UCSF Reproducibility Workshop Series

Open Publishing

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Dan Morgan, Director Community Relations, PLOS

October 3, 2019
Veronique Kiermer

- Employed by PLOS (2015 – present)
  - Founding Chief Editor, Nature Methods, 2004
  - Executive Editor, Nature journals, 2010
- Biotech industry
  - Cell Genesys, Inc
- ORCID, Board of Directors Chair (2017 – present)
- DORA, Steering Committee member (2017 – 2019)
- CRediT taxonomy development (2014)
- Keystone Symposia, Board of Directors (2019 – present)
Disclosures

Dan Morgan

• Employed by PLOS (2019 – present)
• Previously employed by University of California Press (2014 – 2019)
  • Publisher – OA program
• Previously employed by Elsevier (2001 – 2014)
  • Executive Publisher, Psychology division
  • Senior Manager, Global Academic Relations
• DORA, Steering Committee member (2019 - current)
• orcid.org/0000-0003-0625-2770
1. Overview of economics of scholarly publishing
2. [Activity]
3. Beyond OA to Open Science
4. [Activity]
5. Open science in practice
6. [Activity]
7. Tying it all together
8. [Questions/discussion]


[https://doi.org/10.1371/journal.pone.0127502](https://doi.org/10.1371/journal.pone.0127502)


Everything you need to know about Scopus content but didn’t know to ask [https://blog.scopus.com/posts/everything-you-need-to-know-about-scopus-content-but-didn-t-know-to-ask](https://blog.scopus.com/posts/everything-you-need-to-know-about-scopus-content-but-didn-t-know-to-ask)
Academic Publishing characteristics

• Academic Publishing (a.k.a. Scholarly communications, STM Publishing, etc.) is a $25+ Billion industry


• Characterized by high profitability

• Characterized by certain complaints
  • “Triple payer” E.g. Institutions and government fund research, perform, write + publish, review research, and then purchase published research back via subscriptions
  • Public funds versus public access/goods debate
  • Appropriateness of profitability level when public funds are highly utilized
Journals versus Articles

<table>
<thead>
<tr>
<th>Publisher</th>
<th># journals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Springer-Nature</td>
<td>&gt;3,000</td>
</tr>
<tr>
<td>Elsevier</td>
<td>2,500</td>
</tr>
<tr>
<td>Taylor &amp; Francis</td>
<td>2,500</td>
</tr>
<tr>
<td>Wiley</td>
<td>1,700</td>
</tr>
<tr>
<td>Sage</td>
<td>&gt;1,000</td>
</tr>
<tr>
<td>Wolters Kluwer</td>
<td>c.900</td>
</tr>
<tr>
<td>OUP</td>
<td>c.440</td>
</tr>
<tr>
<td>Hindawi</td>
<td>&gt;400</td>
</tr>
</tbody>
</table>

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Chart Source: https://blog.scopus.com/posts/everything-you-need-to-know-about-scopus-content-but-didn-t-know-to-ask
"Other publishers"

(Larivière V, Haustein S, Mongeon P (2015))

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How did this happen?

• Academic publishing prior to 1950’s was not profitable, usually a shoestring budget activity, supported by handouts/patronage from scholarly societies
• Major patrons emerge (e.g. cold war governments, NSF etc.)
• Entrepreneurs see the business opportunity of optimism + progress + funding, most notably Pergamon Press in 1951
• Template: 1) convince prominent academic that his field needed a new journal 2) install him as editor 3) sell journal to libraries 4) all journals are exclusive, so libraries need them all (unlike e.g. newspapers)
  • Ever expanding niche fields...epic growth of discrete journals
• Arguably, glamor and new forms of prestige were inserted into science!
Scientific problems begin?

• Some will argue value-add from publishers justifies profit levels, some will not. Whatever your opinion, other problems arise:

• Published science (in form of articles) as a saleable product can influence:
  • Publication bias
  • Drive for blockbusters, writing only to get published
  • “We spend a billion pounds a year, and we get back…articles.” Robert Kiley, Wellcome Trust

• If not blockbusters, then the “middle ground” template article emerges (neither the diligent, necessary work of confirmatory progress, nor risky moonshots, when arguably all types of inquiry are needed).
Open Access begins

• Emergence of the global north’s Open Access movement in 2001 was an attempt to tackle some of this. E.g. PLOS, BioMed Central, PubMed Central.

• The economics of a service are probably more consistent with notion of publishers adding value or facilitating science, rather than packaging and selling science.

• Now a genuine model of publishing, c.23% of the market (actually hard to study, since definitions of OA and ability to view at an article-level not ideal)

• Open Access → Focus on openness → Open Science
How might the economic setup of academic publishing have already influenced how you have conducted your science, or managed your career, so far?
Beyond Open Access (OA) to Open Science
Open Science definitions

The Royal Society, 2012

The National Academies of Science, Engineering and Medicine, 2018
Practical definition of Open Science

‘to ensure the free availability and usability of scholarly publications, the data that result from scholarly research, and the methodologies, including code or algorithms, that were used to generate those data.’

