



# Article-level and alternative metrics: Tracking other indicators of impact online

Jean Liu, MSc

Data Curator and Blog Editor, Altmetric

University of Sussex, 12 September 2013

# Every researcher is a communicator

## **Within academia**

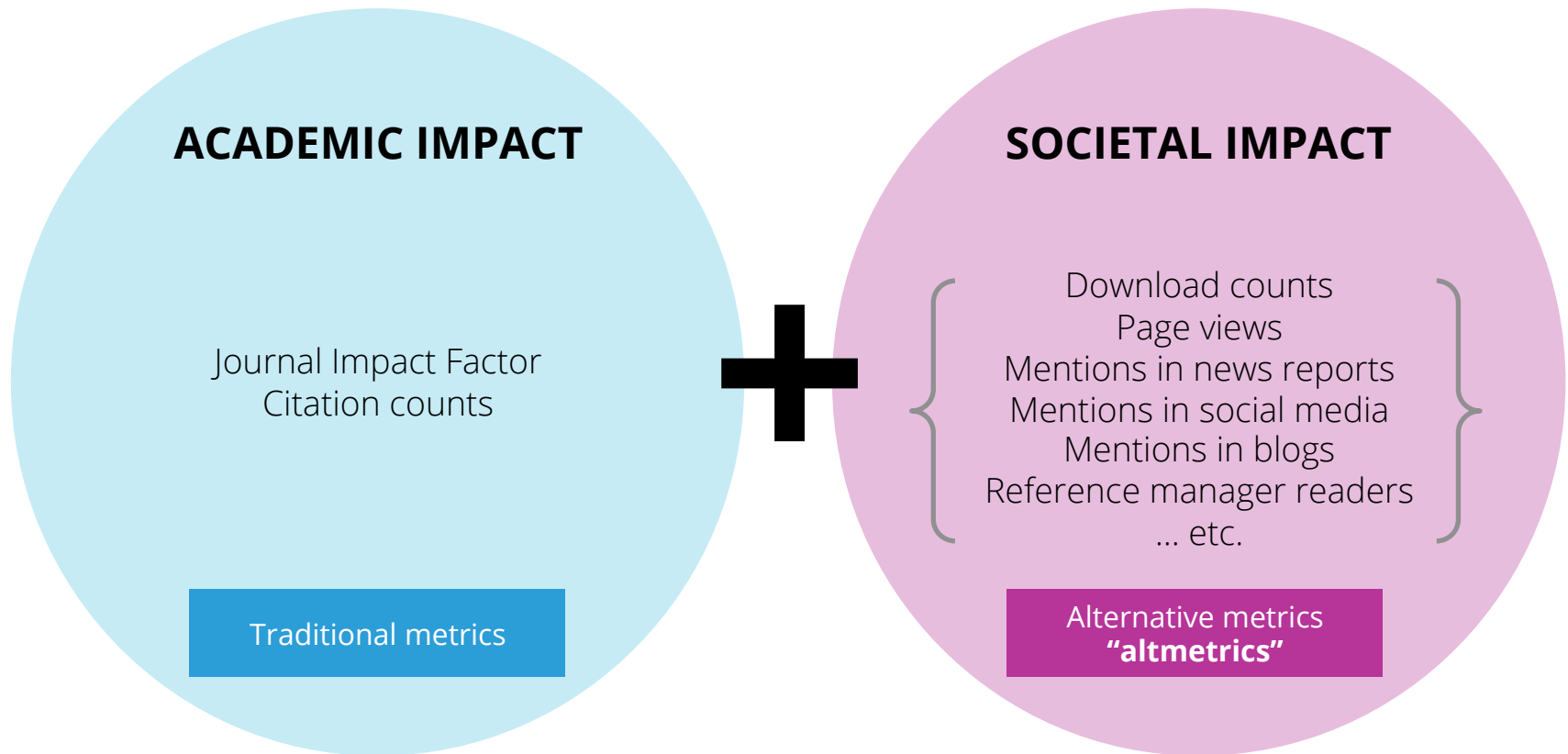
Presentations and seminars  
Funding and ethics applications  
Academic books  
**Journal articles** and posters  
Term papers and essays  
Meetings and conferences  
Correspondence

