for what you wish to register.

**Type "register" if you are sure you want to continue**

# How can you make your research reproducible?

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# 2. Keep track of things

## Version control

- **Track your changes**
- Everything created manually should use version control
- Tracks changes to files, code, metadata
- Allows you to revert to old versions
- Make incremental changes: commit early, commit often
- Git / GitHub / BitBucket

## Version control for data

- Metadata should be version controlled

# 2. Version control

The screenshot shows a web-based version control interface for a file named "analyses.R". At the top, there is a navigation bar with tabs for "Data", "Files", "Wiki", "Analytics", "Registrations", "Forks", "Contributors", and "Settings". Below the navigation bar, the file name "analyses.R" is displayed on the left, and on the right, there are buttons for "Delete", "Check out", "Download", "Toggle view: View Edit", and "Revisions".

The main content area is divided into three sections:

- Left sidebar:** A file browser showing the project structure. It includes a search bar, a "Component: Data" header, and a list of files: "OSF Storage", "Analysis Scripts", "analyses.R" (highlighted), "clean\_data.csv", "Data Dictionary.docx", and "raw\_data.csv". Below this is a "Tags" section with a text input field containing "add a tag".
- Center:** A code editor showing the current content of "analyses.R":

```
data <- as.data.frame(read.csv("../osf-cur-materials/raw_data.csv", header = T))
cor(data[,c(7, 8, 9, 11, 13, 4)])
```
- Right:** An "Edit" view of the file, labeled "Live editing mode". It shows the same code as the center, with a "Revert" button and a "Save" button at the bottom.

# 2. Version control

Materials Files Wiki Analytics Registrations Forks Contributors Settings

Questionnaire.docx

Delete Check out Download View Revisions

Search

Component: Materials

OSF Storage

Questionnaire.docx

Revisions

Version ID	Date	User	Download	MD5	SHA2
2	2015-12-11 02:54 PM	Courtney Soderberg	0	6965c573505b9c7503	68bdf73db9cad44fac8
1	2015-12-11 02:50 PM	Courtney Soderberg	1	29cc1757b39a98bda6	978b127c88306cd1ca

