

Defining and Measuring 'Impact'

Publication metrics, politics and the academic environment



What Does 'Impact' Mean?

Most publication metrics are taken to measure quality, yet the reality is far more complex. I often hear that we need metrics to take us *beyond citations* – but the association of citations and other metrics is a false one.

- Citation metrics measure the level of 'impact' a paper has had on published research.
- Usage metrics measure the popularity of a paper within the journal's readership.
- Altmetrics measure the extent to which a paper is discussed on social media platforms.

Things to consider ...

- What external factors can influence these metrics?
 - What do metrics REALLY measure?
 - Can they be compared?
 - What can a *journal-level metric* tell us about the quality of a contributing paper or author?
 - Can the underlying dataset be trusted?

Interrogating Metrics

- Investigate the parameters – and quality – of the underlying dataset.
 - What is the content selection process? Is it robust?
 - What assumptions are made by the metric calculation? Are these assumptions valid for the use you wish to make of the metric?
 - Can the metric be ‘gamed’? What steps are in place to prevent this from happening?
 - Stripped of rhetoric, what does the metric actually mean?
 - Can the metric be used – fairly – to rank articles, journals, institutes or authors? What might be the consequences?
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Ranking Academics

Many governments and funding agencies measure academic performance using metrics such as research output and citations. However, the process is riddled with assumptions.

- Data source: Is a citation index used? Which one? Does it have even discipline and regional coverage?
- Are academics ranked according to article-level data, or according to the 'rank' of their publication platform? If the latter – what types of media are included, what are excluded?
 - Journal articles, blogs, datasets, policy documents, books, patents (etc)
- Are other aspects of an academic's work taken into account?
 - Reviewing papers, teaching, administration
- What are the potential consequences of ranking academics?



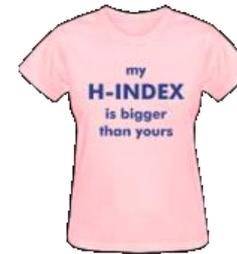
Author Rankings

Probably the most famous is the H-Index.

- If an academic has an H-Index of 10, they have published 10 papers with a **minimum** of 10 citations each.

Problems with the H-Index

- **No defined citation database**
- **No defined citation or publication window**
- **No secure way to identify unique authors in any citation database**



Academic X publishes 20 papers in a 40 year career. His/her H-Index is 10. Academic Y publishes 9 papers in a 5 year career. **Even if every paper receives 1000 citations, Academic Y's H-Index can not be higher than 9.**

Who gets hired, if both academics put their H-Index on their C.V? And what are the unintended consequences of making employment or funding decisions based upon author metrics?

Premise

The Impact Factor is increasingly used by funding organisations, institutions and government bodies to compare research output at an individual or institutional level, without considering the limitations of the metric.

DORA's Suggestions:

Stop using journal metrics to evaluate individuals – i.e. for hiring, promotion or funding decisions.

When assessing research, consider all research outputs (not just publications), and consider a range of impact measures including qualitative indicators of research impact, such as influence on policy and practice.

For publishers:

Stop promoting the Impact Factor, or balance with other metrics.

Make available a range of article-level metrics to encourage a shift toward assessment based on the scientific content of an article rather than publication metrics of the journal in which it was published.

Whether a journal is open-access or subscription-based, remove all reuse limitations on reference lists in research articles and make them available under the Creative Commons Public Domain Dedication.

Remove or reduce the constraints on the number of references in research articles, and, where appropriate, mandate the citation of primary literature in favour of reviews in order to give credit to the group(s) who first reported a finding.

