



Open Notebook Science

Open and Reproducible Methodology

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Outline

Science 1.0

Science 2.0

Pros and cons of pre-registration

Implementation of pre-registration

Summary and Discussion



Science 1.0

Science 1.0: The classical research approach

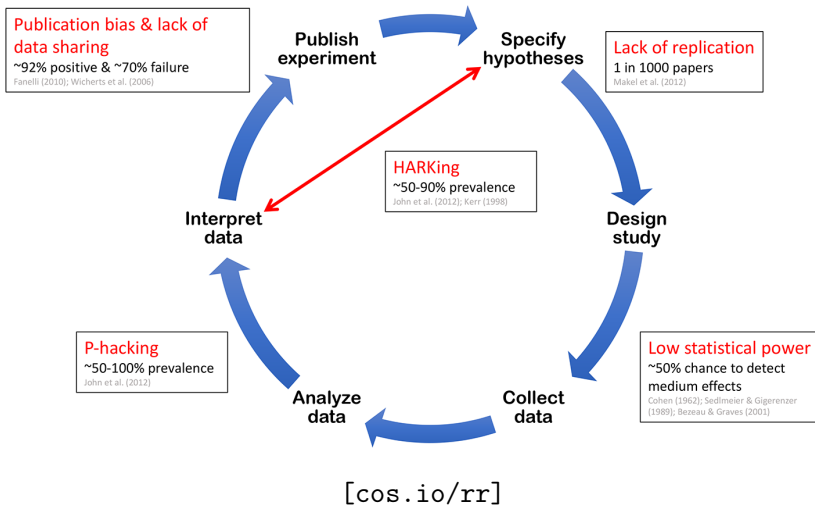
- ▶ Closed research workflow with insider information:
 - ▶ Planning
 - ▶ Data collection
 - ▶ Data analysis
 - ▶ Publication

→ 1 stage review process



[adapted from osf.io/rr/]

The scientific workflow and where it can fail



Science 2.0

Science 2.0: Open (Notebook) Science

► Continuous publication at all stages of scientific work:

- ✓ Planning (pre-registered)
- 👤 Data collection (crowdsourcing/citizen science)
- 🔧 Data analysis (Open Software, Open Notebooks)
- 🔓 Publication (Open Access)

→ Transparency

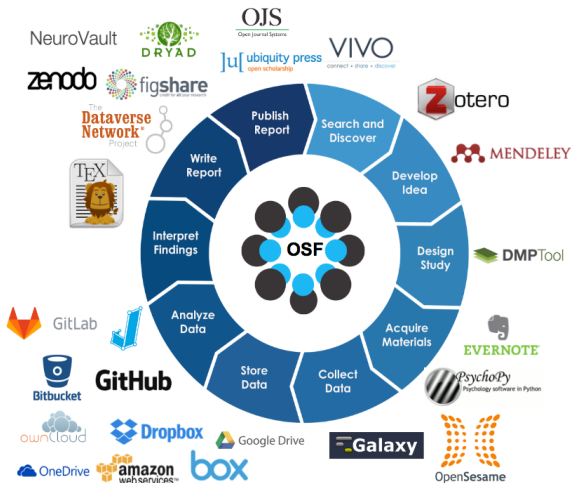


→ Registered Reports at osf.io/rr/

In one sentence:


Make your lab book publicly available! (E.g. at labfolder.mpg.de)

Open Science in a (bigger) picture



Open Science Framework [osf.io]




An example of fully applied Open Science



OPEN SOURCE MALARIA

Looking for New Medicines

Also Check Out

-  [Lab Notebook](#)
-  [Project Wiki](#)
-  [Molecule Database](#)
Chroms Only

Catch us on the Daily Show?

If you're here to see more about the **Breaking Good** project, as featured on the Daily Show


[Click here!](#)


The Open Source Malaria project is trying a different approach to curing malaria. Guided by open source principles, everything is open and anyone can contribute.


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[Synthetic Chemistry Needed](#)

Photochemical possibilities

2 Feb 2018 at 18:42  5 Comments

I found this webpage that details a few interesting photochemical reactions for anybody who is interested in applying this type of chemistry to the OpenSourceMalaria project <http://www.hepatocem.com/sci-update/photoredox-box-setup/> The catalyst used: <https://www.sigmaaldrich.com/catalog/product>

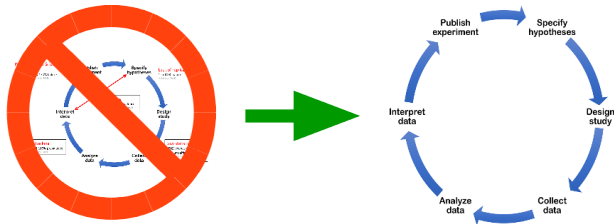
[Read More](#)

[OpenSourceMalaria.org]

Pros and cons of pre-registration

Pros of pre-registration (I/II)

- ▶ Widely used for clinical trials (Good Clinical Practice) due to
 - ▶ Ethical reasons and
 - ▶ Conservation of resources
- ▶ Source of inspiration and information (e.g. concepts, methods)
- ▶ Enhancement of reproducibility, statistical power, and credibility
- ▶ Less p-hacking, HARKing, and publication bias