Tags

add a tag

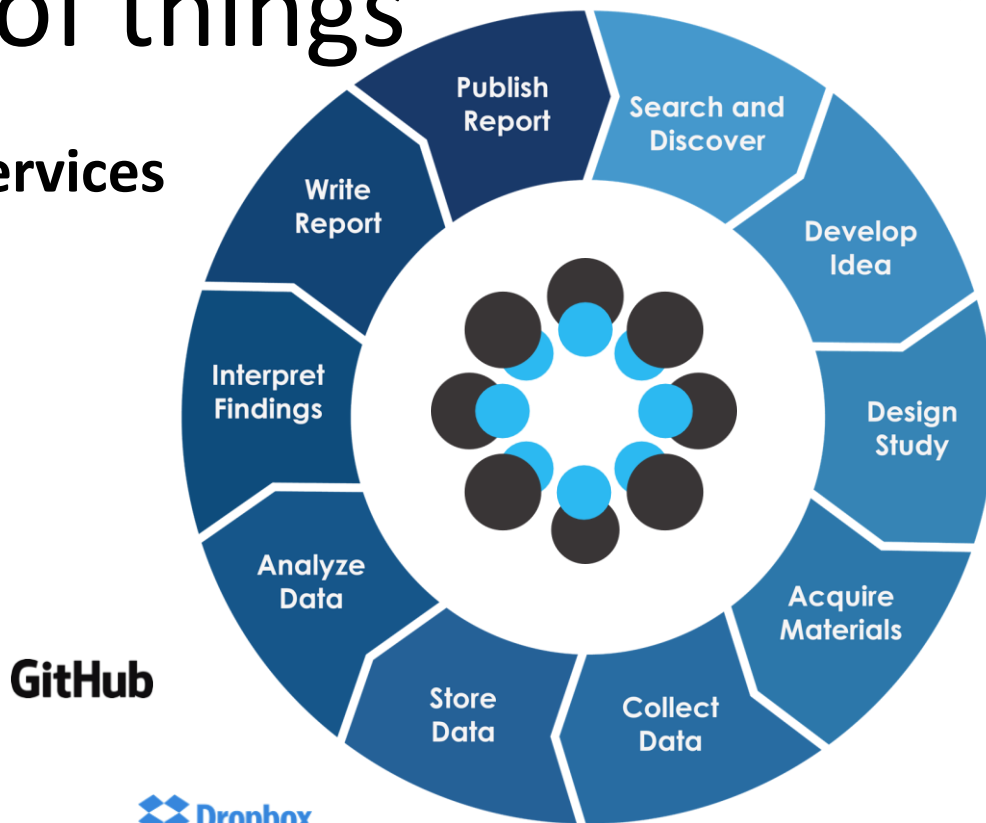
# 2. Keep track of things

## Documentation

- **Document everything done by hand**
- Document your software environment (eg, dependencies, libraries, `sessionInfo ()` in R)
- Everything done by hand or not automated from data and code should be precisely documented:
  - README files
- Make raw data read only
  - You won't edit it by accident
  - Forces you to document or code data processing
- Document in code comments

# 2. Keep track of things

Connect your research services



GitHub



Name

Component: Demo Add-Ons

GitHub: AndrewSallans/demofiles master d2e68a6246

ExamplePythonNotebook.ipynb

ExampleImage.jpg

ExampleCSV.csv

ExampleImage.png

Connects Services  
Researchers Use

Dropbox: /demofiles

ExampleImage.jpg

ExampleImage.png


ExamplePDF.pdf

ExamplePython.py

ExampleSPSS.sav

Name


📁 Component: Demo Add-Ons

📁  GitHub: AndrewSallans/demofiles master d2e68a6246


📄 ExamplePythonNotebook.ipynb

 ExampleImage.jpg


📄 ExampleCSV.csv

 ExampleImage.png

📄 ExampleSPSS.sav


 ExamplePython.py


 ExampleSpreadsheet.xlsx


 ExamplePDF.pdf

📄 ExampleR.r

 ExampleWordDocument.docx


⊕  Amazon Simple Storage Service: osfdemofiles

⊕  FigShare: demofiles:892

📁  Dropbox: /demofiles

 ExampleImage.jpg

 ExampleImage.png

 ExamplePDF.pdf

 ExamplePython.py

📄 ExampleSPSS.sav

# 3. Contain bias

## Reporting

- **Report transparently + completely**
- Transparently means:
  - Readers can use the findings
  - Replication is possible
  - Users are not misled
  - Findings can be pooled in meta-analyses
- Completely means:
  - All results are reported, no matter their direction or statistical significance

## How?

- **Use reporting guidelines**
- Avoid HARKing:  
Hypothesizing After the Results are Known
- Report all deviations from your study plan
- Report which decisions were made after looking at the data



# 4. Archive + share your materials

## Share your materials

- **Where doesn't matter. That you share matters.**
- Get credit for your code, your data, your methods
- Increase the impact of your research



