Open Science

in Eco/Evo

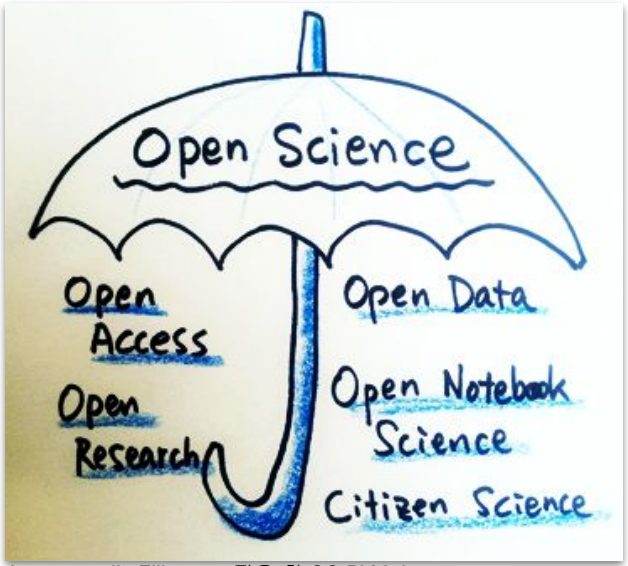


Image credit: Flikr user 지우 황 CC BY 2.0

Ultimate goal:

Improving Openness, Integrity and Reproducibility of Scientific Research

What are the problems?

- Studies lacking rigor
- Outcomes that are never shared
- Results that are not *reproducible*

What are the problems?

BIOLOGICAL REVIEWS
Cambridge Philosophical Society
Biol. Rev. (2013), **88**, pp. 511–536.
doi: 10.1111/brv.12013

What do we really know about the signalling role of plumage colour in blue tits? A case study of impediments to progress in evolutionary biology

Timothy H. Parker*
Department of Biology, Whitman College, Walla Walla, WA 99362, USA

Table 2. Tallies of sufficiently and insufficiently reported statistical effects from papers ($N = 48$) testing sexual selection hypotheses related to plumage colour in blue tits

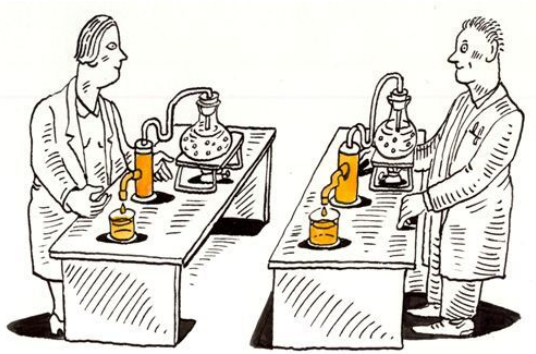
Category	Total effects reported (including interactions)	Total main effects reported (excluding interactions)	Number of main effects reported sufficiently (including effect size, sign, and sample size)	Proportion of effects reported insufficiently
All categories	1192	997	588	0.41
Age	111	76	40	0.47
Aggression	77	71	69	0.03
Mate choice	254	222	130	0.41
Quality	382	324	172	0.47
Sex	172	155	105	0.32
Offspring sex ratio	86	55	20	0.64

i.e. impossible to incl. in meta-analysis

Different reasons for those problems:

- ➔ Methodological, statistical, and reporting practices that are not always crystal clear
- ➔ Structural and organisational practices that result in unavailable, lost, or difficult to use data, code, and materials
- ➔ Rarely, intentional cases of scientific misconduct

Reproducibility?



Research findings become credible and useful if they are reproducible

→ The results are reliable, and others can independently obtain the same evidence
→ Knowledge accumulation facilitated when others can reuse or extend credible ideas and findings

Computational, Methods and Results Reproducibility

Open research in eco/evo?

