Demystifying Citation Metrics

Michael Ladisch
Pacific Libraries
<table>
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<tr>
<th>No.</th>
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<th>Journal Impact Factor</th>
<th>Eigenfactor Score</th>
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<tr>
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<td>NATURE REVIEWS MOLECULAR CELL BIOLOGY</td>
<td>36,128</td>
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Outline

- Use and Misuse of Bibliometrics
- Databases for Citation Analysis
  - Web of Science
  - Scopus
  - Google Scholar
- Journal Ranking
  - Journal Citation Reports
  - ScImago Journal Rank
- Alt-metrics
- Your Resume
Not everything that can be counted counts, and not everything that counts can be counted.

William Bruce Cameron (1963) “Informal Sociology: A Casual Introduction to Sociological Thinking”
Bibliometrics

... is a set of methods to quantitatively analyze academic literature.

Metrics are **one indicator** used for

- Evaluation of research by individual researcher / group / institution
- Awarding research grants
- Recruitment / Promotion
- Discovering relevant publications
- Finding relevant journals

Be aware

- Measuring “Impact” not “Quality”
- Works better in some disciplines than in others
- Metrics are not the “whole picture”, no replacement for peer review
Bibliometrics

**Primary metrics:**
- Number of publications
- Number of citations received
- Collaborations
- Weighted Impact

**Secondary metrics:**
- Journal Impact Factor
- H-Index

**Types of metrics:**
- Journal metrics
- Author metrics
- Article metrics
- Alt-metrics
Many reasons for citing

• Acknowledge published or unpublished sources
• Highlight other sources
• Criticize other sources (negative citations)
• Self-citations
• “Strategic citations”
  • Citation networks
  • Publications in same journal/by same publisher
Bibliometrics

Citation = Citation?

Number of Authors / Contribution to publication

- Single author vs. multiple authors
- Position in author listing
Bibliometrics

Citation = Citation?

**Document types**
- Book
- Book chapter
- Review
- Article
- Conference paper
- Editorial
- Book review
- Note
- Letter to editor
- Correspondence

**Location in publication**
- Introduction
- Background
- Methods
- Results
- Discussion
- Conclusion

**Number of occurrences**
Bibliometrics

Citation = Citation?

Publication Year

Bibliometrics

Citation = Citation?

Discipline

http://www.harzing.com/data_metrics_comparison.htm#indivh
The Leiden Manifesto for research metrics

Use these ten principles to guide research evaluation, urge Diana Hicks, Paul Wouters and colleagues.

Data are increasingly used to govern science. Research evaluations that were once bespoke and performed by peers are now routine and reliant on metrics. The problem is that evaluation is now led by the data rather than by judgment. Metrics have proliferated: usually well intentioned, often well intentioned, often ill applied. We risk damaging the system with the very tools designed to improve it; as evaluation is increasingly implemented by organizations without knowledge of, or advice on, good practice and interpretation.

Before 2005, there was the Science Citation Index on CD-ROM from the Institute for Scientific Information (ISI), used by experts for specialist analyses. In 2002, Thomson Reuters launched an integrated platform, making the Web of Science database widely accessible. Competing citation indices were created. Thomson Reuters (released in 2006) and Google Scholar (beta version released in 2009). Web-based tools to easily compare institutional research productivity and impact were introduced, such as iScore (using the 24,000 of Science) and SciVal (using Scopus), as well as software to analyze individual citation profiles using Google Scholar (Plos or PNAS, released in 2007).

In 2005, Jorge Hirsch, a physicist at the University of California, San Diego, proposed the H-index, popularizing citation counting for individual researchers. Interest in the journal impact factor grew_etaed by altmetrics (see ‘Impact factor obsession’).

Lastly, metrics related to social usage.

The controversy:

“Quantitative evaluation should support qualitative, expert assessment.”

http://www.nature.com/news/bibliometrics-the-leiden-manifesto-for-research-metrics-1.17351
The Controversy

San Francisco DORA
Declaration on Research Assessment

http://www.ascb.org/dora/
H Index

my H-INDEX is bigger than yours
H-Index

Aims to capture both productivity (output) and impact (citations)

How many $h$ of a researcher’s publications have at least $h$ citations each.

Pro Contra

The h index is …

- Considering productivity and impact
- Comprehensible
- Easy to compute

- Not taking subject differences in account
- Disadvantaging early career researchers
- Distinguishing between single and multi-author articles
The Tools

- Scopus (Elsevier)
- Web of Sciences (Clarivate)
- Google Scholar
- Publisher Databases
The Tools

Web of Science Vs. Scopus Coverage

WoS
934

Scopus
8,432

11,377

Source: JISC http://adat.crl.edu
Vierra, Craig A.
University of the Pacific, California, Department of Biological Sciences, Stockton, United States.
Author ID: 6603228840

Documents: 29
- Citations: 534 total citations by 299 documents
  - h-index: 13
- Co-authors: 85

Subject areas:
- Biochemistry, Genetics and Molecular Biology, Materials Science

29 Documents | Cited by 299 documents | 85 co-authors

Molecular mechanisms of spider silk
  - 2006, Cellular and Molecular Life Sciences, 84

E2A expression, nuclear localization, and in vivo formation of DNA- and non-DNA-binding species during B-cell development
- Jacobs, Y., Vierra, C., Nelson, C.
  - 1993, Molecular and Cellular Biology, 58

Molecular and mechanical properties of major ampullate silk of the black widow spider, Latrodectus hesperus
- Lawrence, B.A., Vierra, C.A., Moore, A.M.F.
  - 2004, Biopolymers, 50
This author's h-index is 13

The h-index is based upon the number of documents and number of citations.