Private

Make Public

👁 0

↻ 0

Component

# Merges Public-Private Workflows

🔒 Material

Axt, Nosek &

🔒 Analysis

Axt, Nosek &

🔒 Procedure

Axt, Nosek & Ebersole

4 contributions

Private

Make Public



0



0

## Components

Add Component

Add Links

### Materials

Axt, Nosek & Ebersole

 4 contributions

### Analysis Plan

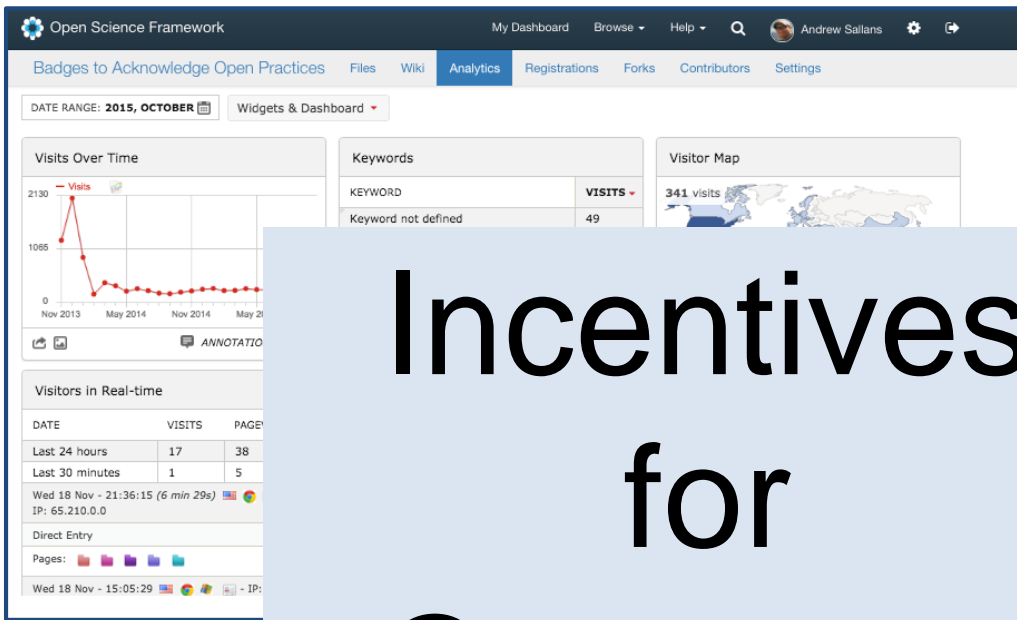
Axt, Nosek & Ebersole

 4 contributions

### Procedure

Axt, Nosek & Ebersole

 4 contributions



# Incentives for Openness

Andrew Sallans

Search

Downloads

	274	
	114	
	130	
	173	
	11	
	94	
0 kB	57	
kB	62	
4 kB	54	
kB	74	
data_small_color.tif	598.7 kB	55
data_small_gray.png	1.4 kB	49
data_small_gray.tif	598.0 kB	52
materials_large_color.png	3.6 kB	65

Open Science Framework

My Dashboard Browse Help Andrew Sallans

Badges to Acknowledge Open Practices Files Wiki **Analytics** Registrations Forks Contributors Settings

DATE RANGE: 2015, OCTOBER Widgets & Dashboard

### Visits Over Time

Annotations: 24

### Visitors in Real-time

DATE	VISITS	PAGEVIEWS
Last 24 hours	17	38
Last 30 minutes	1	5
Wed 18 Nov - 21:36:15 (6 min 29s)		
IP: 65.210.0.0		
Direct Entry		
Pages: [Icons]		
Wed 18 Nov - 15:05:29 [Icons] - IP:		

### Keywords

KEYWORD	VISITS
Keyword not defined	49
open science badges	1

1-2 of 2

### Referrer Websites

WEBSITE	VISITS
www.psychologicalscience.org	52
cos.io	36
openresearchbadges.org	15
pss.sagepub.com	8
htmlpreview.github.io	4
t.co	4
ees.elsevier.com	3
www.elsevier.com	3

### Visitor Map

341 visits

### Visits by Server Time

Contributors Settings

Search

	Size	Downloads
	42.1 kB	274
	38.0 kB	114
	46.8 kB	130
	47.8 kB	173
	19.9 kB	11
	3.1 kB	94
	676.0 kB	57
	3.0 kB	62
	672.4 kB	54
	1.4 kB	74
	598.7 kB	55
	1.4 kB	49
	598.0 kB	52
	3.6 kB	65

data\_large\_color.png  
data\_large\_color.tif  
data\_large\_gray.png  
data\_large\_gray.tif  
data\_small\_color.png  
data\_small\_color.tif  
data\_small\_gray.png  
data\_small\_gray.tif  
materials\_large\_color.png

**File downloads**

# How can you make your research reproducible?

## 1. Plan for reproducibility before you start

- Create a study plan – **Begin documentation at study inception**
- Set-up a reproducible project – **Centralize and organize your project management**
- Registration – **Preregister your study + analysis plan**