EDITOR'S CHOICE

Data-Intensive Ecological Research Is Catalyzed by Open Science and Team Science

Kendra Spence Cheruvelil, Patricia A Soranno

BioScience, Volume 68, Issue 10, October 2018, Pages 813–822, https://doi.org/10.1093/biosci/biy097

Published: 12 September 2018

Psychology's replication crisis inspires ecologists to push for more reliable research

By Cathleen O'Grady | Dec. 9, 2020 , 2:05 PM

Perspective | Published: 17 February 2020

Open Science principles for accelerating trait-based science across the Tree of Life

Rachael V. Gallagher, Daniel S. Falster, [...] Brian J. Enquist

Nature Ecology & Evolution **4**, 294–303(2020) | Cite this article

OPENTRAITS

SPI-Birds

Review | Open Access | Published: 01 July 2015

Building a multi-scaled geospatial temporal ecology database from disparate data sources: fostering open science and data reuse

Patricia A. Soranno, Edward G. Bissell, Kendra S. Cheruvelil, Samuel T. Christel, Sarah M. Collins, C. Emi Fergus, Christopher T. Filstrup, Jean-Francois Lapierre, Noah R. Lottig, Samantha K. Oliver, Caren E. Scott, Nicole J. Smith, Scott Stopyak, Shuai Yuan, Mary Tate Bremigan, John A. Downing, Corinna Gries, Emily N. Henry, Nick K. Skaff, Emily H. Stanley, Craig A. Stow, Pang-Ning Tan, Tyler Wagner & Katherine E. Webster

GigaScience **4**, Article number: 28 (2015) | Cite this article

ECOLOGICAL APPLICATIONS
ECOLOGICAL SOCIETY OF AMERICA

Article | Open Access

Open science, reproducibility, and transparency in ecology

Stephen M. Powers, Stephanie E. Hampton

First published: 25 October 2018 | https://doi.org/10.1002/eap.1822 | Citations: 22

How can you start doing open research?

Pre/Register* your study (when adequate)

→ separates hypothesis-generating (exploratory) from **hypothesis-testing** (confirmatory) research (both are important, but the same data cannot be used to generate and test a hypothesis)

→ a means of addressing publication bias in academic journals

→ an opportunity to get feedback at an earlier stage


Journal of Applied Ecology
BRITISH ECOLOGICAL SOCIETY

COMMENTARY | Open Access

Exploratory and confirmatory research in the open science era

Erlend B. Nilsen, Diana E. Bowler, John D. C. Linnell

First published: 09 February 2020 | https://doi.org/10.1111/1365-2664.13571 | Citations: 2

*publishing format used by over 250 journals

How can you start doing open research?

Share Data, Materials or Code (when allowed)

→ allows others to benefit from and build on your work, and facilitates replication

figshare

Open Science Framework

GitHub / GitLab

The Dataverse Project

CODE OCEAN BETA

DRYAD

re3data.org
REGISTRY OF RESEARCH DATA REPOSITORIES

git rmarkdown

Cf. Olivier Gimenez

How can you start doing open research?

Share a Paper or a Preprint

→ accelerates scholarly communication, feedback that can improve the work, and discoverability of finished research

