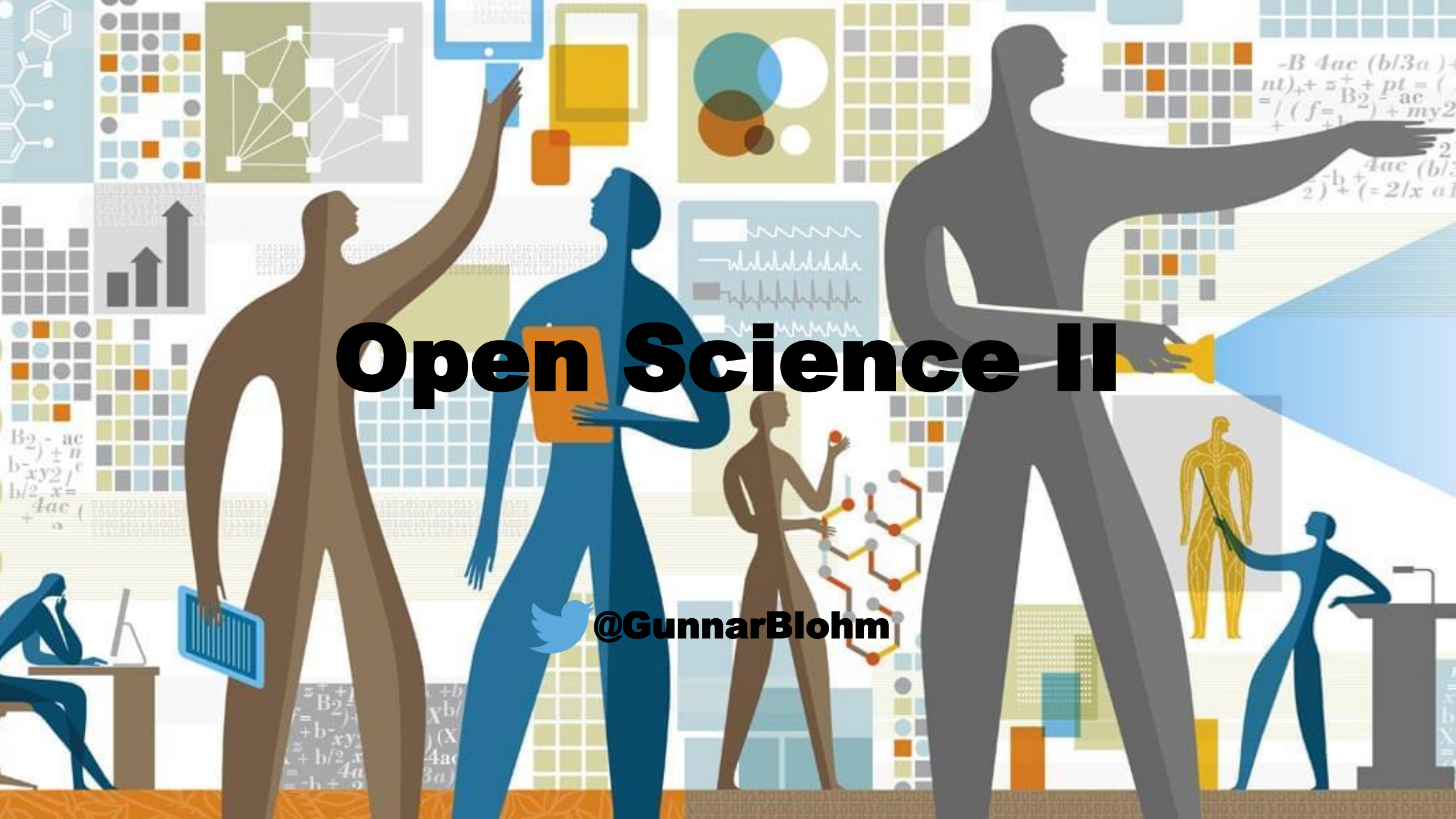
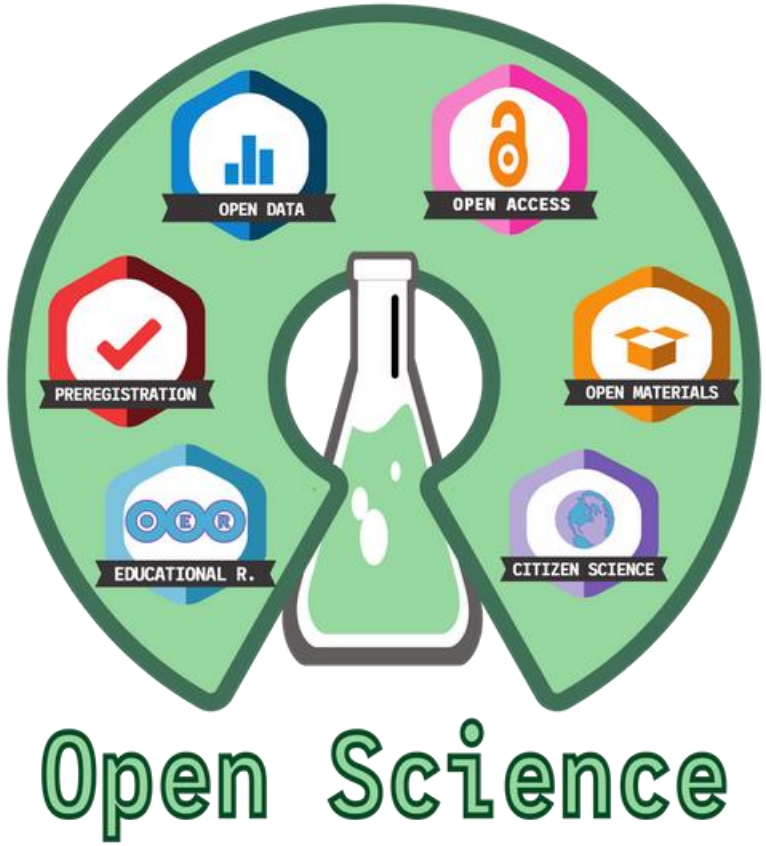

Open Science II
@GunnarBlohm

Outline

- Pre-registration / registered reports
- Publishing
  - Data
  - lab notes
  - Models
  - Analyses
  - …
- Predatory journals
- Plagiarism, honesty, transparency