## 2. Keep track of things

- Version control – **Track your changes**
- Documentation – **Document everything done by hand**
- Connect your research services – **Track all your materials in one place**

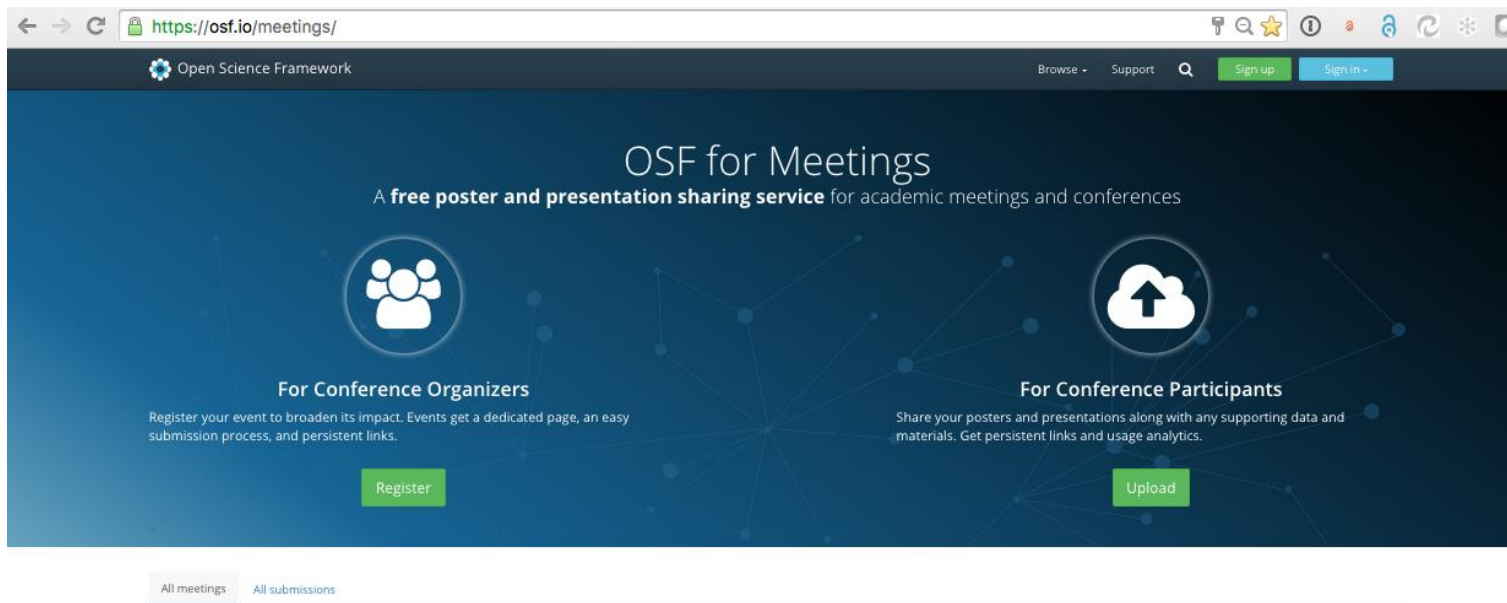
## 3. Contain bias

- Reporting – **Report transparently + completely**

## 4. Archive + share your materials

- Where doesn't matter. **That you share matters.**

# OSF for Meetings



The screenshot shows the homepage of the OSF for Meetings website. The browser address bar displays <https://osf.io/meetings/>. The page features a dark blue background with a network diagram of white dots and lines. At the top, the text reads "OSF for Meetings" and "A free poster and presentation sharing service for academic meetings and conferences". Below this, there are two main sections: "For Conference Organizers" with a "Register" button and "For Conference Participants" with an "Upload" button. The navigation bar includes "Open Science Framework", "Browse", "Support", "Sign up", and "Sign in". At the bottom, there are links for "All meetings" and "All submissions".