+ may help stand against the ‘positive results only’ bias

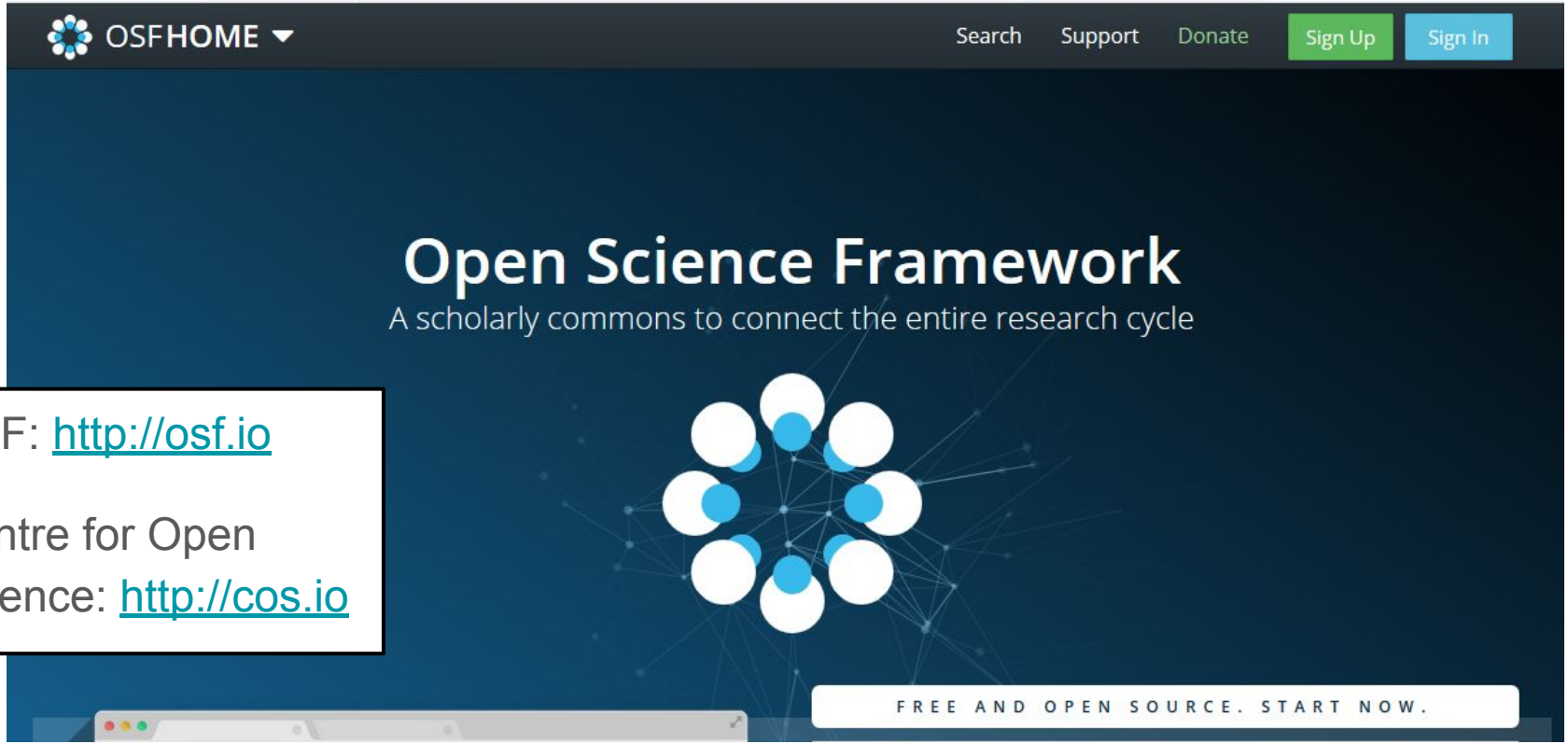
arXiv.org

EcoEvoRxiv bioRxiv

PUBPEER
The online Journal club

PREreview

And in practice?



