Reward, reproducibility and recognition in research - the case for going Open

Eleventh Annual Munin Conference on Scholarly Publishing http://site.uit.no/muninconf/
21 November 2016

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Head of Scholarly Communication
University of Cambridge
@dannykay68
The problem

Researchers are in a rat race to stay ahead
Today’s talk

• How research is measured
• The problems this causes
• A proposed solution
• Implementation challenges
• Caveat: This mainly refers to the STEM experience
The coin in the realm of academia

Impact Factor for 2015 is

- Number of citations in 2014 of articles published in 2012-2013 divided by:
  - Number of articles published in the journal in 2012-2013

- In 2016 *Nature* has a JIF of 41.456. This is supposed to mean that over the past 2 years, Nature articles have been cited, on average, about 41 times each
Issues with the JIF

• Only a selection of journals
• Some disciplines badly represented
• English language bias
• North American bias
• Timeline
• Measuring the vessel, not the contents!
• Uneven distribution.

– Argument that we should be making non-citation levels available 10.1186/1471-2288-4-14
Journals banned from the JIF list

• Journals are removed because of:
  – Self-citation
  – Citation stacking – where journals cite each other
  – Requirements to cite from within the journal

• 2013 – 66 journals
• 2012 – 51 journals
• 2011 – 34 journals

Backlash

Hate journal impact factors? New study gives you one more reason

By John Bohannon | Jul. 6, 2016, 4:30 PM

Scientists have a love-hate relationship with the journal impact factor (JIF), the measurement used to rank technical journals by prestige. They have come to use it not only for deciding where to submit research papers, but for judging their peers, as well as influencing who wins grants and promotions. All this is now called into question.
Scientists have a love-hate relationship with the journal impact factor (JIF), the measurement used to rank technical journals by prestige. They have come to use it not only for deciding where to submit research papers, but for judging their peers, as well as influencing who wins funding and promotions. All of this use has flaws, however.

The Impact Factor Game

The PLoS Medicine Editors

Published: June 6, 2006 • http://dx.doi.org/10.1371/journal.pmed.0030291

It is time to find a better way to assess the scientific literature


Published: June 6, 2006

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http://journals.plos.org/plosmedicine/article?id=10.1371/journal.pmed.0030291
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http://journals.plos.org/plosmedicine/article?id=10.1371/journal.pmed.0030291
We are stuck

The insistence on the need to publish novel results in high impact journals is creating a multitude of problems with the scientific endeavour

Image by Danny Kingsley
## Problem 1: Data Excuse Bingo

<table>
<thead>
<tr>
<th>Reason</th>
<th>Excuse</th>
<th>Concern</th>
<th>Reason</th>
</tr>
</thead>
<tbody>
<tr>
<td>My data contains personal/sensitive information</td>
<td>My data is too complicated</td>
<td>People may misinterpret my data</td>
<td>My data is not very interesting</td>
</tr>
<tr>
<td>Commercial funder doesn’t want to share it</td>
<td>We might want to use it in another paper</td>
<td>People will contact me to ask about stuff</td>
<td>Data Protection/National Security</td>
</tr>
<tr>
<td>It’s too big</td>
<td>People will see that my data is bad</td>
<td>I want to patent my discovery</td>
<td>It’s not a priority and I’m busy</td>
</tr>
<tr>
<td>I don’t know how</td>
<td>I’m not sure I own the data</td>
<td>Someone might steal/plagiarise it</td>
<td>My funder doesn’t require it</td>
</tr>
</tbody>
</table>

Data Excuse Bingo created by @jenny_molloy
| My data contains personal/sensitive information | My data is too complicated | People might see that my data is bad |
| Commercial funder doesn’t want to share it | We might want to use it in another paper | People might contact me to ask about stuff |
| It’s too big | People might steal/plagiarise it | It’s not a priority and I’m busy |
| I don’t know how | I own the data | My funder doesn’t require it |

Data Excuse Bingo created by @jenny_molloy
‘A second concern held by some is that a new class of research person will emerge — people who had nothing to do with the design and execution of the study but use another group’s data for their own ends, possibly stealing from the research productivity planned by the data gatherers, or even use the data to try to disprove what the original investigators had posited. There is concern among some front-line researchers that the system will be taken over by what some researchers have characterized as “research parasites.”’
Problem 2: Hyperauthorship

24 of the 33 pages of this paper listed the over 5,000 authors (nine pages are the paper itself)

Physics paper sets record with more than 5,000 authors

Detector teams at the Large Hadron Collider collaborated for a more precise estimate of the size of the Higgs boson.