‘for researchers and non-researchers alike to retrieve, scrutinize and build directly on the work of investigators around the world.’
Philosophical definition of Open Science

‘Open inquiry is at the heart of the scientific enterprise’

Open Science typically refers to the entire process of conducting science, including the collaborative underpinnings of the scientific enterprise.
“Openness enables researchers to address entirely new questions and work across national and disciplinary boundaries.”

NASEM Report, Open Science by Design, 2018
Majority of Americans say they are more apt to trust research when the data is openly available

% of U.S. adults who say when they hear each of the following, they trust scientific research findings ...

<table>
<thead>
<tr>
<th>Data is openly available to the public</th>
<th>Less</th>
<th>More</th>
<th>Makes no difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reviewed by an independent committee</td>
<td>8%</td>
<td>57%</td>
<td>34%</td>
</tr>
<tr>
<td>Funded by the federal government</td>
<td>10%</td>
<td>52%</td>
<td>37%</td>
</tr>
<tr>
<td>Funded by an industry group</td>
<td>28%</td>
<td>23%</td>
<td>48%</td>
</tr>
<tr>
<td></td>
<td>58%</td>
<td>10%</td>
<td>32%</td>
</tr>
</tbody>
</table>

% of U.S. adults who say when they hear each of the following, they trust a science practitioner's recommendation ...

<table>
<thead>
<tr>
<th>Open to getting a second opinion</th>
<th>Less</th>
<th>More</th>
<th>Makes no difference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Based on review from an independent committee</td>
<td>7%</td>
<td>68%</td>
<td>23%</td>
</tr>
<tr>
<td>Received financial incentives from the government</td>
<td>17%</td>
<td>43%</td>
<td>38%</td>
</tr>
<tr>
<td>Received financial incentives from an industry group</td>
<td>37%</td>
<td>14%</td>
<td>48%</td>
</tr>
<tr>
<td></td>
<td>62%</td>
<td>10%</td>
<td>27%</td>
</tr>
</tbody>
</table>

Note: Respondents who did not give an answer are not shown.
Source: Survey conducted Jan. 7-21, 2019.
“Trust and Mistrust in Americans’ Views of Scientific Experts”
Trust, reliability, reproducibility

- Bias mitigation in study design
- Appropriate use of statistics
- Reagents validation

Disinterestedness & skepticism

Credit, no plagiarism

Protection of human research participants
Open Science?

It’s just science, done accordingly to its own norms
"Your best critic is your future self"
Thinking of your most recent scientific output, how might the future “you” (say in 10 years time) be able to reproduce and access everything that you are currently working on?

(When you might be at a completely different institution, have a different email address, Dropbox login)
Open Science in practice

....and in publishing
1 - Sharing as a research practice

In the lab, sharing:

• Data
• Code
• Methods/protocols
• Reagents

Journals’ roles:

Enforce → policies

Facilitate → partnerships
Probability of finding the data associated with a paper declined by 17% every year.


Image: Nature doi:10.1038/nature.2013.14416
PLOS journals require authors to make all data underlying the findings described in their manuscript fully available without restriction, at the time of publication.

>120,000 articles published in PLOS with Data Availability Statements

- 25% with data in public repositories
- Supplementary information in figshare

March 2014
Prepare to share

Think about it early

Data management plan

Ask for support
Authors are encouraged to deposit their laboratory protocols on the protocols.io site, obtain a unique DOI, and link directly to these from the Methods section of their articles.
2 - Reporting transparency

In your papers, detail:

- Design of experiments
- Use of statistics
- Disclosures:
  - Competing interests
  - Funding

Journals’ roles:

Checklists & guidelines

Reporting requirements
The effect of NXY-059 in experimental stroke

- 11 publications, 29 experiments, 408 animals
- Improved outcome by 44% (35-53%)

Macleod et al, 2008

Randomisation

Blinded conduct of experiment

Blinded assessment of outcome

Risk of bias in animal studies
Publication bias

The literature is not an accurate record of the universe of results obtained in laboratories worldwide but a skewed version of reality.
>200 journals have adopted Registered Reports

https://cos.io/rr/
3 - Open Science in journals processes

| Access & transparency | • Data, protocols, code, methods, reagents  
|                       | • Reporting requirements  
| Preprints             | Primacy, credit, peer feedback  
| Registered reports    | • Peer review before data collection  
|                       | • Acceptance in principle, regardless of outcome  
| Transparent evaluation| Publish peer review history  

[Image of PLOS logo]
Preprints – partnership with bioRxiv

Authors can choose to have their work posted to the bioRxiv preprint server upon submission to PLOS journals

- PLOS staff perform initial screening to determine suitability and match with bioRxiv’s scope
- Authors must opt-in at submission
- Editors can consider commentary on the preprint during the peer review process