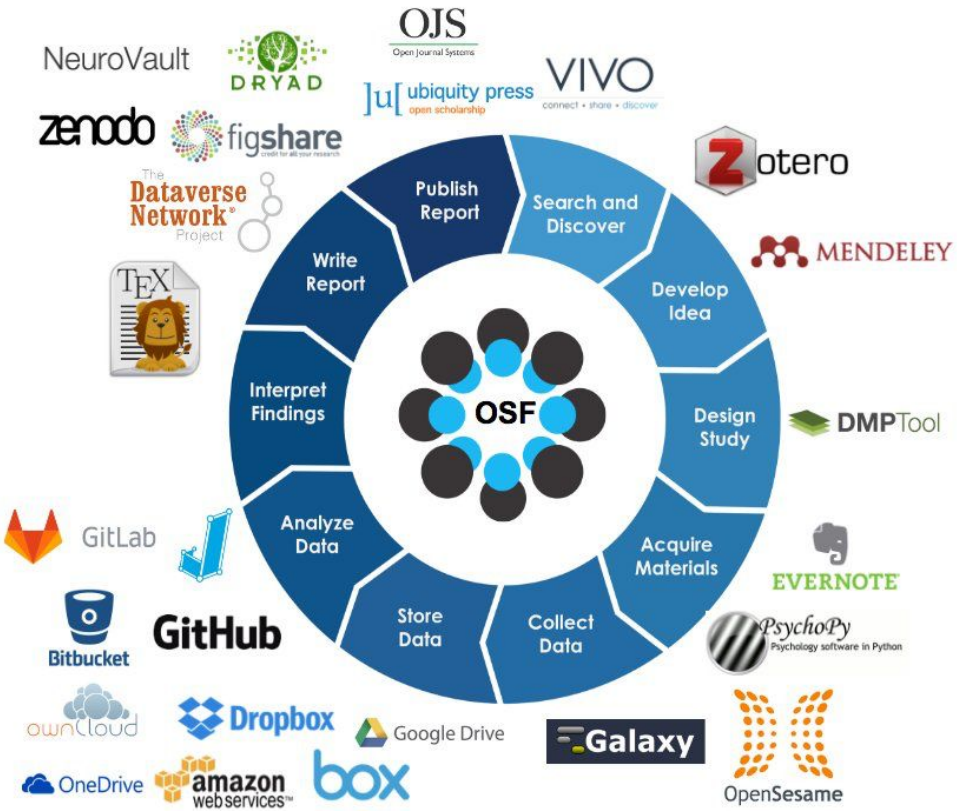
OSF: http://osf.io

Centre for Open Science: http://cos.io

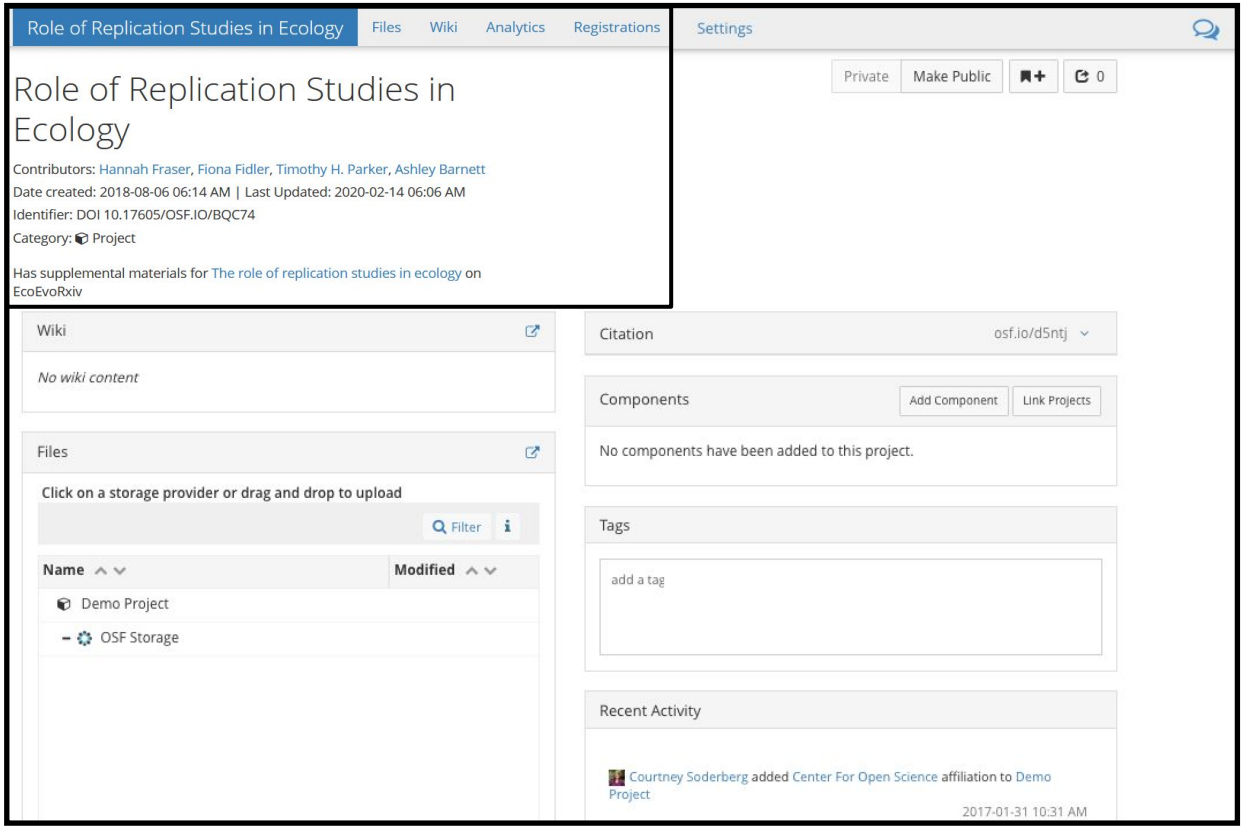
What is OSF?

