A fetish too far? (Alt)metrics in the groves of academe

Blaise Cronin
Rudy Professor Emeritus of Information Science
Indiana University
Canonicity vs. Iconicity
<table>
<thead>
<tr>
<th>Justin Bieber Statistics</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date Justin Bieber was born</td>
<td>3.1.1994</td>
</tr>
<tr>
<td>Number of YouTube video views</td>
<td>3.75 Billion</td>
</tr>
<tr>
<td>Number of songs from his My World album that reached the Billboard Hot 100</td>
<td>7 of 7</td>
</tr>
<tr>
<td>Number of Facebook fans</td>
<td>57,000,000</td>
</tr>
<tr>
<td>Number of Twitter followers</td>
<td>45,000,000</td>
</tr>
<tr>
<td>Box Office sales for Justin Bieber “Never Say Never”</td>
<td>$98,441,954</td>
</tr>
<tr>
<td>Time it took Justin Bieber to sell out Madison Square Garden</td>
<td>22 Minutes</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Justin Bieber Studio Album Sales Statistics</th>
<th>Albums Sold</th>
</tr>
</thead>
<tbody>
<tr>
<td>Believe</td>
<td>5,500,000</td>
</tr>
<tr>
<td>Under the Mistletoe</td>
<td>2,200,000</td>
</tr>
<tr>
<td>My World 2.0</td>
<td>5,100,000</td>
</tr>
<tr>
<td><strong>Total Albums Sold</strong></td>
<td><strong>12,800,000</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>My World Tour Statistics</th>
<th>Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Number of Shows</td>
<td>88</td>
</tr>
<tr>
<td>Total number of sold out shows</td>
<td>67</td>
</tr>
<tr>
<td>Total number of tickets sold</td>
<td>1,398,690</td>
</tr>
<tr>
<td>Total ticket sales revenue</td>
<td>$83,341,886</td>
</tr>
</tbody>
</table>
Beethoven vs. Bieber
Apples and oranges
Apples ... and apples
Dr. Beethoven vs. Dr. Bieber
The new phrenology?
The numbers game

‘Not everything that can be counted counts, and not everything that counts can be counted’

Willam B. Cameron, 1963
Segmenting an author’s oeuvre

- High Scholarly substance
- Low Scholarly substance
- Light Peer review
- Heavy Peer review

- Encyclopedia entry
- Technical report
- Book chapter
- ACM conf paper
- Nature article
- OUP monograph
- Keynote address
- Science blog
- Op ed
- Letter to the editor
- Tweet
Beyond bibliometrics

- Citations miss important traces/impacts & are lagged

- Online reference managers, slide-sharing services and social media capture impacts (??) in real-time
Forms of academic authorship

Author

Co-author
Gift author
Ghost author
Co-opted author

Sub-author

Unearned but granted
Earned but denied
Hired by Big Pharma

Acknowledgments – trusted peers, colleagues, technicians, funders, et al.
Credit Inflation

More and more scientists are sharing credit as co-authors on research papers, with a sharp increase in reports whose author counts exceed 1,000 people.

1,400 scientific papers

Source: Thomson Reuters Web of Science
‘Hyperauthorship’ (Cronin, 2001)

Words et alia

Contributions go well beyond words

Textual input

Instrumental contributions

Many hands

Few
Changing character of academic authorship

Then

Sole author

‘Wordy’, discursive, static texts; narrative; craft activity

Massive collaboration, fractionalization

Now

Data-intensive texts; visualizations; animations; dynamic texts; interactive data sets, software etc.
Authorial engagement

Trade-off

# of authors

Many

Few

Ownership/equity

High

Low

Quality control and public trust issues: division of labor and weakened accountability, error, fabrication, retraction…
Wellcome Trust: Contributorship

CRedit

An open standard for expressing roles intrinsic to research

This taxonomy provides a high-level classification of the diverse roles performed in the work leading to a published research output in the sciences. Its purpose to provide transparency in contributions to scholarly published work, to enable improved systems of attribution, credit, and accountability.
International Association of STM Publishers: Author Contributorship Badges

- **Resources**
  - Edward Gomperts
  - Stephen J. O’Brien
  - Mark Van Natta
  - Efe Sezgin
  - Sharyne Donfield

- **Data Curation**
  - Nikolay Cherkasov
  - Anton Svitin

- **Methodology**
  - Nikolay Cherkasov
  - Pavel Dobrynin
  - Stephen J. O’Brien
  - Holli Dilks
  - Anton Svitin
  - Oleksyk Taras
  - Sergey Malov

- **Formal Analysis**
  - Nikolay Cherkasov
  - Pavel Dobrynin
  - Stephen J. O’Brien
  - Anton Svitin
  - Andrey Shevchenko
  - Efe Sezgin
  - Sergey Malov

- **Testing**
  - Nikolay Cherkasov
  - Pavel Dobrynin
  - Anton Svitin
  - Andrey Shevchenko
  - Efe Sezgin
  - Sergey Malov