Open Science Framework

Browse Support Sign up Sign in

## OSF for Meetings

A free poster and presentation sharing service for academic meetings and conferences

**For Conference Organizers**  
Register your event to broaden its impact. Events get a dedicated page, an easy submission process, and persistent links.  
[Register](#)

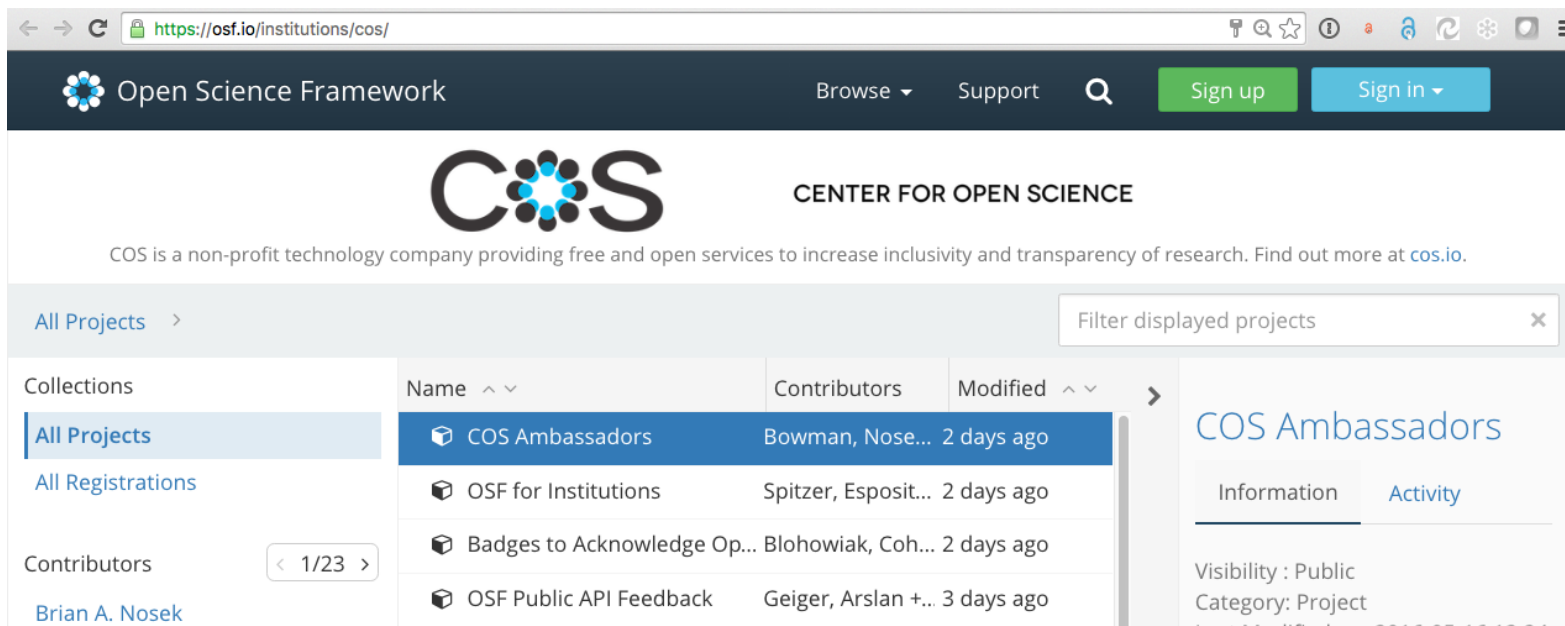
**For Conference Participants**  
Share your posters and presentations along with any supporting data and materials. Get persistent links and usage analytics.  
[Upload](#)

[All meetings](#) [All submissions](#)

<https://osf.io/meetings/>

free poster + presentation service

# OSF for Institutions

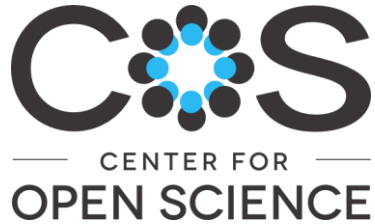


The screenshot shows the OSF website for institutions. The header includes the OSF logo and navigation links for 'Browse', 'Support', 'Sign up', and 'Sign in'. The main content area features the COS logo and the text 'CENTER FOR OPEN SCIENCE'. Below this, a search bar is present, and a table lists various projects. The table has columns for 'Name', 'Contributors', and 'Modified'. The first row is highlighted in blue.