Note: Scopus is in progress of updating pre-1996 cited references going back to 1970. The h-index might increase over time.
Molecular and mechanical properties of major ampullate silk of the black widow spider, Latrodectus hesperus

Scopus Metrics

Citation Count
50
Cited by in Scopus

Field-Weighted Citation Impact
2.93

Citation Benchmarking
86th percentile
Compared to Polymers and Plastics articles of same age and document type

Cited by

50 Citations
Date range: 2013 to 2017

Benchmarking
Measures of activity relative to specific research domains, based on cited by in Scopus
Compared to Polymers and Plastics articles of the same age and document type
All Citations
86th Percentile
Web of Science

Results: 24
(in your subscription)

View the articles authored by:
Vierra, C
For: AUTHOR: Vierra, C ...More

Refine Results

Search within results for...

Sort by: Publication Date -- newest to oldest

1. Comprehensive Proteomic Analysis of Spider Dragline Silk from Black Widows: A Recipe to Build Synthetic Silk Fibers
By: Larmaca, Camille; Hekman, Ryan; Dymnes, Simmone; et al.
INTERNATIONAL JOURNAL OF MOLECULAR SCIENCES  Volume: 17  Issue: 9  Article Number: 1537
Published: SEP 2018

View Abstract

Create Citation Report
Citation report for 24 results from Web of Science Core Collection between 1990 and 2017.

- Total Publications: 24
- h-index: 13
- Sum of Times Cited: 524
- Citing articles: 293

Average citations per item: 21.83
Without self citations: 449
Without self citations: 273

Sum of Times Cited per Year

https://www.webofknowledge.com/
Marcos Gridi-Papp
University of the Pacific
animal comunication, auditory physiology, vocal physiology, amphibia, bioacoustics
Verified email at pacific.edu - Homepage

<table>
<thead>
<tr>
<th>Title</th>
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<tr>
<td>SoundRuler: acoustic analysis for research and teaching</td>
<td>98</td>
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<td>M Gridi-Papp</td>
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<td>Animal communication: complex call production in the túngara frog</td>
<td>70</td>
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<td>M Gridi-Papp, AS Rand, MJ Ryan</td>
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<td>Nature 441 (7089), 38-38</td>
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<td>Pure ultrasonic communication in an endemic Bornean frog</td>
<td>38</td>
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<td>VS Arch, TU Grafe, M Gridi-Papp, PM Narins</td>
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<td>PLoS One 4 (4), e5413</td>
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<td>Active control of ultrasonic hearing in frogs</td>
<td>26</td>
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<td>M Gridi-Papp, AS Feng, JX Shen, ZL Yu, JJ Rosowski, PM Narins</td>
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<td>Proceedings of the National Academy of Sciences 105 (31), 11014-11019</td>
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<td>Differential fruit consumption of two Melastomataceae by birds in Serra da Mantiqueira, southeastern Brazil</td>
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Citation indices

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<td>h-index</td>
<td>8</td>
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<tr>
<td>i10-index</td>
<td>6</td>
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Google Scholar Citations
http://scholar.google.com
Journal Metrics
Journal Citation Reports – Journal Impact Factor

- 55 Subject categories
- Uses Web of Science dataset
- Calculates 2 years period
<table>
<thead>
<tr>
<th>Year</th>
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<tr>
<td>2016</td>
<td>26,283</td>
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<tr>
<td>2014</td>
<td>24,324</td>
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<tr>
<td>2013</td>
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<td>2012</td>
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<tr>
<td>2011</td>
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<td>12.472</td>
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<td>2010</td>
<td>15,699</td>
<td>12.916</td>
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<td>------</td>
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<td>------------</td>
</tr>
<tr>
<td>3</td>
<td>Studies in Mycology</td>
<td>journal</td>
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<tr>
<td>4</td>
<td>Plant Cell</td>
<td>journal</td>
</tr>
<tr>
<td>5</td>
<td>Annual Review of Phytopathology</td>
<td>book serie</td>
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Scopus - CiteScore

Plant Cell
Scopus coverage years: from 1989 to Present
Publisher: American Society of Plant Biologists
ISSN: 1040-4651  E-ISSN: 1532-298X
Subject area: Agricultural and Biological Sciences: Plant Science

Visit Scopus Journal Metrics

CiteScore 2016
7.66
SJR 2016
5.516
SNIP 2016
2.102

CiteScore

2016
7.66

*CiteScore includes all available document types

Scopus content coverage

Calculated on 23 May, 2017

CiteScore rank
In category: Plant Science
Percentile: 98th
Rank: #5/379

View CiteScore trends
Add CiteScore to your site
Altmetrics
Altmetrics

"Altmetrics are measures of scholarly impact mined from activity in online tools and environments.”