Citation Metrics

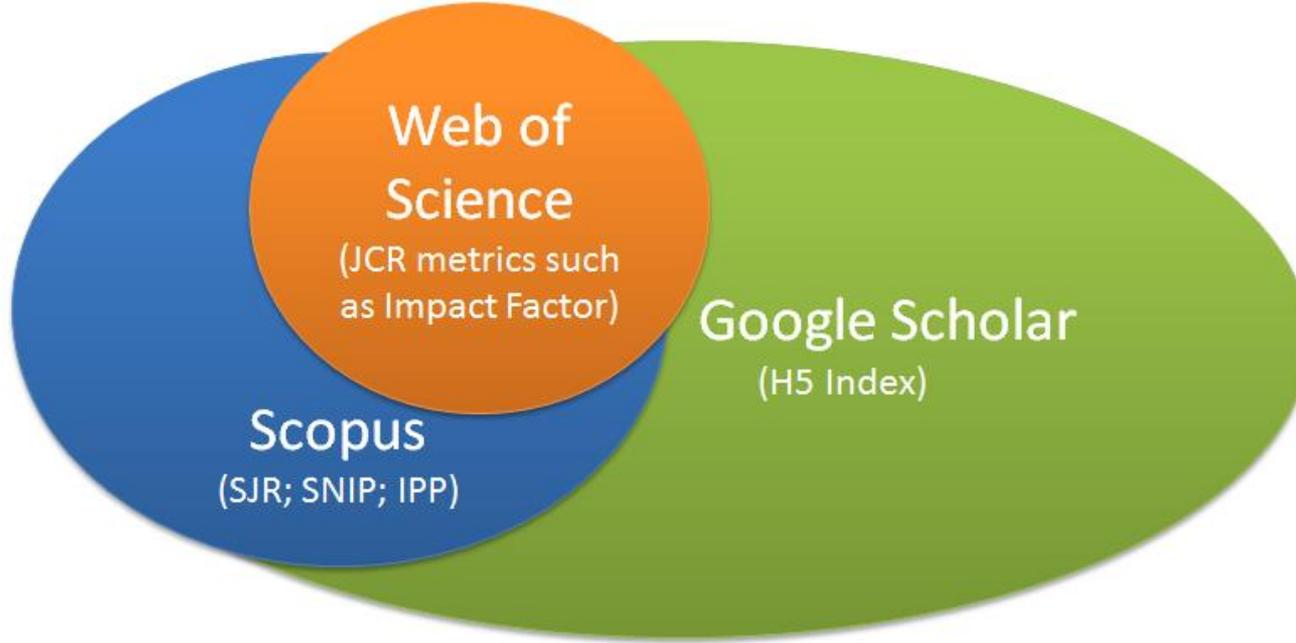
- Citation metrics measure the reuse of research within the *published academic community*.
- 'Quality' is assumed by the understanding that have had an *impact* upon the research that cited them.

What Factors Influence Citation Metrics?

- Discipline
- Discipline coverage in citation index
- Research type
- Publication date
- Citation manipulation
- ... Open Access?



Citation Metrics – Data Sources



Remember that a citation database will only count a citation if both the cited and citing paper are indexed. Each index may show a different number of citations for the same paper.

However, when selecting an index, it is important to rank database size against data quality, and to carefully consider the implications of your choice.

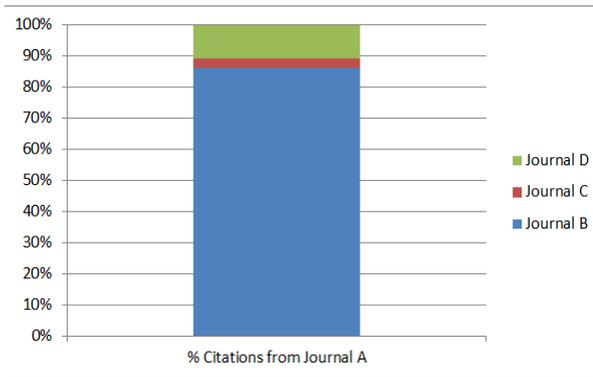
Citation Stacking vs. Self Citation

Many factors can influence the rate of citation, thereby distorting the metrics and ranks of journals. Sometimes, 'anomalous' citation patterns are discovered which unduly influence the rankings. In extreme cases, Thomson Reuters omit such titles from the JCR.

Self Citation

The practice by which an author cites their own research, OR the practice by which a journal cites other papers published in the journal.

Self Cites	1019 (1% of 62604)
Self Cites to Years Used in Impact Factor Calculation	205 (3% of 6215)
Impact Factor without Self Cites	4.740



Citation Stacking

The practice by which certain journals disproportionately cite other publications. There is typically a 'donor' journal which 'donates' citations to the 'recipient' journal.

Popular Citation Metrics

5-Year Impact Factor – Citations in the census period (2013) to papers published in the target period (2008-2012), divided by the number of citable items published during the target period (2008-2012).

Immediacy index – Citations in the census period (2013) to papers published in the target period (2013), divided by the number of citable items published during the target period (2013).

Impact Factor – Citations in the census period (2013) to papers published in the target period (2011-2012), divided by the number of citable items published during the target period (2011-2012).

H-index - An article level measure designed to evaluate individual authors, but which can be extended to any set of publication data. The H-index indicates the number of papers, H, that have been cited at least H times, e.g. an H-index of 15 means that 15 papers have been cited at least 15 times each. Numerous H-index variants have been proposed. Google Scholar use the H5 Index: <http://www.google.com/intl/en/scholar/metrics.html#metrics>

SJR -The SJR (SCImago Journal Rank) Indicator is a journal metric derived from Scopus data . It weights citations according to the quality of the citing journal. Similar to the Google PageRank algorithms.