Collections	Name	Contributors	Modified
All Projects	COS Ambassadors	Bowman, Nose...	2 days ago
All Registrations	OSF for Institutions	Spitzer, Esposit...	2 days ago
Contributors	Badges to Acknowledge Op...	Blohowiak, Coh...	2 days ago
Brian A. Nosek	OSF Public API Feedback	Geiger, Arslan +...	3 days ago

<https://osf.io/institutions/usc/>  
integration with local services





Technology to *enable* change

**Training to *enact* change**

Incentives to *embrace* change

# Stats + methods training

## Statistical & Methodological Consulting

Scientists can improve the replicability of their own work through careful documentation, adherence to standards, and the use of open tools. We answer questions and provide training on open and reproducible tools, methodologies, and workflows. Some examples:

- ✓Using R
- ✓Conducting power analyses
- ✓Using the OSF
- ✓Learning Github
- ✓Conducting meta-analyses
- ✓Preregistering analysis plans

This service is provided in partnership with the [Berkeley Initiative for Transparency in the Social Sciences \(BITSS\)](#)



Request a Consultation



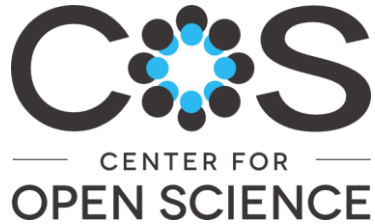
Request a Workshop



Receive Updates  
on our Services

[http://cos.io/stats\\_consulting](http://cos.io/stats_consulting)

free stats + methods training



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# Transparency and Openness Promotion (TOP) Guidelines

1. Data citation
2. Design transparency
3. Research materials transparency
4. Data transparency
5. Analytic methods (code) transparency
6. Preregistration of studies
7. Preregistration of analysis plans
8. Replication