## **Within society**

Speaking at public events  
Books for general audiences  
**Press**  
**Social media**  
**Blogs**

How can we measure both  
**academic** and **societal research impact?**

# New perspectives of impact



# Do Altmetrics Work? Twitter and Ten Other Social Web Services

Mike Thelwall<sup>1\*</sup>, Stefanie Haustein<sup>2</sup>, Vincent Larivière<sup>3</sup>, Cassidy R. Sugimoto<sup>4</sup>

<sup>1</sup> School of Technology, Université du Québec à Montréal, Montréal, Québec, Canada, <sup>2</sup> Institut de Recherche en Information Scientifique, Université de Montréal, Montréal, Québec, Canada, <sup>3</sup> Centre de Recherche en Information Scientifique, Université de Montréal, Montréal, Québec, Canada, <sup>4</sup> School of Information Systems, University of California San Diego, La Jolla, California, United States of America

2013, *Nature*, 493, 159

COMMENT

## Value all research products

A new funding policy by the US National Science Foundation represents a sea-change in how researchers are evaluated, says **Heather Piwowar**.

**W**hat a difference a word makes. For all new grant applications from 14 January, the US National Science Foundation (NSF) asks a principal investigator to list his or her research “products” rather than “publications” in the biological sketch section. This means that, according to the NSF, a scientist’s research is not dependent solely on publications, data sets, software and other non-traditional research products will count too.

There are more diverse research products now than ever before. Scientists are developing and releasing better tools to improve their workflow, check each other’s

game, because it will alter how scientists assess research impact.

The new NSF policy states: “Acceptable products must be citable and accessible including but not limited to publications, data sets, software, patents, and copyrights.”

Altmetric.com (also supported by Digital Science) reveals the impact of anything with a digital object identifier (DOI) or other standard identifier. It can find mentions of a data set in blog posts, tweets and mainstream media (see [go.nature.com/yche8g](http://go.nature.com/yche8g)).

### Perspective

## An Introduction to Social Media for Scientists

Holly M. Bik<sup>1\*</sup>, Miriam C. Goldstein<sup>2,3</sup>

<sup>1</sup> UC Davis Genome Center, University of California Davis, Davis, California, United States of America, <sup>2</sup> Scripps Institution of Oceanography, University of California San Diego, La Jolla, California, United States of America, <sup>3</sup> California Sea Grant, La Jolla, California, United States of America

Understanding and refining altmetrics is a growing field of research.



## What are “altmetrics”?

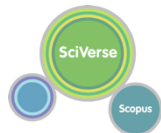
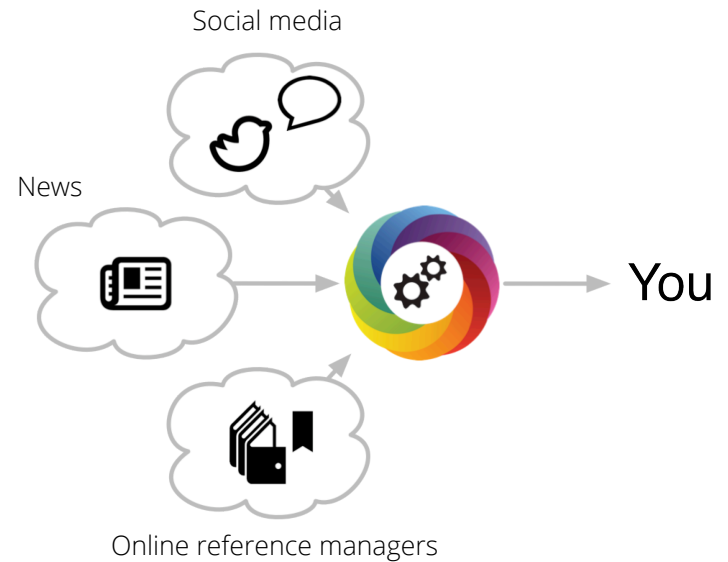
- “alternative metrics”
- new ways of measuring different, non-traditional forms of impact.
- “alternative to *only using* citations”, not “alternative to citations”.
- *complementary* to traditional citation-based analysis.