SNIP - The SNIP (Source Normalised Impact per Publication) weights citations by subject category, thereby making metrics comparable across different disciplines.

Usage Metrics

Usage metrics measure the popularity of a paper within the journal's readership.

Traditional usage metrics

- Full text downloads / access denied reporting / Usage Factor?
- Usage per article / cost per download
- Data should be from a COUNTER-compliant source

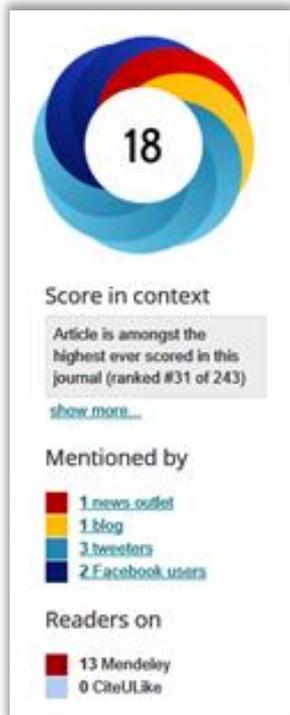
Web Metrics

- Page metrics (i.e. no. views, no. clicks)
 - User metrics (unique visitors, length of visit, referrer traffic)
- 

Factors Influencing Usage Metrics

- Defining the variable (does 'usage' mean 'full text downloads'? Does it include both html and pdf?).
 - Web crawlers and bots (controlling for usage 'spikes').
 - Geographical location and internet availability.
 - Matching IP ranges to end users is often imprecise.
 - Journal platform (is the journal available from multiple sites?).
 - Promotional or self-usage.
 - Open Access (but some of this is due to crawlers).
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Altmetrics



Altmetrics measure the extent to which an article is discussed in the online community. Not to be confused with the company Altmetric.com.

The score is a reflection of the number of mentions an article has received, weighted by:

- The source of the mention (calculating the relative value of a FB 'like' vs a 'tweet');
- The profile strength of the author mentioning the article.

The colour strands of the Altmetrics 'donut' reflects the variety of web sources referencing a paper.

On 8th July 2014 (following a successful trial on Open Access titles), Wiley launched a trial of Altmetrics across all journals.

When is a tweet not a tweet? Altmetrics and Data Quality

There are a few companies that deal with altmetrics, most notably Altmetric.com and Lagotto (created by PLOS). However, just because they both publish 'article level metrics', does not mean they are comparable.

Zoreh Zahedi (CWTS, University of Leiden) outlined some of the differences in the recent 2AM conference in Amsterdam:

- The Mendeley counts shown in Altmetric.com ignore articles which have ONLY Mendeley usage but nothing else
- Reddit counts in Altmetric.com include only the posts, Lagotto (the „competitor“) counts all comments
- Twitter counts are harvested in real-time by Altmetric.com and include everything (incl. retweets), Lagotto uses the public API which is limited to 100 tweets per DOI
- For Facebook, Altmetric counts only public posts but Lagotto adds up posts, likes and shares

Zoreh Zahedi in the „[Standards in Altmetrics](#)“ session

In June 2013, a NISO working group was formed to establish a code of best practice.



Altmetrics, Self-Impact and Gaming

We have already looked at the question of self-citation and citation stacking in relation to citation metrics – but what about in usage metrics? What about in altmetrics?

Euan Adie, founder of Altmetric.com, asks how we define ‘gaming’ in relation to altmetrics – and even if such a line can be drawn, how can it be policed?

- Alice has a new paper out. She tweets about it. HootSuite automatically posts all of her tweets to Facebook and Google+.
- Alice has a new paper out. She writes about it on her lab’s blog and sends an email highlighting it to a colleague who reviews for Faculty of 1000.
- Alice has a new paper out. She asks her colleagues to share it via social media if they think it’d be useful to others.
- Alice has a new paper out. She asks those grad students of hers who blog to write about it.
- Alice has a new paper out. She believes that it contains important information for diabetes patients and so pays for an in-stream advert on Twitter.
- Alice has a new paper out. She believes that it contains important information for diabetes patients and so signs up to a ‘100 retweets for \$\$\$’ service.

Adie, E – ‘Gaming Altmetrics’, Sept 18 2013, <http://www.altmetric.com/blog/gaming-altmetrics/>

Pros

- More ‘immediate’ measurements (whereas citations can take a significant amount of time to build up).
- Not reliant on inclusion in a citation index.
- Diverse tools for measuring different aspects of readership and usage.