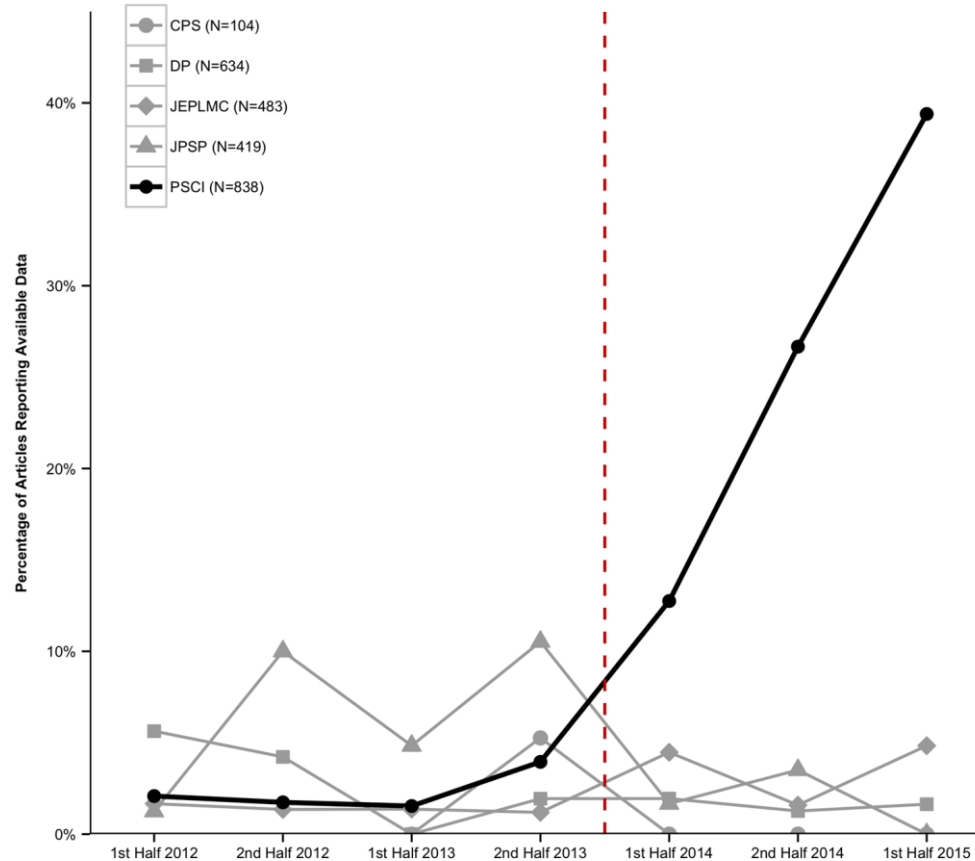
<http://cos.io/top>

guidance on open policies

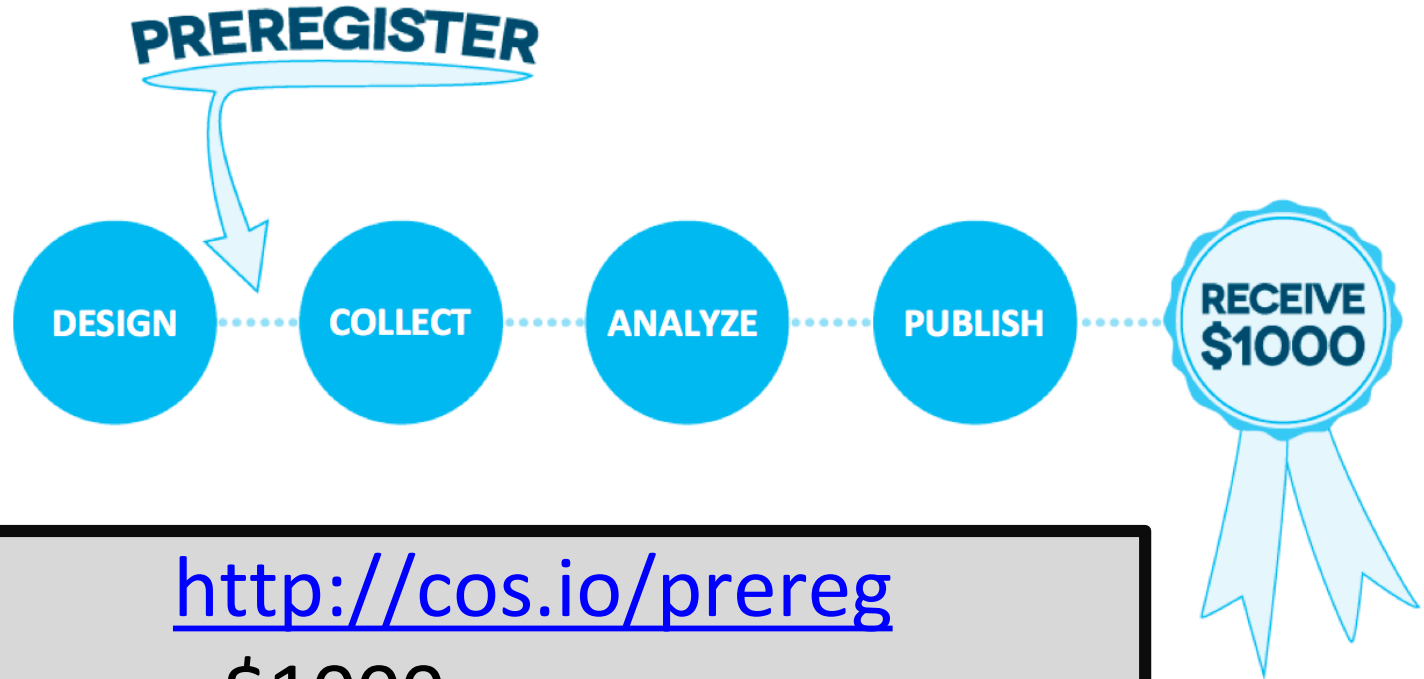
# Badges: making behaviors visible promotes adoption



# Case Study: Psychological Science



# The Preregistration Challenge



<http://cos.io/prereg>

\$1000 per prereg

# The \$1,000,000 Preregistration Challenge

## The Big Picture

[The Challenge](#)[How to Earn the Prize](#)[Eligibility Criteria](#)[FAQ](#)[Eligible Journals](#)[Review Process](#)[Begin a Preregistration](#)

Preregistration increases the credibility of hypothesis testing by confirming in advance what will be analyzed and reported. For the Preregistration Challenge, one thousand researchers will win \$1,000 each for publishing results of preregistered research.