Launched in May 2018

journals.plos.org/plosone/s/preprints
Published Peer Review at PLOS
Monthly submissions to bioRxiv

Richard Sever, bioRxiv, May 2019
It feels really hard....
Credit & transparency in author contributions

Persistent unique identifiers for researchers and scholars

Orcid.org

Machine- and human-readable taxonomy of contributions to research

http://casrai.org/CRediT
COLLECT & CONNECT WORKFLOW
— FUNDERS

CONNECT
award to record

PRE-FILL FORMS,
populate profiles

ASSERT
award

COLLECT
information from record

SYNCHRONIZE
with ORCID record

SYNCHRONIZE
with your systems

ENTER ONCE
REUSE OFTEN

RESEARCHER
https://orcid.org/
0000-0001-2345-6789

AUTHENTICATE
using the ORCID API

DISPLAY
in funding database

INCLUDE ID in metadata

PUBLISHERS | EMPLOYERS | FUNDERS

Synchronize with other systems
Smek promotes corticogenesis through regulating Mbd3’s stability and Mbd3/NuRD complex recruitment to genes associated with neurogenesis

Byoung-San Moon, Hyung-Mun Yun, Wen-Huean Chang, Bradford H. Staele, Mingyang Cai, Si Ho Choi

Published: May 3, 2017 • https://doi.org/10.1371/journal.pbio.2002328

Abstract

The factors that regulate neural progenitor cell differentiation and neuronal differentiation are important in corticogenesis, and potentially improve the regenerative capacity of neural progenitor cells (NPCs). In this study, we examined the role of Smek, a member of a conserved gene family that includes members in nematodes, flies, and mice. We found that Smek promotes Mbd3 downregulation and neuronal differentiation of NPCs. We propose that Smek promotes Mbd3 downregulation and neuronal differentiation of NPCs, which may explain its role in corticogenesis.
Sharing Detailed Research Data Is Associated with Increased Citation Rate
Heather A. Piwowar, Roger S. Day, Douglas B. Fridsma
Published: March 21, 2007 • https://doi.org/10.1371/journal.pone.0000308

Willingness to Share Research Data Is Related to the Strength of the Evidence and the Quality of Reporting of Statistical Results
Jelle M. Wicherts, Marjan Bakker, Dylan Molenaar
Published: November 2, 2011 • https://doi.org/10.1371/journal.pone.0026828
Thinking about your future self...

What might you do differently now?
Tying it all together
As competition for jobs and promotions increases, the inflated value given to publishing in a small number of so-called “high impact” journals has put pressure on authors to rush into print, cut corners, exaggerate their findings, and overstate the significance of their work.”

Alberts, Kirschner, Tilghman and Varmus, PNAS 2014

doi: 10.1073/pnas.1404402111
“Given finite resources, the importance placed on novel findings, and the emphasis on a relatively small number of publications, scientists wishing to accelerate their career progression should conduct a large number of exploratory studies, each of which will have low statistical power.”

Higginson and Munafo, PLOS Biology, 2016
doi: 10.1371/journal.pbio.2000995
Changing a Research Culture

Brian Nosek

- **Infrastructure**
- **User Interface/Experience**
- **Communities**
- **Incentives**
- **Policy**

- Make it required
- Make it rewarding
- Make it normative
- Make it easy
- Make it possible
We now accept preprints in grant applications

Reporting Preprints and Other Interim Research Products

Notice Number: NOT-OD-17-050

Key Dates
Release Date: March 24, 2017
Effective date for application: Applications submitted for the May 25, 2017 due date and thereafter
Effective date Research Performance Progress Report (RPPR): RPPR submitted on or after May 25, 2017

Related Announcements
NOT-OD-17-005 - Request for Information (RFI): Including Preprints and Interim Research Products in NIH Applications and Reports

Issued by
National Institutes of Health (NIH)

Purpose
The NIH encourages investigators to use interim research products, such as preprints, to speed the dissemination and enhance the rigor of their work. This notice clarifies reporting instructions to allow investigators to cite their interim research products and claim them as products of NIH funding.

Definitions
“With effect from 2021, all scholarly publications on the results from research funded by public or private grants provided by national, regional and international research councils and funding bodies, must be published in Open Access Journals, on Open Access Platforms, or made immediately available through Open Access Repositories without embargo.”
Demand support for Open Science workflows

- **Funders**: Expectations, evaluation & funds
- **Research institutions**: education, infrastructure & resources
- **Researchers**: Data and metadata capture & archival
- **Journals**: Easy inclusion of data in submission

Signals & credit
Update ORCID record

ORCID record for grant reporting

Compliance, reward
According to the culture change pyramid, all the required levels are now essentially present. What else do we need? It is probably going to be down to you guys... so let's discuss!
To accelerate progress in science and medicine by leading a transformation in research communication.

Thank you for listening!