Cons

- Difficulties with standardisation and data-capture.
- How should different types of altmetric be weighted?
- How can we distinguish between genuine traffic, advertising and self-promotion?
- Uneven distribution of global internet access leads to distortion.

What are the likely characteristics of articles that achieve high altmetric scores?



Sexual Medicine

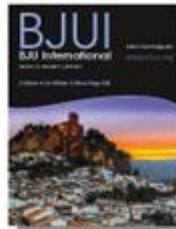
Am I normal? A systematic review and construction of nomograms for flaccid and erect penis length and circumference in up to 15 521 men

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What Can Be Measured?

Citation Metrics

i.e. Impact Factor, SNIP, H-Index, Eigenfactor, article-level metrics.

Author surveys
and peer review?

Submission
statistics?

Usage Metrics / Web Metrics

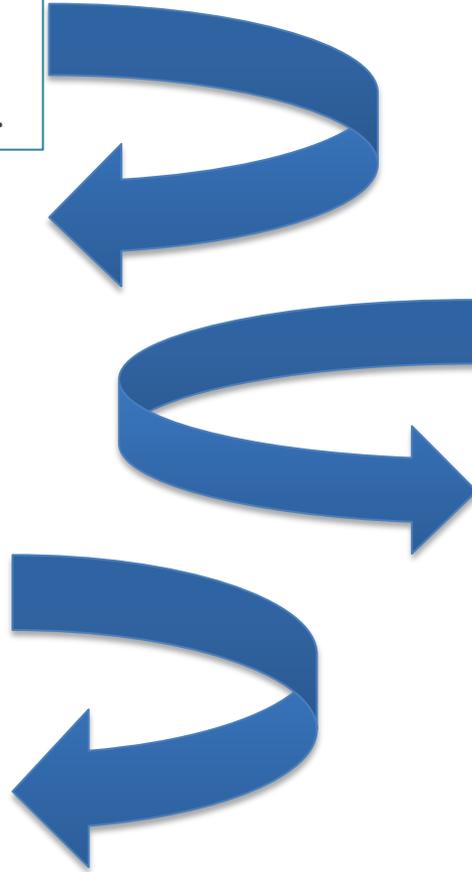
i.e. Full text downloads, usage-per-article, page views.

Altmetrics

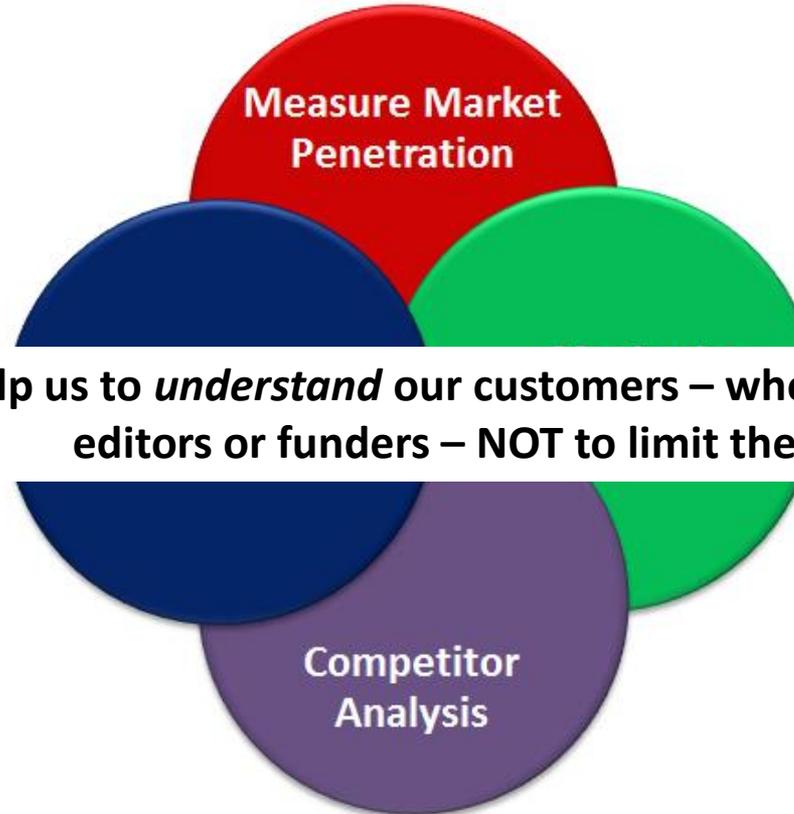
Based on Facebook likes, tweets, blog mentions, etc.

Network
analysis?

Quality Metrics?



How Should We Use Metrics?



Metrics should help us to *understand* our customers – whether authors, institutes, editors or funders – NOT to limit them.

Thank you