Article-level metrics have come to refer to the altmetrics surrounding a scholarly article.



## What does Altmetric do?

- Measures online attention surrounding journal articles and datasets.
- Collects and delivers article-level metrics to journal publishers.



Each day, scholarly articles receive **~12,000** new mentions across social media, news, and blogs.

Each week, **~20,000** unique articles are shared.

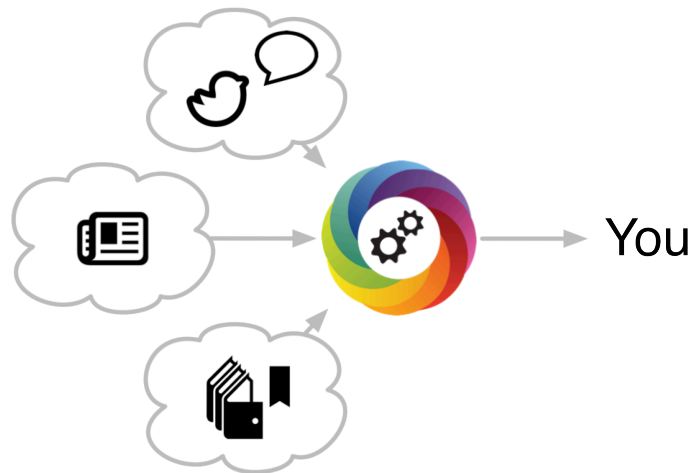
That's 1 mention every 7 seconds!

Mentions range in complexity, from quick shares to comprehensive reviews.

Article-level metrics are worth paying attention to.



# Building an altmetrics tool





# Challenges for altmetrics toolmakers



1. What should be measured?
2. Which sources of data should be used?
3. How should the data be collected?
4. How can the data be interpreted?

# How does Altmetric measure attention?



- We follow a specific list of sources from all over the web.
- From these sources, we collect any mentions that contain links to papers.
- We collate the attention paid to different versions of the same paper.
- Our users see the raw metrics and the actual conversations that make up the numbers.



Editorial

## Are conservation biologists working too hard? ☆

Ahimsa Campos-Arceiz<sup>a</sup>,  , Lian Pin Koh<sup>b</sup>, Richard B. Primack<sup>c</sup>

<sup>a</sup> School of Geography, University of Nottingham Malaysia Campus, Jalan Broga, Semenyih 43500, Selangor, Malaysia

<sup>b</sup> Department of Environmental Systems Science, ETH Zurich, CHN G 73.2, Universitatstrasse 16, CH-8092 Zurich, Switzerland

<sup>c</sup> Biology Department, Boston University, 5 Cummington Street, Boston, MA 02215, USA

[Open Access](#)

### Highlights

- We analyze the work habits of conservation biologists contributing to Biological Conservation.
- Conservation scientists conduct substantial amount of work on weekends and after office time.
- There are geographical differences in the tendency to work on weekends or after office time.
- Over time there has been a gradual increase in the tendency to conduct work on weekends.