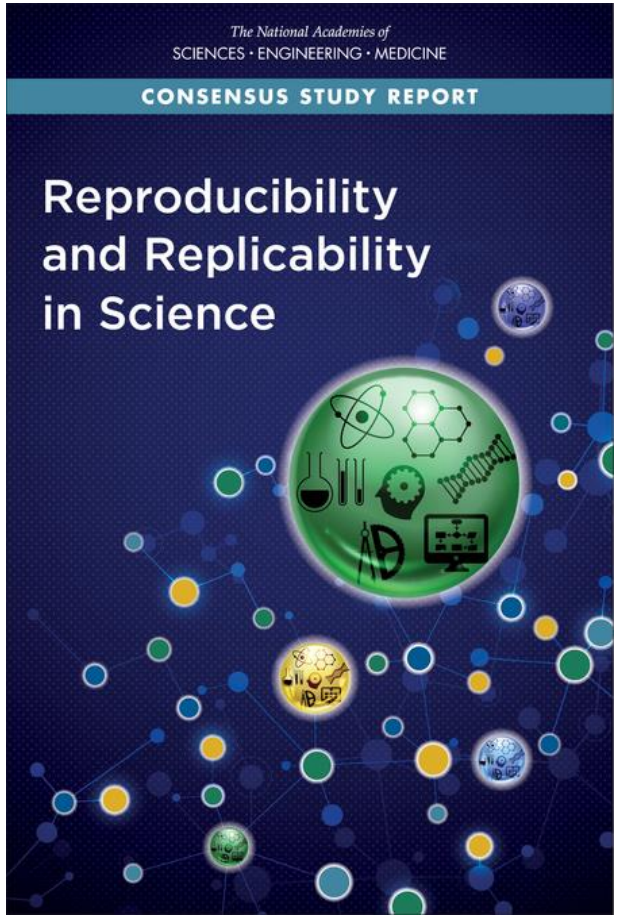


Transparency

https://youtu.be/i60wwZDA1CI

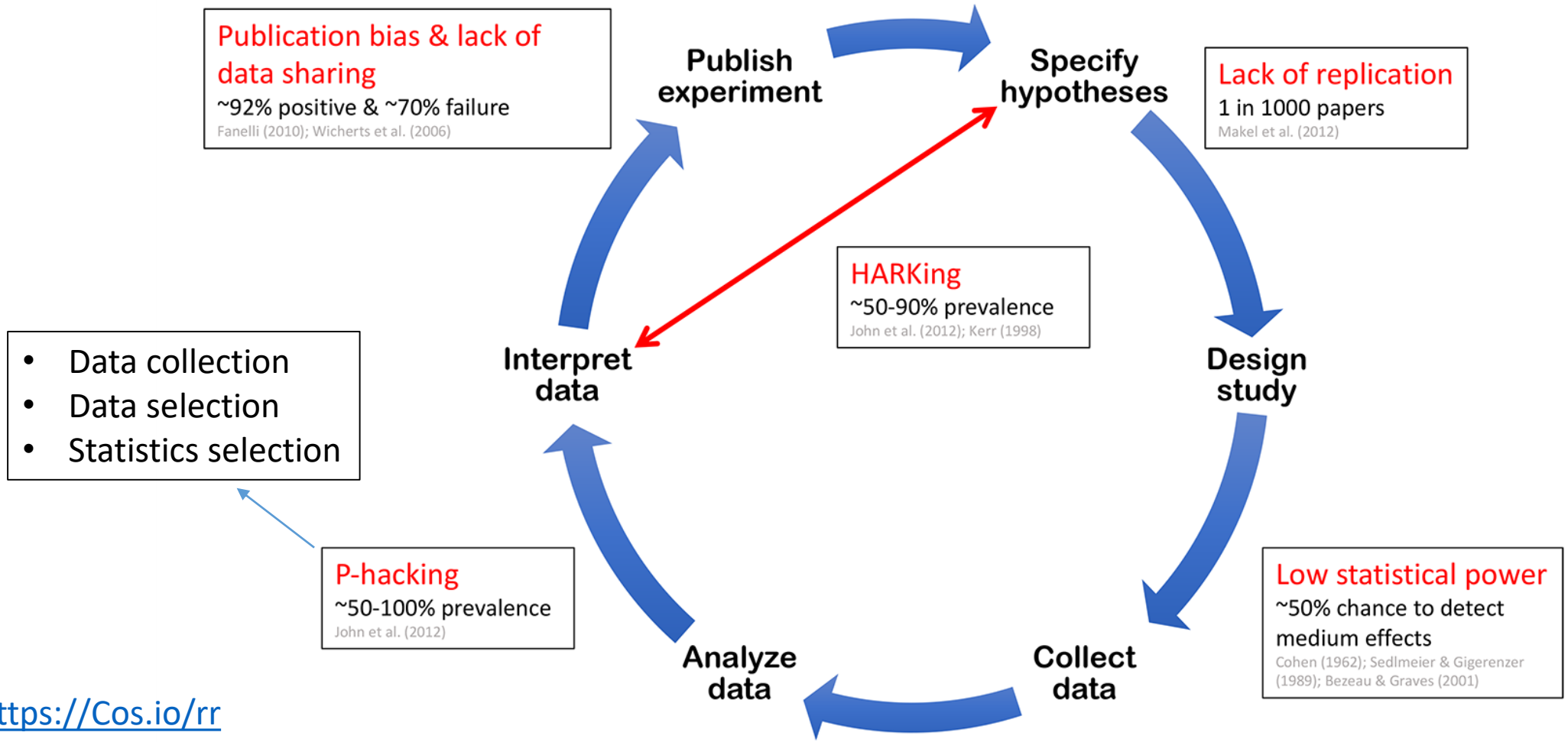
Why transparency matters

- Reproducibility
  - “obtaining consistent results using the same input data, computational steps, methods, code and conditions of analysis”
  - All information is made available: Clarity, specificity, completeness
- Replicability
  - “obtaining consistent results across studies aimed at answering the same scientific question, each of which has obtained its own data”
  - Made possible through reproducibility
- Trust
  - = progress!



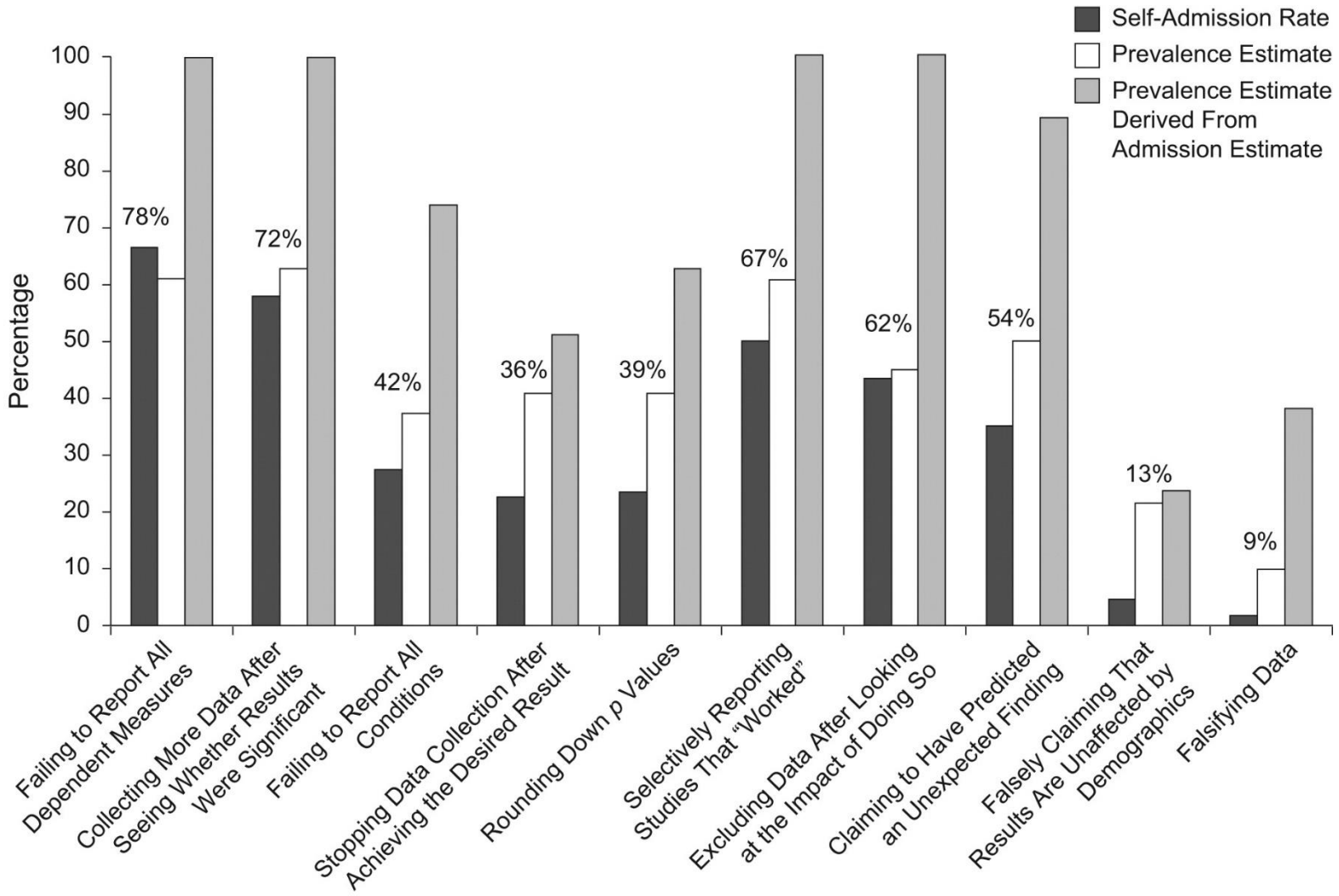
https://www.nap.edu/catalog/25303/reproducibility-and-replicability-in-science

Some stats on sketchy science

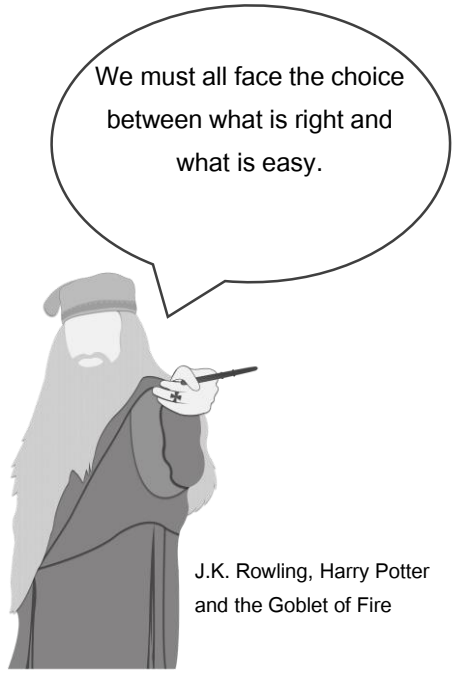


https://Cos.io/rr

How common are questionable research practices?