Davide Castelvecchi

15 May 2015

http://www.nature.com/news/physics-paper-sets-record-with-more-than-5-000-authors-1.17567
Storm of protest

Long author-lists on research papers are threatening the academic work system

Now that academic papers are written by thousands (yes, thousands) of contributors, it's getting hard to tell workers from shirkers. Ernesto Priego reports on 'hyperauthorship'

Ernesto Priego | Wednesday 27 May 2015 | 0 comments

http://www.independent.co.uk/news/science/long-author-lists-on-research-papers-are-threatening-the-academic-work-system-10279748.html
Storm of protest

https://theconversation.com/long-lists-are-eroding-the-value-of-being-a-scientific-author-42094
Is mass authorship destroying the credibility of papers?

The rise in ‘kilo-authors’ and ‘gift authorship’ is causing the academy to rethink how it assesses the worth of academic publications

August 24, 2015

By Jack Grove  |  Twitter: @jgro_the

Speaking of other ways of measuring...

This Altmetrics score of 579 is “in the top 5% of all research outputs scored by Altmetric”

Blogged because of author list!

https://aps.altmetric.com/details/3997327/blogs
Scientists are very rarely rewarded for being right, they are rewarded for publishing in certain journals and for getting grants.
The nine circles of scientific hell
(with apologies to Dante and xkcd)

I  Limbo
II  Overselling
III  Post-Hoc Storytelling
IV  P-Value Fishing
V  Creative Outliers
VI  Plagiarism
VII  Non-Publication
VIII  Partial Publication
IX  Inventing Data

Neuroskptic Perspectives on Psychological Science
2012;7:643-644

Copyright © by Association for Psychological Science
“Simulations show that for most study designs and settings, it is more likely for a research claim to be false than true.”
Conducted replications of 100 experimental and correlational studies published in three psychology journals using high-powered designs and original materials when available.

- Replication effects = half the magnitude of original effects (substantial decline)
- 97% of original studies had significant results
- 36% of replications had significant results

https://osf.io/ezcuj/
In this extraordinary case, patients discovered that the treatments tested had much lower efficacy after an information tribunal ordered the release of data from the PACE trial to a patient who has requested access using a freedom of information request.

http://m.hpq.sagepub.com/content/early/2016/10/27/1359105316675213.full
IS THERE A REPRODUCIBILITY CRISIS?

- 38% Yes, a slight crisis
- 7% Don’t know
- 52% Yes, a significant crisis
- 3% No, there is no crisis

1,576 researchers surveyed

Nature, 533, 452–454 (26 May 2016) doi:10.1038/533452a
http://www.nature.com/news/1-500-scientists-lift-the-lid-on-reproducibility-1.19970
Problem 4: Retraction

- According to Retraction Watch there are 500-600 retractions a year
  - [http://retractionwatch.com/](http://retractionwatch.com/)
- In 2014 a 14-month investigation by the publisher SAGE uncovered a fake peer-review scam involving hundreds of fraudulent and assumed identities. A total of 60 research articles published over the past 4 years in the *Journal of Vibration and Control (JVC)* were retracted.
- Only 5% of publicly available versions (non-publisher websites) of retracted works have a retraction statement attached
  - [http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3411255/](http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3411255/)
Correlation between impact factor and retraction index.