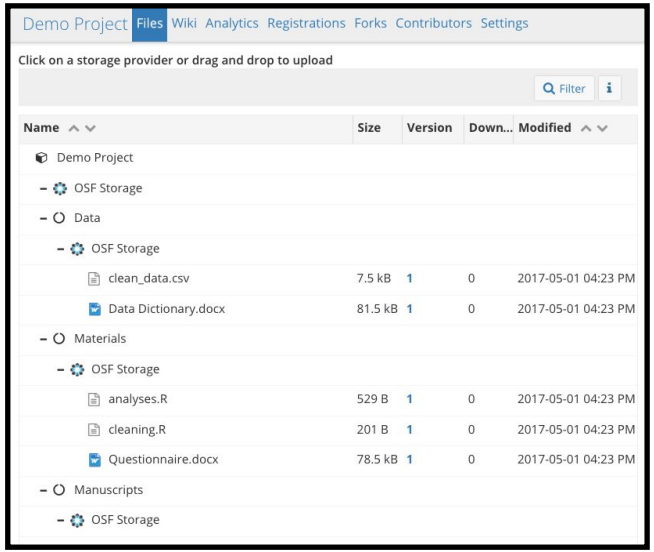

Research Hub
Project Management Tool
Notifier
Archive
Registry
EcoEvoRxiv
Collaboration Tool
Discovery Platform

OSF: Tools


NeuroVault
DRYAD
OJS
Open Journal Systems
ubiquity press
open scholarship
VIVO
connect • share • discover
zenodo
figshare
Zotero
The Dataverse Network Project
MENDELEY
TEX
Publish Report
Search and Discover
Develop Idea
Design Study
Acquire Materials
Collect Data
Store Data
Analyze Data
Interpret Findings
Write Report
OSF
DMPTool
GitLab
EVERNOTE
Bitbucket
GitHub
PsychoPy
Psychology software in Python
ownCloud
Dropbox
Google Drive
Galaxy
OneDrive
amazon web services
box
OpenSesame

Demo project





Tim Parker

SORTEE

Society for Open, Reliable, and Transparent Ecology and Evolutionary Biology

SIPS SOCIETY FOR THE IMPROVEMENT OF PSYCHOLOGICAL SCIENCE

Very active twitter account @sortecoevo

- Journal club, Open Science Tools Ressources and Blog section Network and Discussion

Join for free!

IN DEPTH | RESEARCH INTEGRITY

Ecologists push for more reliable research

Cathleen O'Grady

+ See all authors and affiliations

Science 11 Dec 2020:
Vol. 370, Issue 6522, pp. 1260-1261
DOI: 10.1126/science.370.6522.1260

https://www.sortee.org/join/

Any thoughts?

Open science as THE solution?

Isn't it a risky bet?

Will that really make any change?

Could we imagine another alternative?

Other useful resources

THINK CHECK SUBMIT

thinkchecksubmit.org

statcheck

SHERPA/RoMEO

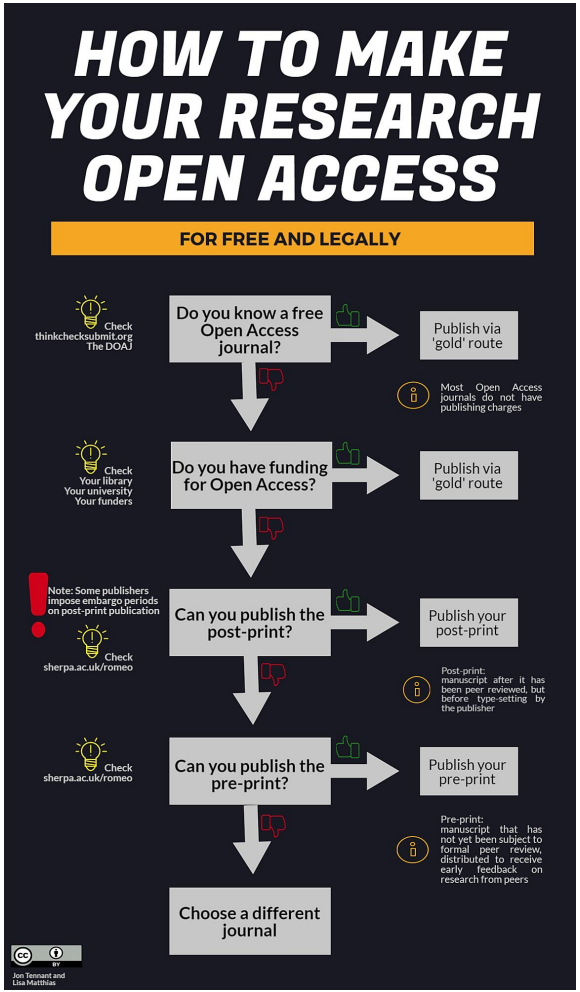
Publisher copyright policies & self-archiving

sherpa.ac.uk/romeo

Retraction Watch

Tracking retractions as a window into the scientific process

https://retractionwatch.com/



Registered Reports