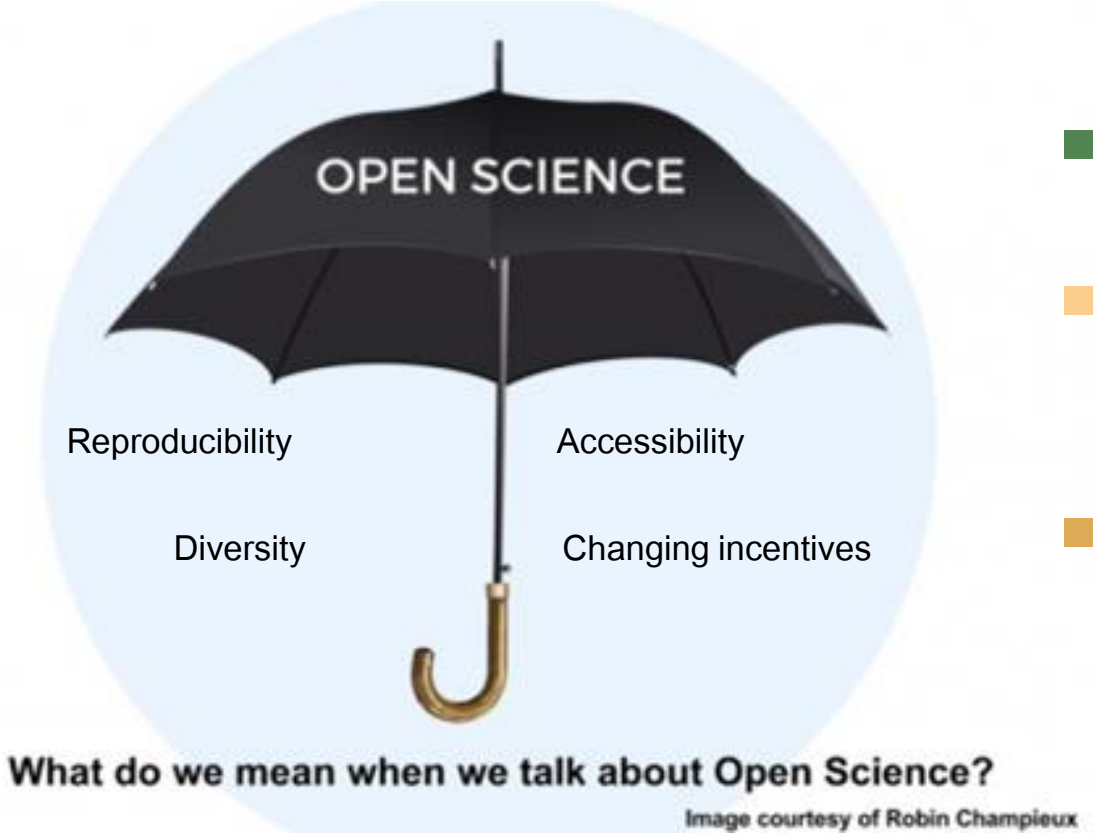


John, Loewenstein, & Prelec (2012) Psych Science



Curtesy of Mariella Paul

We need open science!



adapted from: David Mehler and Kevin Weiner: "Open science: Sharing is caring, but is privacy theft?" and: Tal Yarkoni: "I hate open science"

Open Science tools

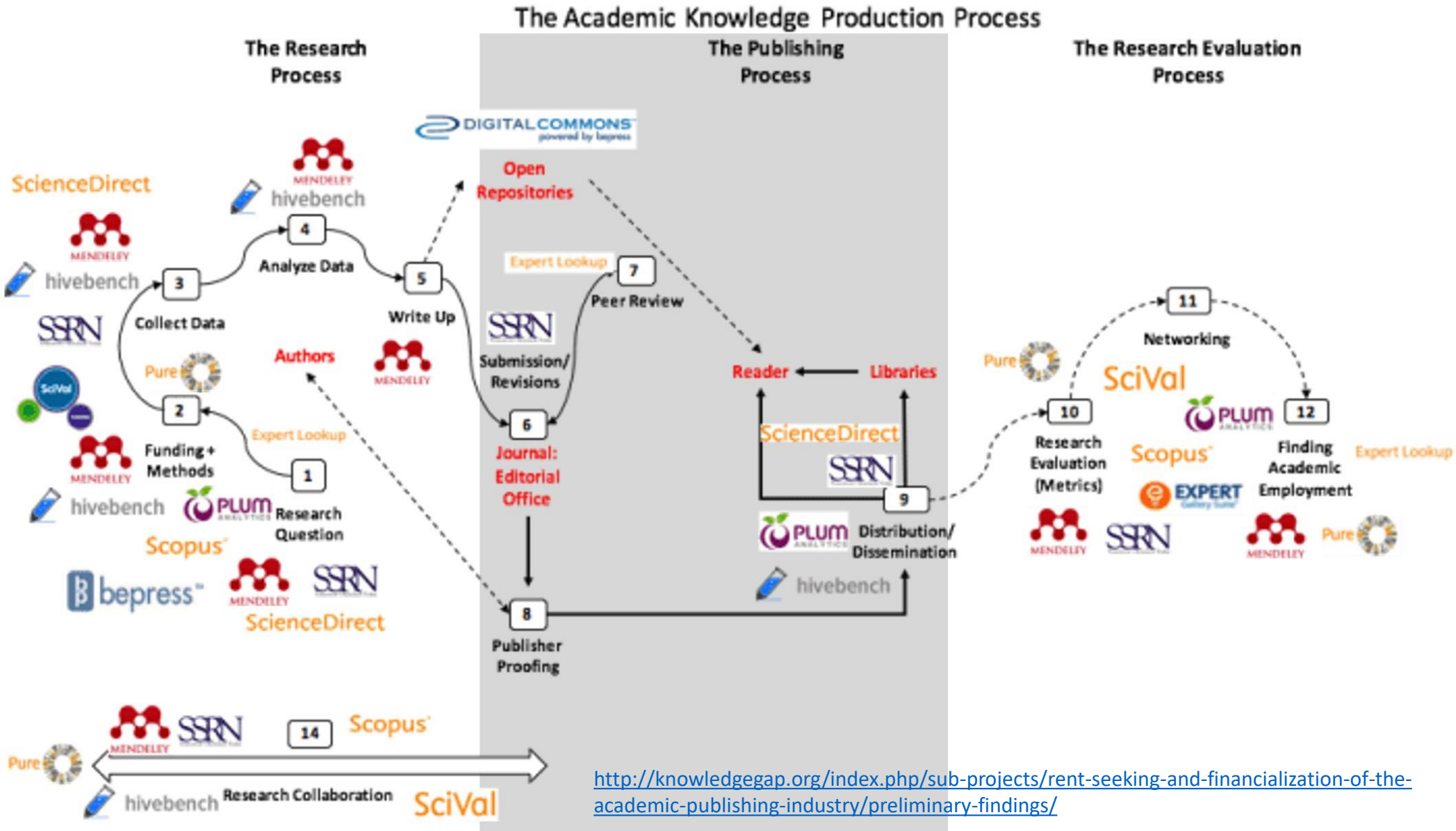
- Pre-registration keeps you honest!
  - OSF.io & many journals accepting pre-registered studies
  - Rationale, methods, hypotheses, analytic plan, etc
  - Distinguishes hypothesis testing from exploratory analyses
- Data repositories make the most out of data
  - OSF.io
- Model sharing ensures impact of model / hypothesis
  - Github – importance of documentation
- Open peer review makes it transparent and constructive
- Open access provides it to everyone!
  - bioRxiv, open-access journals, etc

Let’s talk specifics…

Broken publication system…

Data and money business!