- **Writing - Initial Draft**
  - Nikolay Cherkasov
  - Pavel Dobrynin
  - Stephen J. O’Brien
  - Anton Svitin
  - Andrey Shevchenko
  - Sergey Malov

- **Computation**
  - Nikolay Cherkasov
  - Pavel Dobrynin
  - Anton Svitin
  - Efe Sezgin
  - Oleksyk Taras
  - Sergey Malov

- **Investigation**
  - Pavel Dobrynin

- **Writing - Review**
  - Stephen J. O’Brien
  - Holli Dilks
  - Anton Svitin
  - Efe Sezgin
  - Oleksyk Taras
  - Sergey Malov

- **Conceptualization**
  - Stephen J. O’Brien
  - Holli Dilks
  - Anton Svitin
  - Efe Sezgin
  - Oleksyk Taras
  - Sergey Malov
Evolving culture of metrics

Yesterday (c. 1955): ISI’s Citation indexes (*SCI*, *SSCI* A&HCI)


Today/Tomorrow: Social media monitoring & analytics (*e.g.*, altmetric.com)
Measuring article impact

- Reputation of journal
- Journal Impact factor
- No. of citations
- Quality of citations
- Persistence of citations

***********

- Times accessed
- Times downloaded
- Inclusion in syllabi
- Media mentions
  etc.
Anticipating altmetrics: ‘Invoked on the Web’ (Cronin et al., 1998)

‘polymorphous mentioning’

‘presence density’

‘diverse ways in which academic influence is exercised and acknowledged’
Scholarly buzzometer – an attention economy (H. Simon)
‘Researchers must ask if altmetrics really reflect impact, or just empty buzz.’

http://altmetrics.org/manifesto/
Effects of research

Immediate vs. delayed impacts

Scholarly vs. professional vs. social impacts

Read vs. cited vs. used

Substance vs. buzz
Article-level metrics

• Real-time
• Multi-dimensional
• Countable

*******

• Ego-boosting
• Behavior-modifying
• Culturally corrosive?

Is my research making an impact?
The Altmetric score is one measure of the quality and quantity of online attention that this article has received. You can read about how Altmetric scores are calculated here.

This article scored 707.22

The context below was calculated when this article was last mentioned on 3rd January 2014

Compared to all articles in Nature
So far Altmetric has tracked 22,562 articles from this journal. They typically receive a lot more attention than average, with a mean score of 35.3 vs the global average of 4.5. This article has done particularly well, scoring higher than 99% of its peers.

All articles of a similar age
Older articles will score higher simply because they’ve had more time to accumulate mentions. To account for age we can compare this score to the 48,625 tracked articles that were published within six weeks on either side of this one in any journal. This article has done particularly well, scoring higher than 99% of its contemporaries.

Other articles of a similar age in Nature
We’re also able to compare this article to 621 articles from the same journal and published within six weeks on either side of this one. This article has done very well, scoring higher than 97% of its contemporaries.

All articles
More generally, Altmetric has tracked 1,768,495 articles across all journals so far. Compared to these this article has done particularly well and is in the 99th percentile: it’s in the top 5% of all articles ever tracked by Altmetric.
Academic social capital

• Highly ‘liked’
• Much tweeted/followed
• Heavily blogged
• Frequently recommended
• Often quoted in the media
Genres of altmetrics

Taylor & Plume (2014)

Altmetrics

Social activity
(tweets, ‘likes’)

Mass media
(news coverage)

Scholarly commentary
(scientific blogs)

Scholarly activity
(reference managers)
Not to be confused!

Social capital  Symbolic capital
Attention ≠ Impact
Complementary metrics

- Acknowledgments
- Data citation counts
- Micro-attributions for data curation
- Social media mentions
- Recommendations
- Downloads
- Mentions in extra-scientific texts
- Press coverage etc., etc...
Mathematical Foundations of Computer Science 2012

EDITORS  Brnaislav Rovan  ·  Vladimir Sassone  ·  Peter Widmayer
ISBN  9783642325892  ·  9783642325885
DOI  10.1007/978-3-642-32589-2

CITATIONS  22
MENTIONS  80
READERS  110
DOWNLOADS  29k
REVIEWS  0

CITATIONS SUMMARY

Showing 1–20 of 22 total citations.

2015

A Bounded Budget Network Creation Game
Journal article in ACM Transactions on Algorithms

Centrality measures-based algorithm to visualize a maximal common induced subgraph in large communication networks
Journal article in Knowledge and Information Systems

Deciding Determinism of Regular Languages
Journal article in Theory of Computing Systems

On the Parameterized Complexity of Computing Balanced Partitions in Graphs
Journal article in Theory of Computing Systems

Structural Parameterizations for Boundedness
Journal article in Algorithmica

Synthesizing structured reactive programs via deterministic tree automata
Journal article in Information and Computation

Pancake Flipping is hard
Journal article in Journal of Computer and System Sciences

An Audit Tool for Genome Rearrangement Algorithms
Journal article in Journal of Experimental Algorithmics

Uniform strategies, rational relations and jumping automata
Journal article in Information and Computation
The hunt for correlations...