⇒ Improvement of research quality (Good Scientific Practice)

Pros of pre-registration (II/II)

- ▶ Certification of (experimental/analysis) protocols
 - ▶ Pre-registration already publishable or afterwards partly preferentially published (see APS)
 - ▶ Growing number of participating journals (currently 107)
e.g.: Cortex, Journal of Cognition etc. → check at cos.io/rr
- ⇒ Improvement of research transparency (public impression)



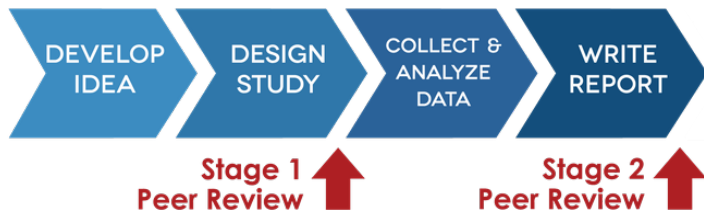
Possible drawbacks, criticism and obstacles

- ▶ Might not be suitable for purely empirical approaches
- ▶ Investment of time and brain power right at the beginning (which will be needed some day anyway)
- ▶ Risk of ideas getting copied (well, if it's a good one... ;-)
- ▶ Possibly problematic if patents are planned as outcome (first-to-file vs. first-to-invent systems)
- ▶ Possible exclusion from peer reviewed publications
- ▶ Classical reputation system still relies on publication of results

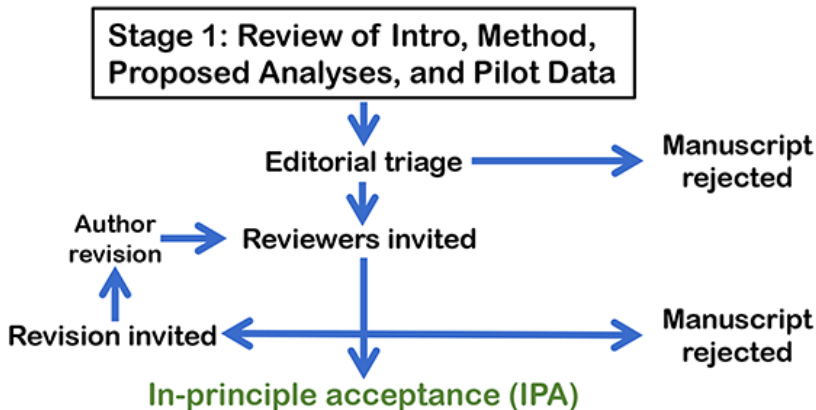
Implementation of pre-registration

Principles of pre-registration

- ▶ Research plan public and transparent (from implementation to evaluation) **before** data collection (time stamped and locked)
- ▶ Still some freedom for experimental implementation
- ▶ Addition of exploratory analyses and lucky findings
- ▶ Changes during the evaluation has to be justified

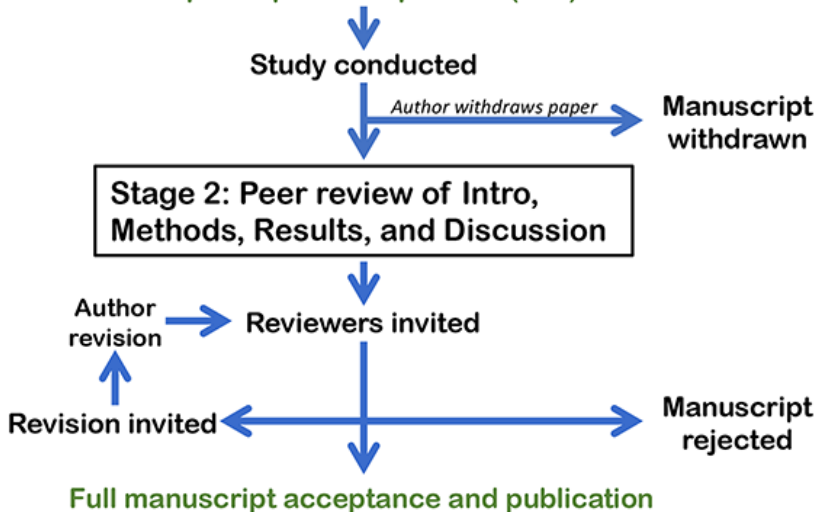


Registered Report Workflow (I/II)



Registered Report Workflow (II/II)

In-principle acceptance (IPA)



How to pre-register

- ▶ CBS Imaging Meeting, Mondays 2 p.m., Lecture Hall
- ▶ Example to go through: osf.io/5z8rx
- ▶ 10 questions manual: osf.io/93znh
- ▶ Alternative to OSF: AsPredicted.org

Summary and Discussion

How can/will we benefit/use?

- ▶ Pre-register in order to publish certified research plans and maybe win a \$ 1,000 prize at the



cos.io/prereg

- ▶ Help ourselves having a clear (i.e. transparent) research plan
- ▶ Get ideas for future studies
- ▶ Which study will be prepared next? By whom and when? (Monocular blindness, ...)



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LEIPZIG

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Thank **you** for your attention!