e.g. Elsevier



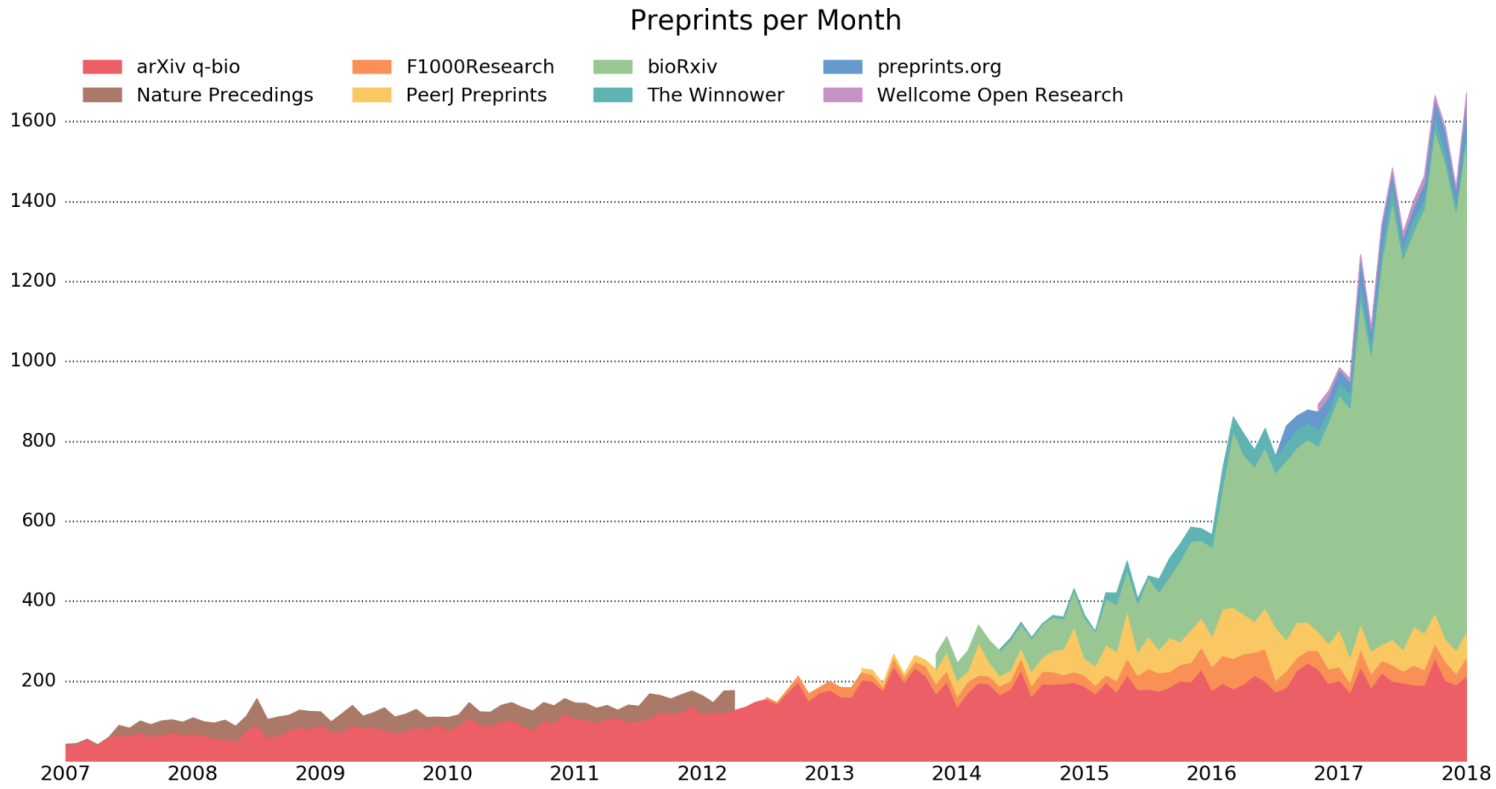
http://knowledgegap.org/index.php/sub-projects/rent-seeking-and-financialization-of-the-academic-publishing-industry/preliminary-findings/

Open access to publications

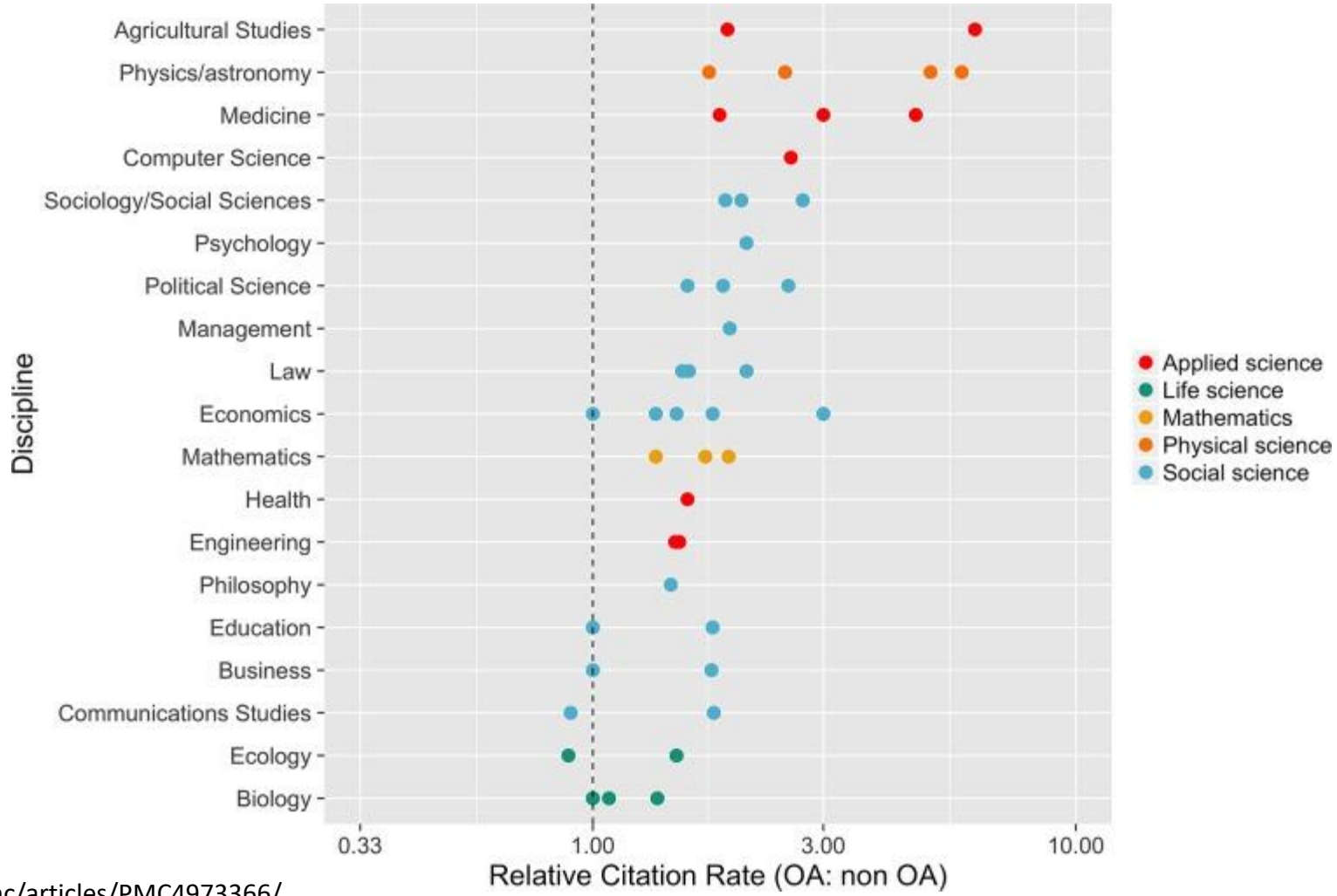
- Open access publications = recent break-through!
- Free, immediate, online access to the results of research
- Free to reuse, e.g. to build tools to mine the content
- Two routes to make sure anyone can access your papers
  - Gold route: paying article processing charges (APCs) to ensure publishers makes copy open
  - Green route: self-archiving Open Access (OA) copy in repository
  - Platinum/diamond route: OA journal without APCs!, e.g. NBDT
  - Find out what your publisher allows on SHERPA RoMEO – www.sherpa.ac.uk/romeo

Benefit of posting pre-prints

- Time stamp / credit
  - Prevent getting scooped
- Get feedback before submission to journals
  - Makes for better papers!
- Increase visibility
  - Higher research impact and citations
- Faster publication of results!