- Citations in *Wikipedia* and *JCR* data (Nielsen, 2007)
- Article *tweets* and *citations* (Eysenback, 2012)
- *F1000* score and *JIF* (*Nature Neuroscience*, 2005)
- Inclusion in *reference managers* and *citations* (Bar-Ilan, 2012)
- *Downloads* and subsequent *citations* (Brody et al., 2006; Nieder, Dalhaug, Aandahl, 2013)
- *Citations in blogs* and subsequent *citations* (Shema, Bar-Ilan, Thelwall, 2013)
- *Altmetrics* and *citations* (Thelwall, Haustein, Larivière & Sugimoto, 2013; Costas, Zahedi & Wouters, 2014)

*Etc., etc., ....*
Downloads vs. citations ScienceDirect

(Moed, 2012)
Downloads & citations

Nieder, Dalhaug & Aandah (2013)
Twitter mentions & arXiv downloads

Shuai, Pep, Bollen (2012)
1 citation = ? tweets

- Citations
- Acknowledgments
- Downloads
- Tweets
- ‘Likes’
- etc.
(Alt)metrics issues

Metrics
- Validity
- Reliability
- Utility
- Ethicality

Platforms
- Transparency
- Usability
- Persistence
- Cost/benefit ratio
Mirror, mirror on the wall, who is the fairest of them all?

‘Users, narcissism and control – tracking the impact of scholarly publications in the 21st century’

Wouters & Costas (2012)
Google Scholar: Ego-boosting/deflating

Blaise Cronin
Rudy Professor Emeritus of Information Science, Indiana University Bloomington, USA
Bibliometrics, Informetrics, Scientometrics, Webometrics, Scholarly Communication
Verified email at indiana.edu

<table>
<thead>
<tr>
<th>Title</th>
<th>Cited by</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>The citation process. The role and significance of citations in scientific communication</td>
<td>801</td>
<td>1984</td>
</tr>
</tbody>
</table>

Using the h-index to rank influential information scientists.

Citation indices
- Citations: 7501 (3139 since 2010)
- h-index: 44 (26 since 2010)
- i10-index: 138 (79 since 2010)
Trivial pursuits

YOUR RESEARCH IS IN THE SPOTLIGHT

With 18 new citations, you were the most cited researcher from your department in June.

Go to your home feed

Congratulations, Blaise. Your achievement has been included directly on the home feeds of your colleagues and co-authors.
Reads: your stats simplified

With improved accuracy and real-time updates, reads shows you exactly how much exposure your work is getting using one straightforward metric.

LEARN MORE
Scholarly Panopticon?

‘an Orwellian surveillance net’

‘cybernating the academy’

Sosteric, 1999
The Holy Grail of holism

A matrix of established & alternative metrics?

A unified measure/composite score (a super h-index)?
The i-Space
Indicators of Impact

Scholarly

h-index

Google Scholar

F1000 ratings

Views & downloads

Institutionalized

Acknowledgments

Bookmarks

Media mentions

Social

Wiki cites

Twitter mentions

Facebook ‘likes’
New Age numerology?

- Atomization of inputs, outputs and impacts
- Fetishization of metrics
- Transparency vs. triviality
- Immediacy vs. canonicity
- Goal displacement?
Ten principles

1. Quantitative evaluation should support qualitative, expert assessment
2. Measure performance against the research missions of the institution, group or researcher,
3. Protect excellence in locally relevant research
4. Keep data collection and analytical processes open, transparent and simple
5. Allow those evaluated to verify data and analysis
6. Account for variation by field in publication and citation practices
7. Base assessment of individual researchers on a qualitative judgement of their portfolio.
8. Avoid misplaced concreteness and false precision
9. Recognise the systemic effects of assessment and indicators
10. Scrutinize indicators regularly and update them.
“research metrics can provide crucial information that would be difficult to gather or understand by means of individual expertise. But this quantitative information must not be allowed to morph from an instrument into the goal.”
Responsible metrics (Hefce)

- **Robustness**: basing metrics on the best possible data in terms of accuracy and scope;
- **Humility**: recognizing that quantitative evaluation should support – but not supplant – qualitative, expert assessment;
- **Transparency**: keeping data collection and analytical processes open and transparent, so that those being evaluated can test and verify the results;
- **Diversity**: accounting for variation by field, and using a range of indicators to reflect and support a plurality of research and researcher career paths across the system;
- **Reflexivity**: recognizing and anticipating the systemic and potential effects of indicators, and updating them in response.
Suggested readings

BEYOND BIBLIOMETRICS
Harnessing Multidimensional Indicators of Scholarly Impact

edited by BLAISE CRONIN and CASSIDY R. SUGIMOTO

SCHOLARLY METRICS
UNDER THE MICROSCOPE

Edited by Blaise Cronin and Cassidy R. Sugimoto
The Metric Tide

Report of the Independent Review of the Role of Metrics in Research Assessment and Management

July 2015
THEORIES OF INFORMETRICS AND SCHOLARLY COMMUNICATION

Altmetrics for Information Professionals
Past, Present and Future