Ferric C. Fang, and Arturo Casadevall Infect. Immun. 2011;79:3855-3859
Problem 5: Poor science

Royal Society Open Science

The natural selection of bad science

Paul E. Smaldino and Richard McElreath

Cognitive and Information Sciences, University of California, Merced, CA 95343, USA
Department of Human Behavior, Ecology, and Culture, Max Planck Institute for Evolutionary Anthropology, Leipzig, Germany

Received: 1 June 2016
Accepted: 17 August 2016

Subject Category:
Psychology and cognitive neuroscience

Subject Areas:
theoretical biology/computer modelling and simulation/statistics

Poor research design and data analysis encourage false-positive findings. Such poor methods persist despite perennial calls for improvement, suggesting that they result from something more than just misunderstanding. The persistence of poor methods results partly from incentives that favour them, leading to the natural selection of bad science. This dynamic requires no conscious strategizing—no deliberate cheating nor loafing—by scientists, only that publication is a principal factor for career advancement. Some normative methods of analysis have almost certainly been selected to further publication instead of discovery. In order to improve the culture of science, a shift must be made away from correcting misunderstandings and towards rewarding understanding. We support this argument with empirical evidence and computational modelling. We first present a 60-year meta-analysis of statistical power in the behavioural sciences and show that power has not improved despite repeated demonstrations of the necessity of increasing power. To demonstrate the logical consequences of structural...
Problem 6: Attrition crisis?

To recap

- Problem 1: Reluctance to share data
  - (all disciplines)
- Problem 2: Hyperauthorship
  - (Physics)
- Problem 3: Reproducibility
  - (Psychology, Neuroscience, Pharmacology)
- Problem 4: Retraction
  - (Biological and Medical Sciences)
- Problem 5: Poor Science
  - (Sociology, economics, climate science also vulnerable)
- Problem 6: Attrition
  - (all disciplines)

This all comes down to the reliance on publication of novel results in high impact journals
Time for a change

The whole outdated enterprise is kept alive for one main reason: the fact that employers and funders of researchers assess researchers primarily by where they publish. It's extraordinary to me and many others that the employers, mainly universities, outsource such an important function to an arbitrary and corrupt system.

‘Richard Smith: Another step towards the post-journal world’ BMJ blog, 12 Jul, 16
We distribute dissemination across the research lifecycle and reward it

• *The Case for Open Research* - series of blogs July & August 2016

https://unlockingresearch.blog.lib.cam.ac.uk/?page_id=2#OpenResearch
Governments

European Open Science Policy Platform

1st Meeting, 19 September 2016

The Open Science Policy Platform met for the first time on 19 September 2016. The
Open Science Policy Platform represents a new way of making policy: co-design and co-

http://ec.europa.eu/research/openscience/index.cfm?pg=open-science-policy-platform
Governments

Governments

http://www.arc.ac.za/
Governments

Promoting Open Science in Japan
Opening up a new era for the advancement of science
Report by the Expert Panel on Open Science, based on Global Perspectives
Cabinet Office, Government of Japan
March 30, 2015

Research community, and to the decline of Japan’s international competitiveness.
Japan should keep pace with the global advancement of open science in a collaborative yet also strategic manner; so
that the value of Japan’s latest research and development
activities can lead to business activities at the next
stage.

I. The Importance of Open Science

“Open science” refers to a new approach to promoting
innovation through knowledge creation in science and
technology. This will be realized by facilitating access to
and use of publicly funded research results such as scientific papers and their underlying data by the
scientific community, industry and the general public.
The concept of open science is spreading rapidly. At the
8th Summit held in June 2013, G8 Science Ministers
issued a joint statement that endorsed the need for
increasing access to publicly funded research, including
peer-reviewed publications, research, and research data.

II. The Need to Promote Open Science

Open science may change scientific research. It will not
replace traditional research methods, but will add new
research tools that help to advance science. It will make research
results widely available in digital formats to all users
including the scientific community, industry and the
general public. This will enable additional value to be
extracted from science and technology information, which will not only improve our knowledge, but will also
reform innovation strategies.