Open Access articles get more citations



https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4973366/

How-to pre-print

- When your manuscript is ready
- Upload on bioRxiv, PsyArXiv, OSF.io, …
  - ArXiv automatically tweets
  - Post on Twitter! Ask for feedback!
  - Consider sending link of pre-print to colleagues
- Collect feedback
  - Give it a few weeks…
  - Improve your manuscript
- Submit to journal as usual…
- Update pre-prints at each round of review / new journal submission

Open peer review

- Open identities
  - Names are explicit
- Open reports
  - review Q&A
- Open participation
  - Anyone can write a review
- Open interaction
  - Direct reciprocal discussion

Why? Broken peer review

- It's supposed to be constructive!
- Battle for high IF publication → high competition, wrong incentives
- High error rate: 3-4 reviewers are not enough to accurately judge!
  - Economist George A. Akerlof's seminal paper, "The Market for Lemons," (how decisions are influenced by one party having more information), was rejected several times before it could be published. Akerlov was later awarded the Nobel Prize for this and other later work.
- Anonymous = problematic
  - Aggressive, subjective, biased reviews
- Review process opaque: review Q&A not published!

Benefits of open peer review

- Greater transparency
- Less bias
- Increased participation to formal and informal peer review processes
  - More feedback is better
  - More solid findings
  - More collaborations
- Faster, more reliable reviews from motivated people
- Opportunities for reviewers
  - Engage with novel research
  - Build academic networks and expertise
  - Refine their own writing skills

How-to peer-review openly

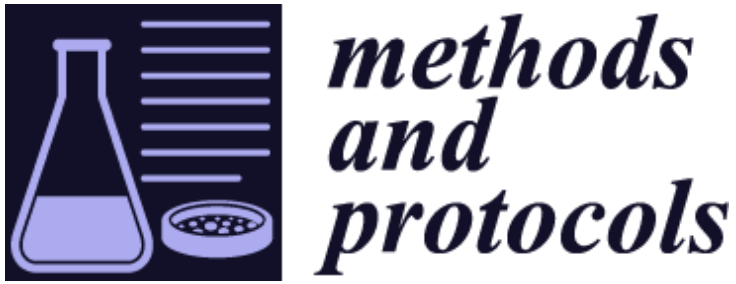
- Send unsolicited review of manuscripts to authors
  - Publish them (e.g. blog, Twitter)
  - Directly interact with authors (e.g. comment in bioRxiv)
- Sign your reviews
- Be constructive!
  - Be reasonable and show integrity
  - Reviewing is about making science better, not to show off
  - Be an ambassador of open science

PUBLONS
EVALUATING ACADEMIC RESEARCH

- Participate in efforts to make review Q&As public
  - Careful about privacy – authors are not allowed to publish reviewer comments without consent
- Pre- vs. post-publication review…

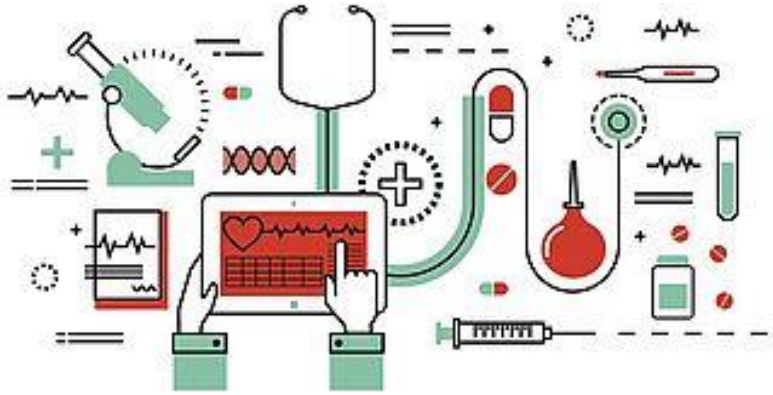
https://www.fosteropenscience.eu/learning/open-peer-review

Open Methods



- Documenting and sharing workflows and methods
- Sharing code and tools to allow others to reproduce work
- Using web based tools to facilitate collaboration and interaction from the outside world
- Open notebook science – “when there is a URL to a laboratory notebook that is freely available and indexed on common search engines.” http://drexel-coas-elearning.blogspot.co.uk/2006/09/open-notebook-science.html

Benefits of open methods



- Facilitates reproducibility
- Increases replicability
- Allows for better understanding and evaluation of Methods used
  - Relates to interpretation of results
  - Limitations of approaches
- Speeds up experimental design
- Makes analysis tools / approaches / rationales available
- Simplifies re-analyses, including unexplored avenues

How-to share methods

- Document everything from the outset
  - Keep detailed lab notes in digital form (if possible)
  - Write clean, well-documented analysis code
  - Decide on a good data organization method
- Publish all experimental procedures (code, notes, etc.)
  - Easy to publish everything (code, manuscript, data, notes) on OSF.io
- Consider sharing code bases in a more comprehensible way
  - e.g. github
- Digital formats, standard formats, open source software preferred

Open data

- Open data make your stuff available on the Web (whatever format) under an open license
  - make it available as structured data (e.g. Excel instead of a scan of a table)
  - use non-proprietary formats (e.g. CSV instead of Excel)
  - use Uniform Resource Identifiers (URIs) to denote things, so that people can point at your stuff (e.g. URLs)
  - link your data to other data to provide context
- Tim Berners-Lee's proposal for five star open data - http://5stardata.info
- "Open data and content can be freely used, modified and shared by anyone for any purpose" http://opendefinition.org

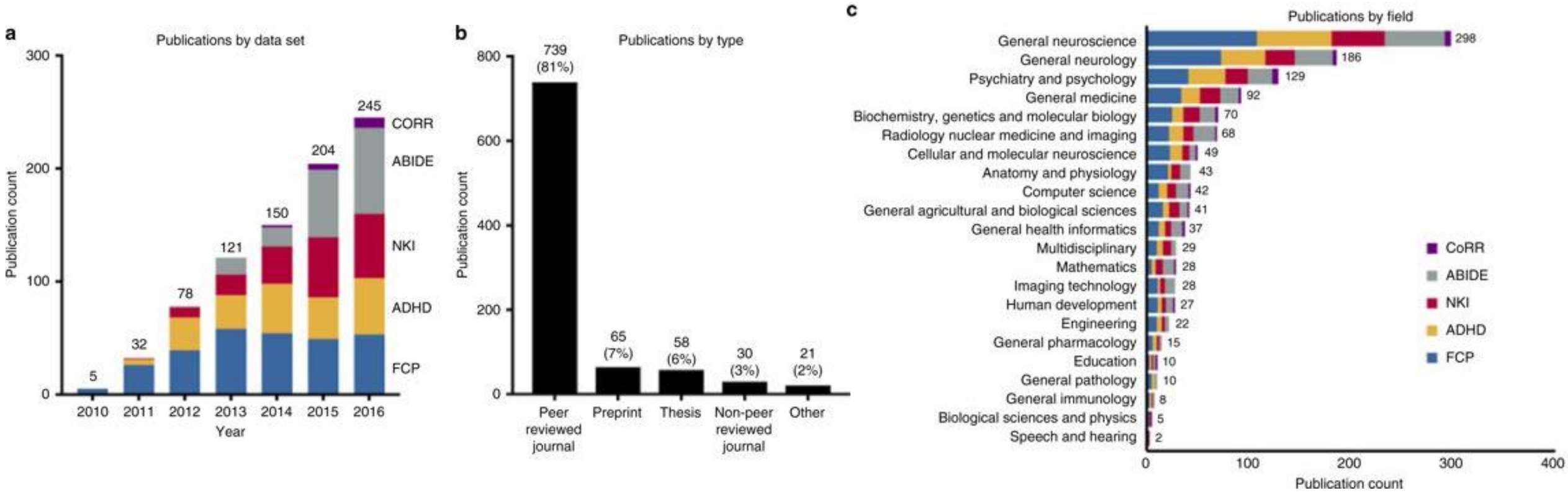
Benefits of open data

- Give data a 2nd, 3rd, … life: the FAIR principle
  - Findable: data is indexed and contains searchable meta-data
  - Accessible: open data and communication protocols
  - Interoperable: data can be combined with other data and tools
  - Re-usable: meaningful metadata and open license
- Re-use of data gives you citations, recognition and visibility
- Satisfaction of making an impact in science and society
- You will get known for your datasets as well as for your science