Share [this handout](#) for a brief overview and links to more information, and [begin your preregistration today!](#)

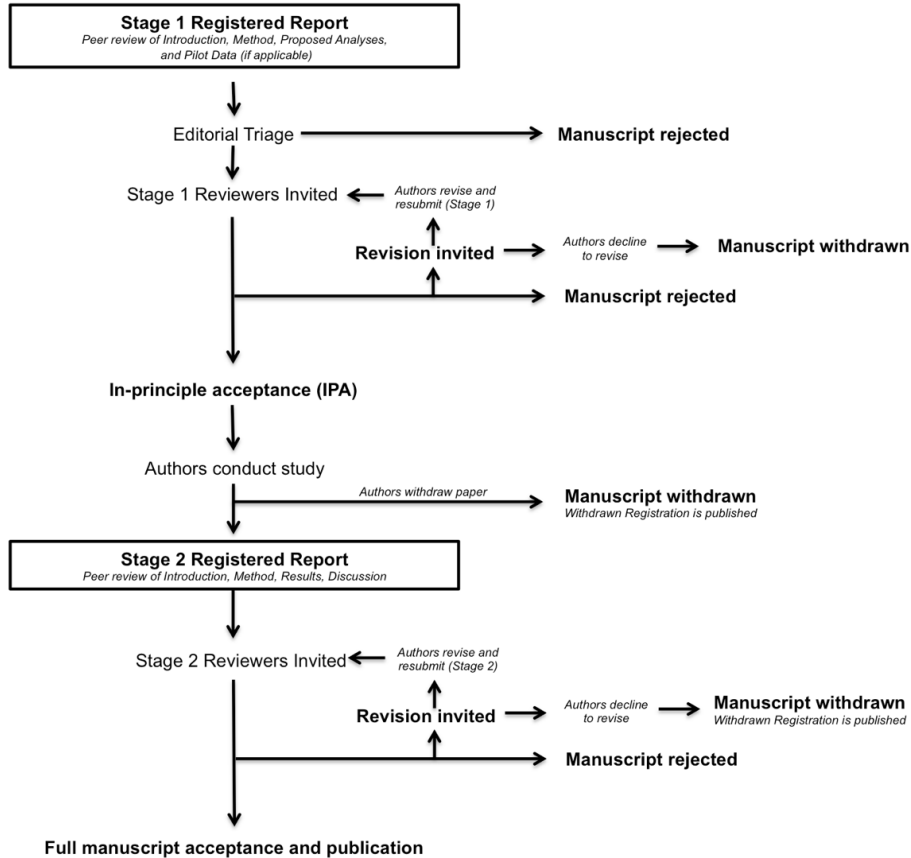


<http://cos.io/prereg>

\$1000 per prereg



# Registered Reports



# Registered Reports

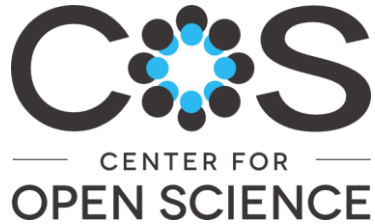


*Neuroscience*



eLIFE

<http://osf.io/8mpji>  
list of journals with RRs



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Reproducible Research Practices

[stats-consulting@cos.io](mailto:stats-consulting@cos.io)

OSF

[support@osf.io](mailto:support@osf.io)

Feedback for how we could support you more

[contact@cos.io](mailto:contact@cos.io)

[feedback@cos.io](mailto:feedback@cos.io)