For the scientific community, the acceleration of data-
driven activities is expected to lead to new collaborations
and to the prevalence of new research methods among
researchers within the scientific community, not only

Concordat on Open Research Data

The Concordat on Open Research Data has been developed by a UK multi-stakeholder group. This concordat will help to ensure that the research data gathered and generated by members of the UK research community is made openly available for use by others wherever possible in a manner consistent with relevant legal, ethical, disciplinary and regulatory frameworks and norms, and with due regard to the costs involved.

http://www.rcuk.ac.uk/documents/documents/concordatonopenresearchdata-pdf/
http://www.data.cam.ac.uk/datanews/call-participants-open-research-pilot-project
Funders

Can publish data sets, case reports, protocols, null & negative results.

wellcomeopenresearch.org/
### Disciplines

<table>
<thead>
<tr>
<th>Discipline</th>
<th>Experience of Data Sharing</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biomedical researchers</td>
<td>actively practice open research</td>
</tr>
<tr>
<td>Clinical researchers</td>
<td>practising open research</td>
</tr>
<tr>
<td>Population and public health researchers</td>
<td>experience challenges in data sharing that need addressing</td>
</tr>
<tr>
<td>Humanities researchers</td>
<td>have very little experience of data sharing and seemingly not much could motivate them to share their data</td>
</tr>
<tr>
<td>Social science researchers</td>
<td>little experience of data sharing and reuse and perceive minimal benefits from data sharing</td>
</tr>
</tbody>
</table>

https://dx.doi.org/10.6084/m9.figshare.4055448
Community

The 21st International Conference on Electronic Publishing
Expanding Perspectives on Open Science: Communities, Cultures and Diversity in Concepts and Practices
6 - 8 June, 2017
Curium Palace Hotel
Limassol, Cyprus

http://elpub.net
Community

The Future of Research Communications and e-Scholarship

Expanding Research Communication Tools, Communities, Cultures, and Practices

6 - 8 June, 2011
Curium Palace Hotel
Limassol, Cyprus

https://www.force11.org/about
Community

Setting the Default to Open

SPARC is a global coalition committed to making Open the default for research and education. SPARC empowers people to solve big problems and make new discoveries through the adoption of policies and practices that advance Open Access, Open Data, and Open Education.

LEARN MORE

http://sparcopen.org/
Community

OPEN, TRANSPARENT, AND REPRODUCIBLE SCIENCE IS STRONGER SCIENCE.

Our mission is to provide expertise, tools, and training to help researchers create and promote open science within their teams and institutions. Promoting these practices within the research funding and publishing communities accelerates scientific progress. Join us!

https://cos.io/
Community

OpenCon 2016

Empowering the Next Generation to Advance
Open Access, Open Education and Open Data
12-14 November 2016

SIGN UP FOR UPDATES ON THE EVENT

http://www.opencon2016.org/
Individuals

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.

Matt Todd - http://opensourcemalaria.org/
16,370 Researchers Taking a Stand. So Can You!

Academics have protested against Elsevier’s business practices for years with little effect. These are some of their objections:

1. They charge exorbitantly high prices for subscriptions to individual journals.

2. In the light of these high prices, the only realistic option for many libraries is to agree to buy very large “packages”, which will include many journals that their users do not actually want. Elsevier then makes huge profits by exploiting the fact that some of these journals are essential.

3. They support measures such as RERA, PIPPA and the Research Works Act, that aim to restrict the free exchange of information.

The key to all these issues is the right of authors to achieve cost-accessible distribution of their work. If you would like to declare publicly that you will not support any Elsevier journal unless they radically change how they operate, then you can do so by filling in your details on this page.

More information:

Individuals

Martin Paul Eve  https://www.openlibhums.org/
Community action

• Themes
  – **Eliminate the use of journal-based metrics**, such as Journal Impact Factors, in funding, appointment, and promotion considerations;
  – The need to **assess research on its own merits** rather than on the basis of the journal in which the research is published; and
  – The need to **capitalize on the opportunities provided by online publishing**
  – >12,500 individuals & >900 organisations

http://www.ascb.org/dora/
All the rage

arXiv.org

SOCARXIV
open archive of the social sciences

Cogprints
Cognitive Sciences Eprint Archive

bioRxiv
THE PREPRINT SERVER FOR BIOLOGY


Kiessling LL, Fernandez LE, Alivisatos AP, Weiss PS.

PMID: 27776406 DOI: 10.1021/acsnano.6b07008
Dramatic growth
Publishing options

Publishing options

Figshare - https://figshare.com/
Publishing options

Enter the next-generation science journal.