Open Data is the norm elsewhere…

- Physics
  - Particle physics (e.g. CERN, SnowLab)
  - Astronomy
  - …
- Genetics
- Climate research
- Machine Learning

Success in numbers: an example



Neuroimaging Data-sharing Initiative (INDI)
https://www.nature.com/articles/s41467-018-04976-1

How-to make data available

- Look for good examples in your field
- Organize your data well right from the start
- Use standard formats if possible
  - Neuroimaging
- De-identify data (and follow ethics guidelines)
- Publish data and metadata together, including
  - Protocols
  - Analysis pipeline
- Link to paper

1. Publish in field-specific database
2. Publish on general purpose repository / database (e.g. OSF.io)

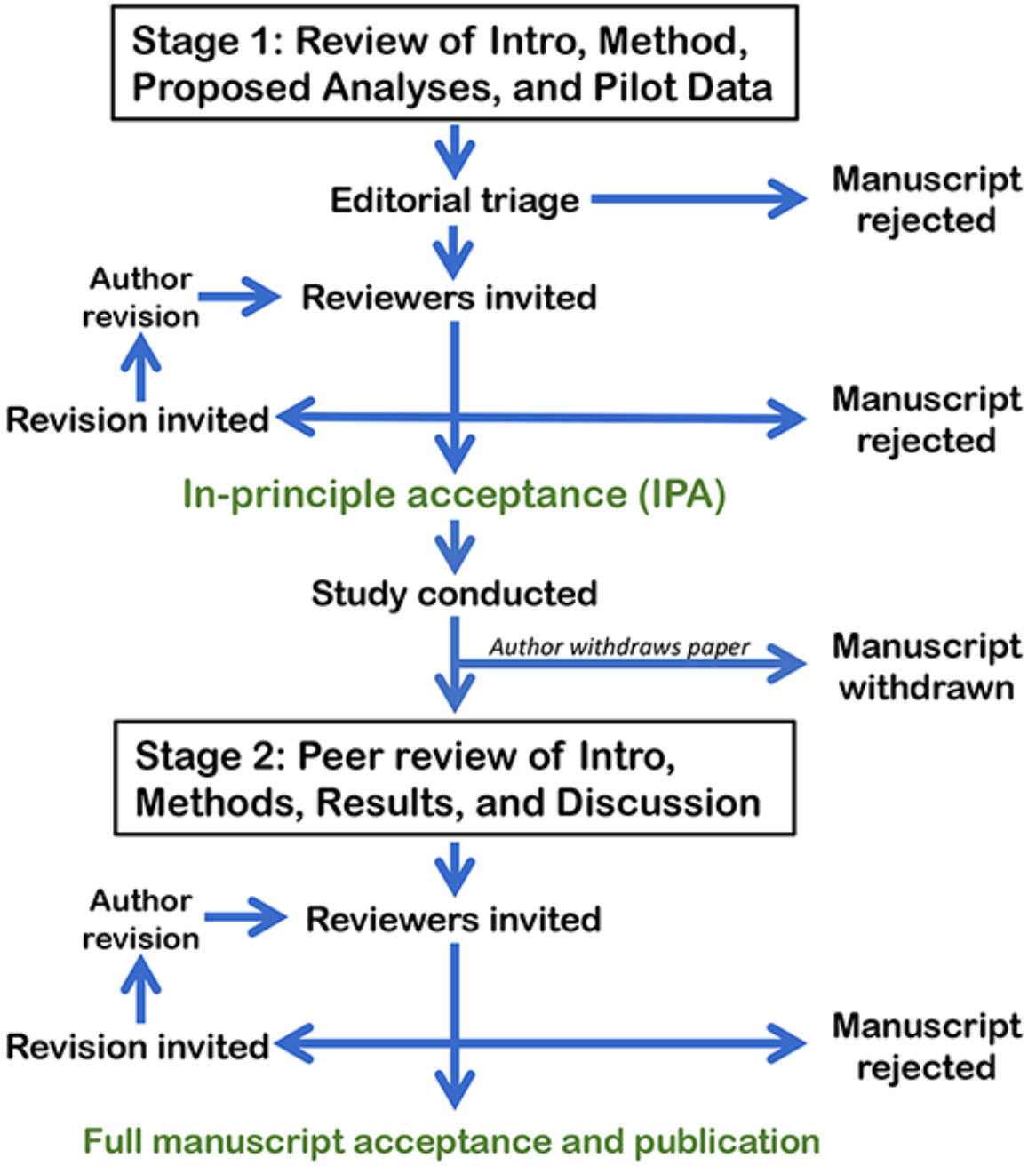
Pre-registration / registered reports

- Ideas, hypotheses, and methods to test them should be the only thing we control in science!
- Write a proposal: Intro, Hypotheses, Methods, Analyses (pilot data)
- Publish the proposal BEFORE collecting data!

https://Cos.io/rr

Pre-registration / **registered reports**

- IPA guarantees publication
  - If original methods are followed
  - Main conclusions need to come from originally proposed analyses
- Does not prevent exploratory analyses
  - Need to be labeled as such



https://Cos.io/rr

Benefits of pre-registrations / registered reports

- Makes your science better by increasing the credibility of your results
  - Avoid p-hacking
  - Avoid HARKing
- Allows you to stake your claim to your ideas earlier
  - Keeps you honest
- Forces you to really think your project through
  - Identify gaps in knowledge and reasoning

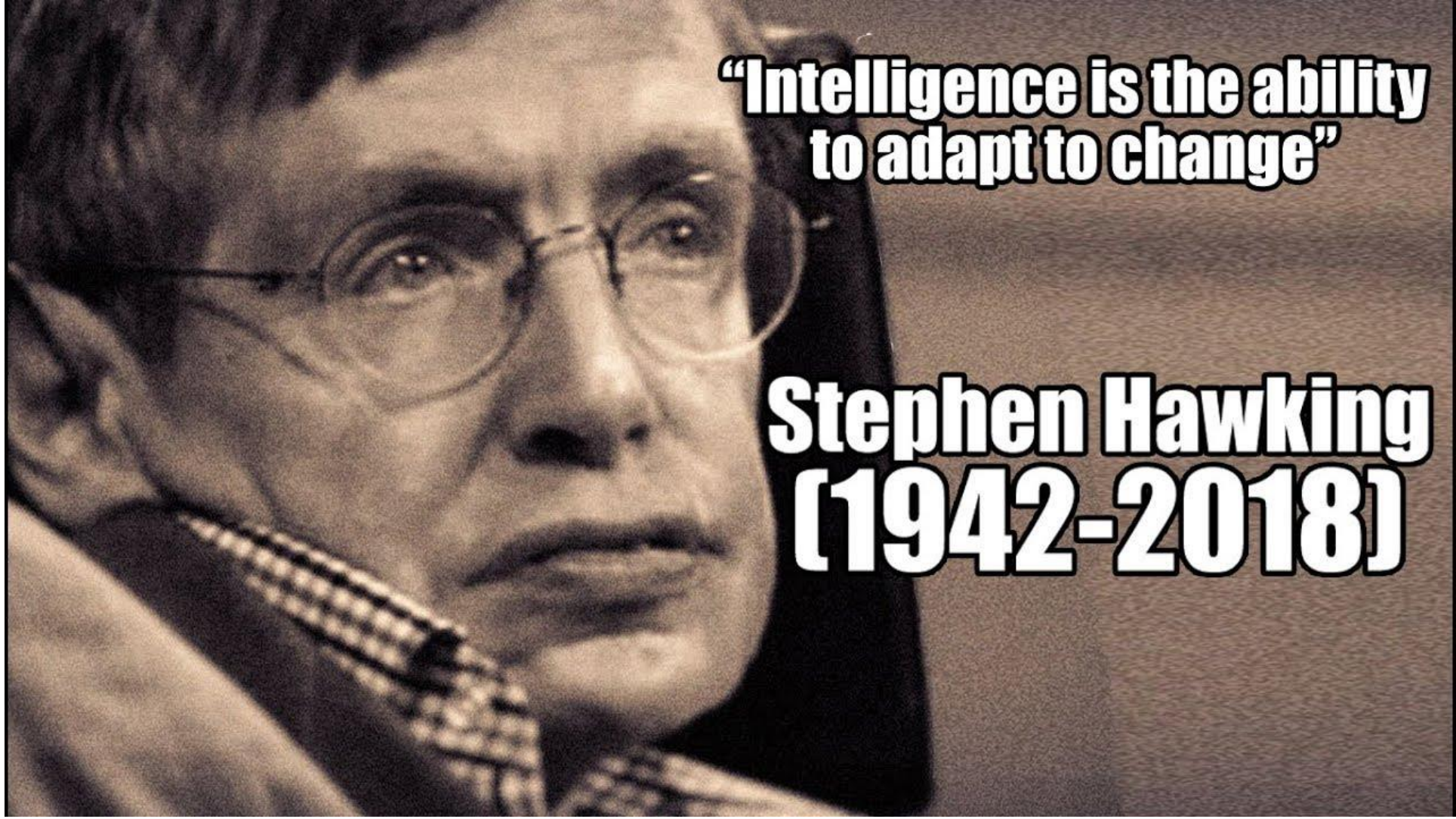
- It's easy and you can win a $1,000 prize for publishing the results of your preregistered research.