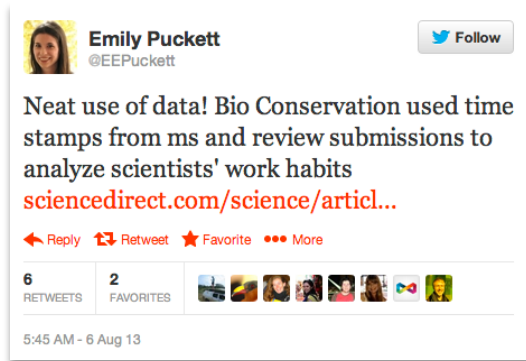


Close ×

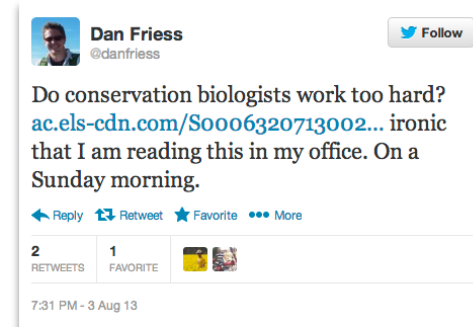
Tweeted by **100**  
Blogged by **3**  
On **12** Facebook pages  
Mentioned in **2** Google+ posts  
Picked up by **4** news outlets  
**1** reader on Mendeley  
**0** readers on CiteULike  
[Click for more details](#)

# Sources of Attention

## Twitter and Other Social Media



~11,000 tweets mention papers per day

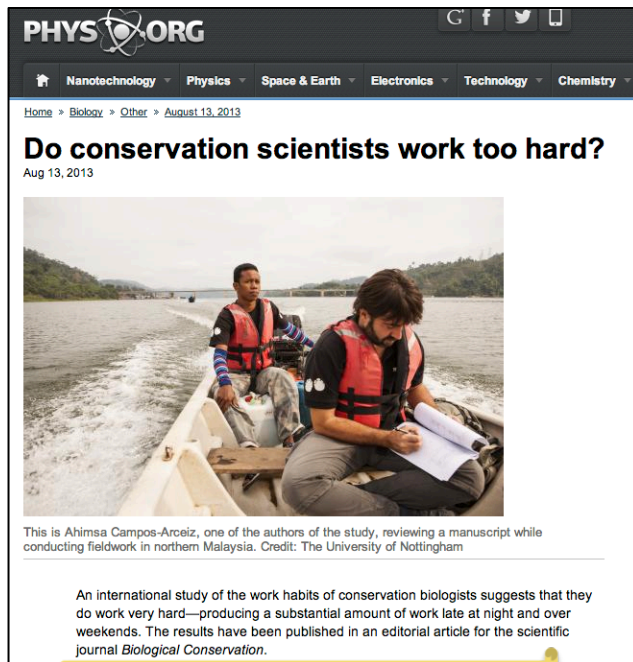


However...

- Only public posts are collected.
- Pre-2011 Twitter data are not available.
- Facebook 'likes' are not counted.

# Sources of Attention

## Mainstream News Outlets



~2,100 news reports mention papers per week

## Tracking mentions in the news

1. Search within a manually curated list of nearly 500 news outlets from around the world.
2. Text-mine English news reports for mentions of scholarly papers.

## How the text-mining mechanism works

- Keywords: journal title and author name.
- Publication date of news report.
- Search PubMed database for articles published -100 and +100 days surrounding the news report's publication date.

# Sources of Attention

## Blogs



## Tracking mentions in blogs

- Look for links to papers within a manually curated list of over 5,000 scholarly blogs.

## Blog categories

Chemistry  
Computing  
Economics  
Education  
Engineering  
Environment & Ecology  
Finance  
Geography  
Geology  
Humanities  
Law

Librarianship & Information Science  
Life Sciences & Natural History  
Mathematics  
Medicine & Health  
Multidisciplinary  
Neuroscience  
Physics & Astronomy  
Politics  
Psychology  
Statistics  
Technology

# Sources of Attention

## Multimedia and Reference Managers

### Tracking mentions in multimedia

- YouTube support: look for links to papers in video descriptions.