Jason Priem, author of “Altmetrics: a manifesto”

Benefits:

• A more nuanced understanding of impact, showing us which scholarly products are read, discussed, saved and recommended as well as cited.
• Often more timely data, showing evidence of impact in days instead of years.
• A window on the impact of web-native scholarly products like datasets, software, blog posts, videos and more.
• Indications of impacts on diverse audiences including scholars but also practitioners, clinicians, educators and the general public.

New perspectives of impact

ACADEMIC IMPACT
- Journal Impact Factor
- Citation counts
- H-index
- Number of publications

Traditional bibliometrics
Can be slow to accrue

SOCIOETAL IMPACT
- Download counts
- Page views
- Mentions in news reports
- Mentions in policy
- Mentions in social media
- Mentions in blogs
- Reference manager readers
  - etc.

Alternative metrics
"altmetrics"
Altmetrics

Potentially “measured”

- Viewed (publisher websites, Dryad)
- Downloaded (publisher websites, Slideshare, Dryad)
- Shared (Facebook, Twitter)
- Reused/adapted (Github)
- Bookmarked (Mendeley, CiteULike, Delicious)
- Purchased (Library catalogues, Sales numbers)
- Commented upon (Twitter, Mendeley, blogs, publisher websites, Wikipedia, Faculty 1000)

Source: S. Konkiel, Univ. of Indiana
Altmetrics

Caveats

• Lack of standard
• Use of online tools may differ by individual researcher, discipline, over time
• Popularity (attention) does not always equal quality of research or researcher
• Was the spike in hits a one-time, short-attention event?
• Data sources come and go (think MySpace, Connotea)
• Open to manipulation and gaming
Altmetrics - Impactstory

http://impactstory.org/
Altmetrics – Altmetric.com

STATISTICS FROM ALTMETRIC.COM

64

Picked up by 2 news outlets
Blogged by 6
Tweeted by 7
Referenced in 3 Wikipedia
1829 readers on Mendeley
5 readers on CiteULike

See more details

Tools for researchers

It's quick and easy to start exploring the Altmetric data for your publications – here's an overview of the tools we provide for individual researchers:

Altmetric Bookmarklet
This free browser plug in lets you instantly see the Altmetric data for any publication with a DOI. Click on the donut to view the full details page for each output.

Altmetric badges
The Altmetric badges enable you to showcase the online attention surrounding your research, and it's free to embed them in your individual profile or publications page in just a few simple steps.

Altmetric API
The Altmetric API is free to use for research purposes! You can use it to query our entire database (which currently contains attention data for over 4 million research outputs).

https://www.altmetric.com/
The timing and spatiotemporal patterning of Neanderthal disappearance.

Citation data: Nature, ISSN: 1476-4687, Vol: 512, Issue: 7514, Page: 306-9
Publication Year: 2014
Your Resume

To include in your CV

- Books
- Book chapters
- Journal articles
- Conference papers
- Working papers
- Patents
- Government publications

Count and mention

- Number of citations
- Impact factor of journal
- Your h-Index
- Downloads/views from Repository
- Reviews of book or book chapter
Your Resume

Include also

- Datasets / Open Source Software (download statistics)
- Awards (best paper award etc.)
- Reviewing invitations (journals, conferences)
- Editorial board membership
- Interviews, public appearances
- Scholarly articles in newspapers/magazines
- Links to professional blogs and professional accounts in social media (Twitter, Facebook, ResearchGate, Academia.edu, LinkedIn, etc.)
Your Resume

Add Summary for Publications

Publications

**Summary:** Since 2004 I have published 21 peer-reviewed journal articles (18 as first/corresponding author) and 3 book chapters. I have an h-index of 6 as calculated using Web of Science or 7 as calculated using Google Scholar. The following lists ISI Impact Factors and citations according to Google Scholar.

*Peer-Reviewed Journal Articles (published or accepted for publication):*


Internet downloads

- 75,000 page downloads from my home page in 2009.
- Over 10,000 hits on INFFER web pages in 2009
- Most downloaded paper in *Australian Journal of Experimental Agriculture* since 2000 – effectively the all time most downloaded paper out of 1300 published in that time (have been no. 1 since May 2008 to present): Pannell, Marshall, Barr, Curtis, Vanclay and Wilkinson (2006).
- 17th most downloaded paper of all time in *Australian Journal of Experimental Agriculture*: Ridley and Pannell (2005).
Thank you!

Feel free to attend other Scholarly Communication Talks
For schedule see: http://scholarlycommons.pacific.edu/plw/

And check out the workshops provided by:
Office of Sponsored Programs
Institutional Review Board
Graduate School
Center for Teaching and Learning

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Twitter: MichaelLibrCA
ORCID: http://orcid.org/0000-0002-0124-5582