https://cos.io/prereg/

How-to pre-register

- As “registered report”
  - See specific journal guidelines:
- As simple “pre-registration”
  - On OSF.io
- When to preregister?
  - Right before your next round of data collection
  - After you are asked to collect more data in peer review
  - Before you begin analysis of an existing data set

Final words


"Intelligence is the ability to adapt to change"
Stephen Hawking
(1942-2018)

Benefits for early career researchers

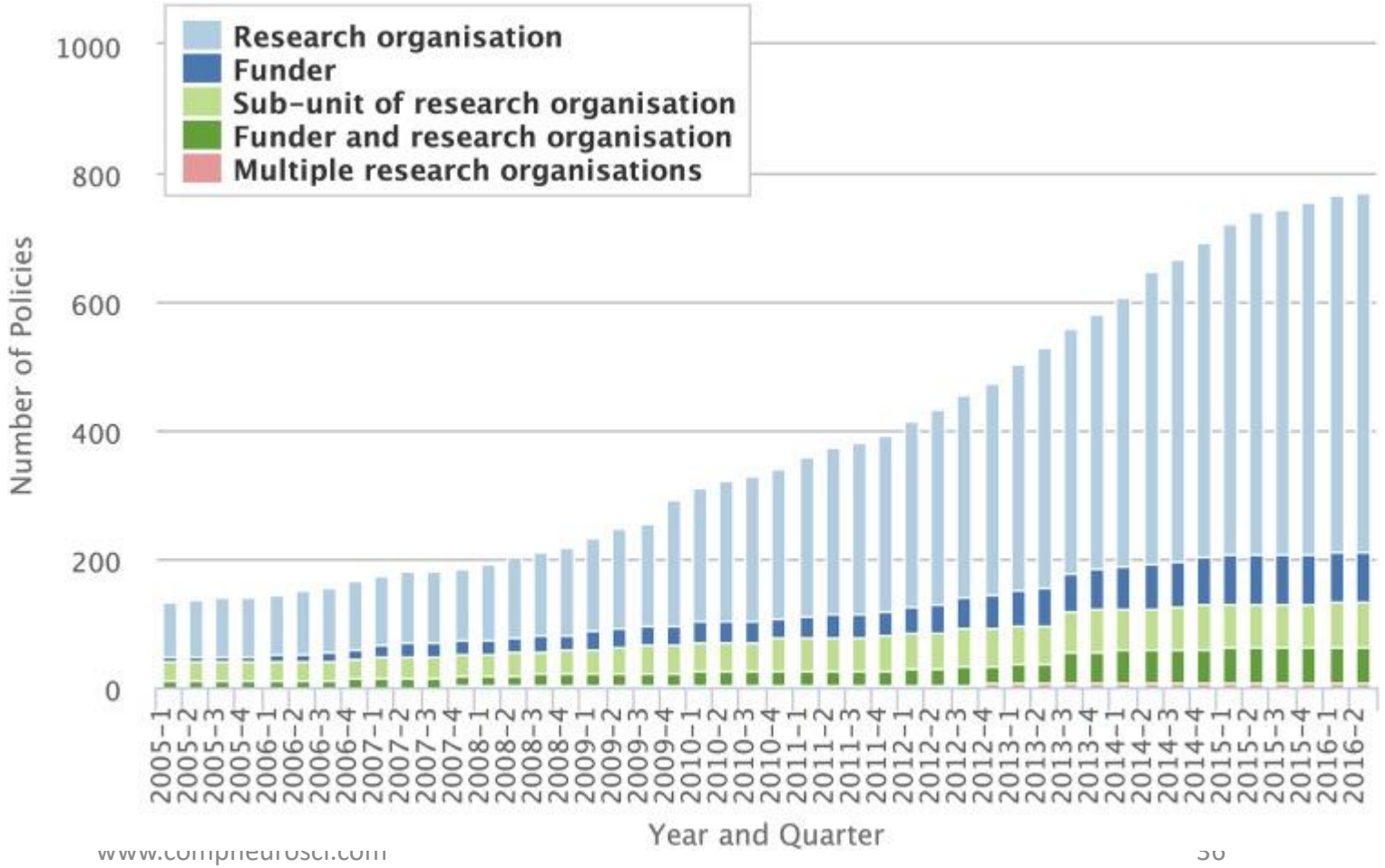
- Become a pioneer
- Gain valuable experience
- Distinguish yourself from the crowd
- Plan successful research proposals
- Receive higher citations
- Get known faster
- Demonstrate research and societal impact
- Enhances your credibility
- Develop a better research network

What can you do as a student?

- Plan on pre-registering your study!
  - Required?
- Provide constructive criticism
  - Be nice!
  - Be helpful
  - Make science better
- Be a good scientist
  - Do what's right: be honest, genuine and true to your beliefs
- Document your project and make outcomes openly available
  - Final report / paper
  - Data & analysis code
  - Lab notes, methods, experiment code and metadata

Open Science = the Future!!!

- Increasingly a requirement!
- Unstoppable!
- Necessary!



https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4973366/

What ifs / yes, buts…

- “yes, but it takes time…”
  - There is no free lunch!
- “yes, but pre-registration requires so much work…”
  - That work is front-loaded – not that much effective additional work!
- “WHAAAAAT??? I have to give away my precious code???”
  - Don’t you like getting code from people? Time to give back and get credit!
- “what if I get scooped?”
  - Pre-registration = time stamp!

It's not The Incentives, it's you (Tal Yarkoni)