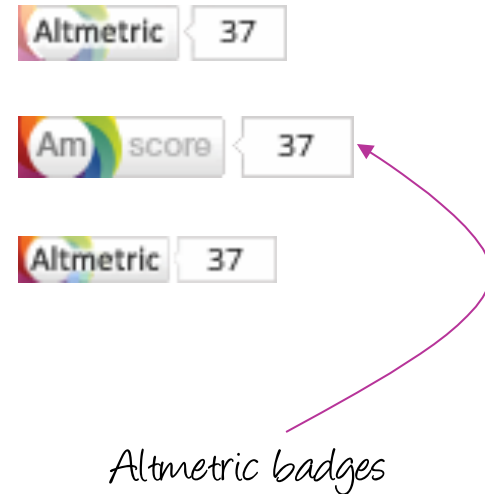
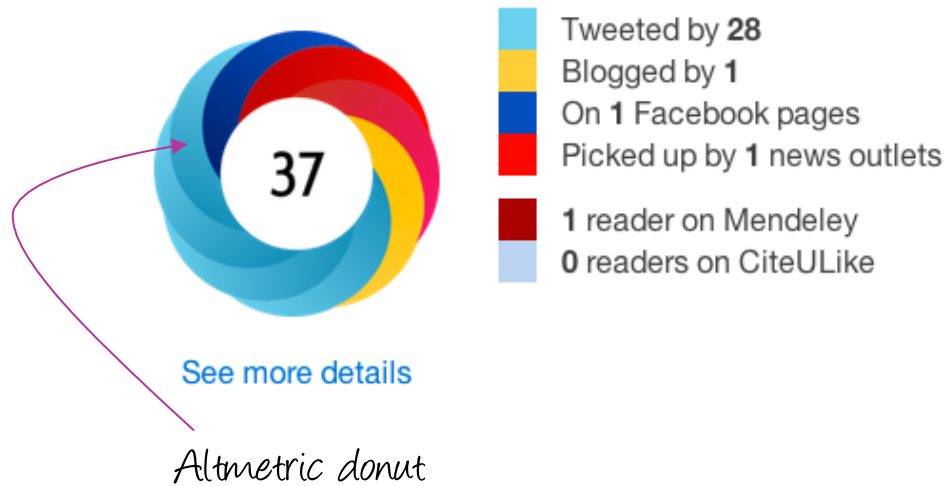


### Tracking readers in online reference managers

- Collect reader counts.
- Note: Reader counts are excluded from the Altmetric score.



# Visualising Attention





# Visualising Attention

Altmetric plugin for Ex-Libris Primo

The screenshot shows the Ex-Libris Primo interface. At the top, there are navigation links like 'Library Search', 'Tags', 'A-Z', 'new search', 'French', 'Help', and 'Language: English'. Below this, there's a search bar with '10.1038/nature10553' entered. The main content area displays the article title 'Ascaris suum draft genome' and a list of authors. An Altmetric badge is visible, showing a circular chart with the number 33. The badge includes the following data: Tweeted by 26, On 1 Facebook page, Picked up by 1 news outlet, Subject of a Research Highlight, 39 readers on Mendeley, 0 readers on CiteULike, and 5 readers on CiteULike. A link 'See more details' is provided below the badge.

Altmetric badges on *Nature* journals

The screenshot shows the Nature Neuroscience website. The article title is 'Adenosine A1 receptors mediate local anti-nociceptive effects of acupuncture'. Below the title, there are three large circular Altmetric badges: 'Total citations' (70), 'Web of Science' (74), and 'CrossRef' (91). To the right, there is an 'Online attention' badge showing a score of 153. The 'Online attention' badge includes the following data: Tweeted by 10, On 13 Facebook pages, Mentioned in 2 Google+ posts, Picked up by 3 news outlets, and 1 Reddit. A link 'View more' is provided below the badge.