Observations matter in science: report them for what they are, no more, no less.
— Prof. John P. Ioannidis

Matters - https://www.science matters.io/
Immediate & Transparent Publishing

F1000Research is an Open Science publishing platform offering immediate publication of articles, posters and slides with no editorial bias. All articles benefit from transparent peer review and the inclusion of all source data.

F1000 - https://f1000research.com/
Publishing options

Understanding Registered Reports

In 2013, the journal Cortex took a step forward in reforming the culture of scientific publishing. With the support of Chief Editor Sergio Della Sala, we became one of the first journals to offer Registered Reports – an empirical article designed to eliminate publication bias and incentivize best scientific practice. In contrast to conventional publishing, we provisionally accept for publication study protocols that are considered methodologically sound and address an important scientific question. Armed with this provisional acceptance of their work, authors can perform the research safe in the knowledge that the results themselves will not determine the article’s publication. At the same time, readers of the final paper can feel more confident that the work is reproducible because the initial study predictions and analysis plans were independently reviewed.

The current issue of Cortex sees the first fruits of this labour: a Registered Report by Jona Sassenhagen and Ina Bornkessel-Schlesewsky from the University of Marburg and the University of South Australia. Sassenhagen and Bornkessel-Schlesewsky pre-registered an innovative experiment for testing whether the P600, an electrophysiological waveform associated with language processing, is in fact an instance of the P3, a waveform associated with attention. Their results are consistent with this hypothesis – these waveforms, considered distinct by some previous studies, may, in fact, reflect the same underlying neural process.

Registered Reports - https://www.elsevier.com/editors-update/story/peer-review/cortexts-registered-reports
Publishing options

Democratic databases: science on GitHub

Scientists are turning to a software-development site to share data and code.

Jeffrey Perkel

03 October 2016 | Corrected: 28 October 2016

GitHub- http://www.nature.com/news/democratic-databases-science-on-github-1.20719
PLOS Taxonomy of Author Contributions

http://journals.plos.org/plosone/s/authorship/?utm_source=plos&utm_medium=blog&utm_campaign=plos-1607-credit#loc-author-contributions
Recap

• There are many initiatives to open up aspects of research by:
  – Governments
  – Funders
  – Community organisations
  – Publishers
  – Individuals

• What about Institutions?
• “Improving the quality of research requires change at the institutional level”
  • Smaldino PE, McElreath R. 2016 The natural selection of bad science. R. Soc. open sci.3: 160384. [http://dx.doi.org/10.1098/rsos.160384](http://dx.doi.org/10.1098/rsos.160384)

• “Universities and research institutes should play a major role in supporting an open data culture”
  • Science as an open enterprise The Royal Society Science Policy Centre report 02/12 Issued: June 2012 DES24782 [https://royalsociety.org/~/media/policy/projects/sape/2012-06-20-saoe.pdf](https://royalsociety.org/~/media/policy/projects/sape/2012-06-20-saoe.pdf)
Cautious

Image by Danny Kingsley
Resistance

• Generally institutions are reluctant to step up, partly because of the governance structure.

• The nature of research itself is changing profoundly. This includes extraordinary dependence on data, and complexity requiring intermediate steps of data visualisation. These eResearch techniques have been growing rapidly, and in a way that may not be understood or well led by senior administrators.

  — “Openness, integrity & supporting researchers” Emeritus Professor Tom Cochrane
  https://unlockingresearch.blog.lib.cam.ac.uk/?p=307
“Academic administrators that I’ve talked to are genuinely confused about how to update legacy tenure and promotion systems for the digital era. This book is an attempt to help make sense of all this.”

• Indiana University-Purdue University Indianapolis (IUPUI) –
  – Have included open access as a value in promotion and tenure guidelines (2016) http://crln.acrl.org/content/77/7/322.full

• University of Liege
  – http://www.ooocanada.ca/motivating_open_practices_rpt

• NIH “Including Preprints and Interim Research Products in NIH Applications and Reports” – 6 October 2016
Lots of work to be done

How long to go Dad?

Still a long way to go Kids!
Thanks!

Dr Danny Kingsley
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University of Cambridge
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