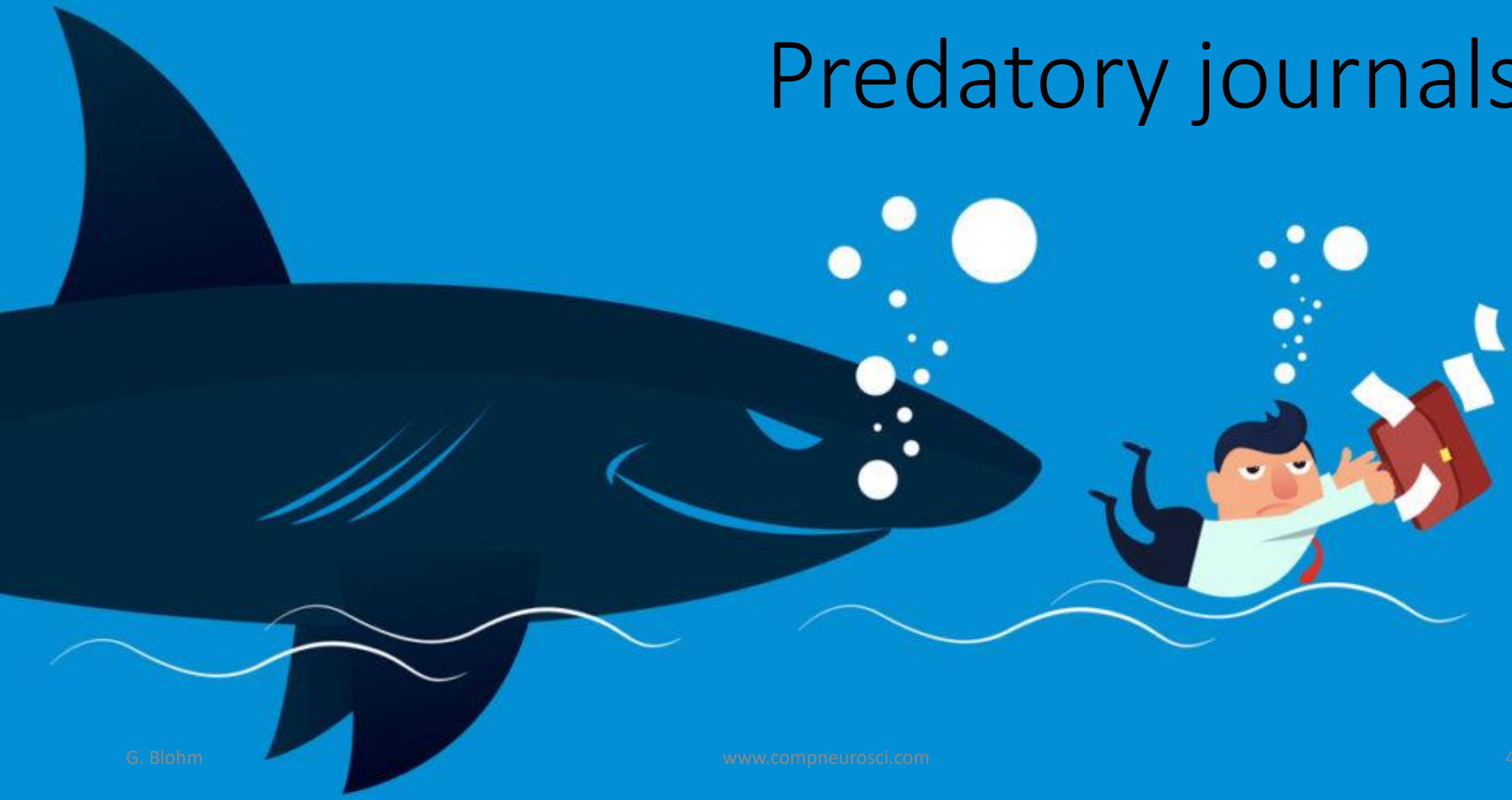
- You can excuse anything by appealing to The Incentives
- Why would it be ok in science if it's not ok, say, in law?
- You are not special
- The Incentives are (probably) not supported by data!
- You (probably) can't boost your career by following The Incentives
- Why would you think that you'll do everything better tomorrow?
- You're not thinking long-term!
- It achieves nothing and probably makes things worse
- It's your job!

http://www.talyarkoni.org/blog/2018/10/02/no-its-not-the-incentives-its-you/

Resources

- Open Science handbook: https://zenodo.org/record/1212496#.W1deLbgpDb0
- FOSTER Open Science: www.fosteropenscience.eu
- Open Science Foundation: www.OSF.io
- Center for Open Science: www.cos.io
- www.opensource.com
- www.openscience.com

Predatory journals



Predatory journals…

- “an exploitative, and typically open-access, academic publishing business model that involves charging publications fees (also known as article processing charges, or APCs) to authors without checking articles for quality and legitimacy and without providing the other editorial and publishing services associated with legitimate journals (open access or not)” (Wikipedia)

- Jeffrey Beall’s list: https://beallslist.weebly.com/
  - More up to date version: https://predatoryjournals.com/journals/

How to avoid predatory journals

- Do your homework!
  - Is the journal on Beall's list?
  - Is the publisher on Beall's list?
  - If OA, is the journal on Directory of Open Access Journals (DOAJ)?
    - https://doaj.org/
  - Is the publisher a member of a recognized professional organization?
    - Adhering to standards of Committee of Publication Ethics, the International Association of Scientific, Technical, & Medical Publishers (STM); or the Open Access Scholarly Publishers Association (OASPA)
  - Is the journal indexed?
    - PubMedCentral, Web of Science
  - Check journal's transparency wrt editorial / peer review process, governance, and ownership
- Legitimate journal almost never solicit submissions…
  - https://thinkchecksubmit.org/

https://blogs.bmj.com/bmj/2015/01/19/jocalyn-clark-how-to-avoid-predatory-journals-a-five-point-plan/

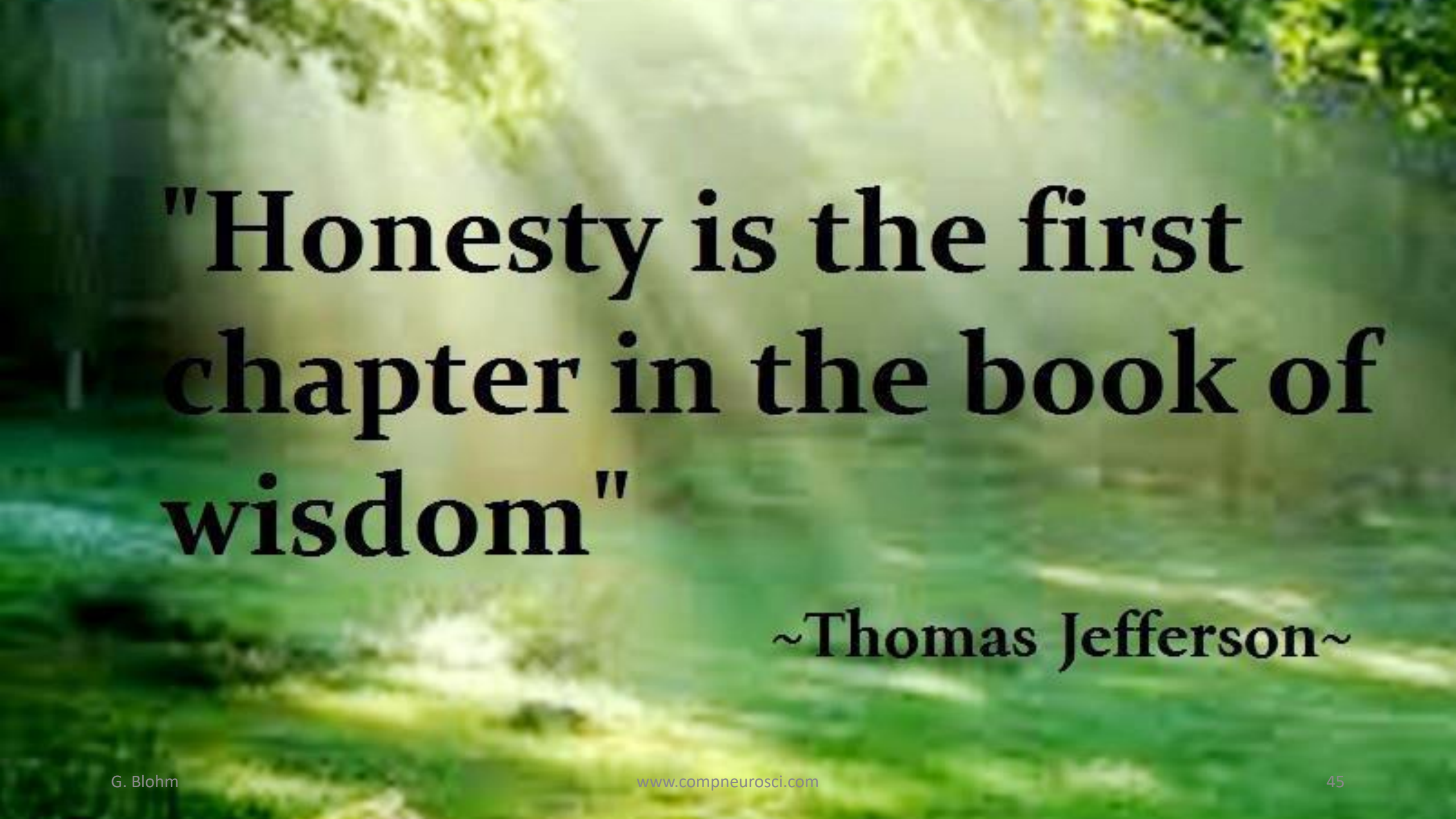
Plagiarism

- Plagiarism is the wrongful appropriation and stealing and publication of another author's language, thoughts, ideas, or expressions and the representation of them as one's own original work. (WikiPedia)

- Consequences
  - Academic censure
  - …
  - Expulsion!

Avoiding plagiarism

- Don’t rush!
- Cite your source correctly
- Include quotations
- Paraphrase (and cite!)
- Present your own ideas – don’t be shy!
- Keep track of references / papers you read
- Plagiarism checker
  - Turnitin @ onQ: https://www.queensu.ca/onqsupport/turnitin-students-0


"Honesty is the first chapter in the book of wisdom"
~Thomas Jefferson~