Altmetric for Scopus

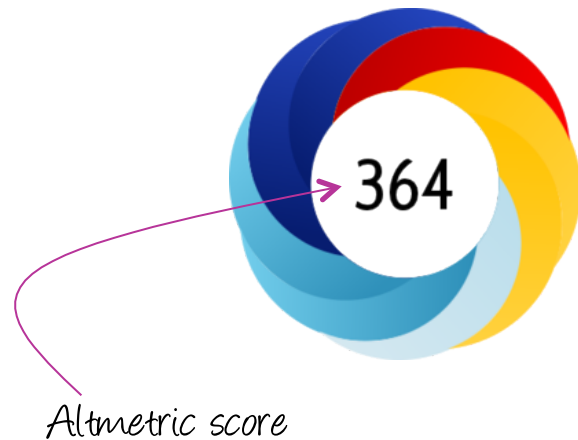
The screenshot shows the 'Altmetric for Scopus' interface. It features a large circular badge with the number 309. The text states: 'Up to now this article has been mentioned 313 times by 305 sources.' Below this, there is a list of sources: 2 Facebook users, 2 science blogs, 1 Google+ user, 1 news outlet, and 299 tweeters. Underneath, it shows 'Saved to reference managers' with 0 CiteULike and 1 Mendeley. At the bottom, there are links for 'see details' and 'open report in new tab', and a note that the app is provided by Altmetric.

Altmetric badges on Royal Society of Chemistry journals



# Quantifying Attention

Volume	Sources	Authors
The score for an article rises as more people mention it.	Each category of mention contributes a different base amount to the final score.	How often the author of each mention talks about scholarly articles influences the contribution of the mention.



## The Altmetric donut

- Light blue = Twitter
- Dark blue = Facebook
- Red = News
- Yellow = blogs

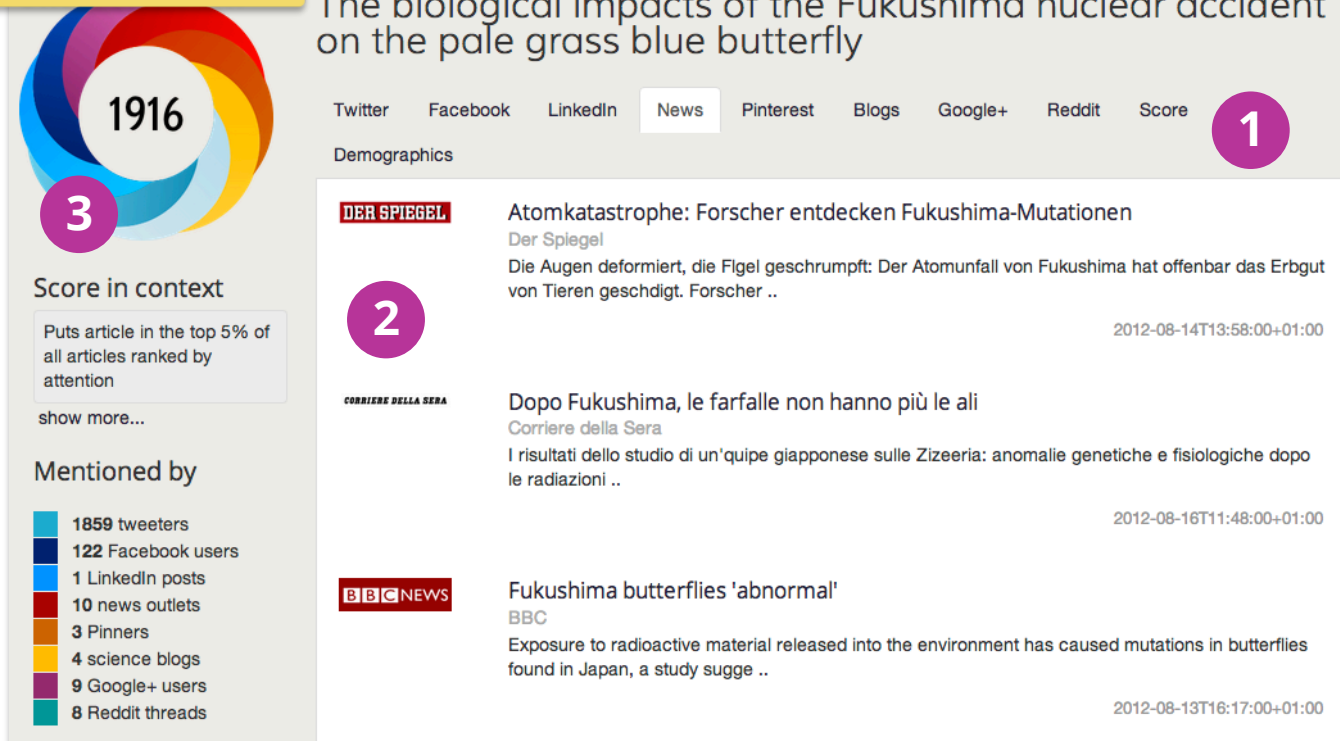
... and many more!



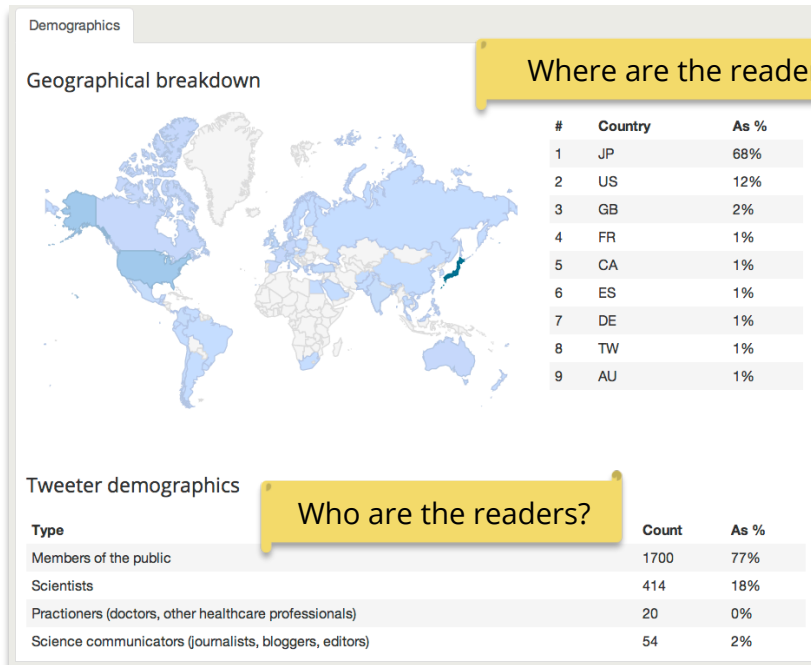
# Altmetric Data: Details Pages

- 1 See all the conversations and mentions.
- 2 Monitor mentions in the mainstream news.
- 3 Estimate attention with the "Altmetric score".

See article-level metrics and a score of attention below.

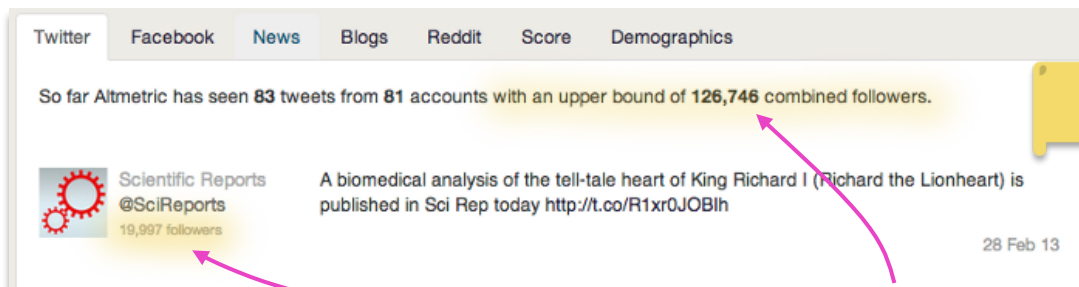


# Altmetric Data: Details Pages



Altmetric details pages show:

- Demographics of the readers
- A paper's online reach



What is the online reach of the community?

View Twitter follower numbers.





128

### Score in context

Puts article in the top 5% of all articles ranked by attention

show more...

### Mentioned by

- 119 tweeters
- 18 Facebook users
- 1 video uploaders
- 1 science blogs
- 1 Redditors

### Readers on

- 0 Mendeley
- 0 CiteULike

Context helps you make your mind up as to what a score of "128" means.

# Fast food hamburgers: what are we really eating?

- Twitter
- Facebook
- Video
- Blogs
- Reddit
- Score
- Demographics

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 **127.40**

The context below was calculated when this article was last mentioned on **5th July 2013**

## Compared to all articles in Annals of Diagnostic Pathology

In the **99%**ile

Ranks **1st**

So far Altmetric has tracked 54 articles from this journal. They typically receive a little less attention than average, with a mean score of 2.0 vs the global average of 3.8. This article **has done particularly well**, scoring higher than 99% of its peers. It's actually **the highest scoring article** in this journal that we've seen so far.

## All articles of a similar age

In the **99%**ile

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 19,608 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 Annals of Diagnostic Pathology

In the **99%**ile

Ranks **1st**

We're also able to compare this article to 2 articles from the same journal and published within six weeks on either side of this one. This article **has scored higher than all of them**.

## All articles

In the **99%**ile

More generally, Altmetric has tracked 1,349,492 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.



# Measuring and quantifying attention

## The case of the auto-tweeting dam

- Some people have argued that altmetrics are useless because they're easily gamed (e.g., through incessant online self-promotion).



Mentioned by

1 tweeters

Readers on

0 Mendeley

1 CiteULike

Gaming is pretty easy to spot by eye or using an algorithm.

## Microcystis Aeruginosa and Underwater Light Attenuation in a Hypertrophic Lake (Hartbeespoort Dam, South Africa)

Twitter Score Demographics

So far Altmetric has seen 34 tweets from 1 accounts.



Hartbeespoort Dam  
@Hartbeespoort Dam  
193 followers

I am 97.588% full. Microcystis aeruginosa and underwater light attenuation in a hypertrophic... <http://t.co/Ni3up8AFU0> #harties

23-Mar-2013



Hartbeespoort Dam  
@Harties\_dam  
193 followers

I am 98.984% full. Microcystis aeruginosa and underwater light attenuation in a hypertrophic... <http://t.co/3RyYnnha> #harties

08-Feb-2013



Hartbeespoort Dam  
@Harties\_dam  
193 followers

I am 97.610% full. Microcystis aeruginosa and underwater light attenuation in a hypertrophic... <http://t.co/3RyYnnha> #harties

14-Feb-2013



Hartbeespoort Dam  
@Harties\_dam  
193 followers

I am 97.074% full. Microcystis aeruginosa and underwater light attenuation in a hypertrophic... <http://t.co/3RyYnnha> #harties

15-Feb-2013



# The Altmetric Explorer

The Altmetric Explorer web app can be used to filter and browse through attention for over 1,000,000 scholarly articles.

Browse through the attention for all mentioned papers.

The screenshot displays the Altmetric Explorer interface. At the top, there are navigation tabs: "Altmetric Explorer", "Reports dashboard", "Explore the data", and "Feedback & Support". The main heading is "Articles published by BioMedCentral mentioned at least once in the past 1w". Below this, there are filters for "Articles 529", "Activity 1,188", and "Journals 76". There are also buttons for "Export to Excel" and "Save these filters as a report".

On the left side, there is a "Pick new articles:" section with several filter options:

- Mentioned in the past:** Radio buttons for 1 day, 3 days, 1 week (selected), 1 month, 3 months, 6 months, 1 year, and Any time.
- With identifiers:** A button to expand this section.
- From publisher:** Radio buttons for "BioMedCentral" (selected) and "Or enter a DOI prefix:" with a text input field.
- In Medline journal(s):** A button to expand this section.
- With Medline subject:** A button to expand this section.
- Mentioned at any time on:** A button to expand this section.
- Order by:** A button to expand this section.

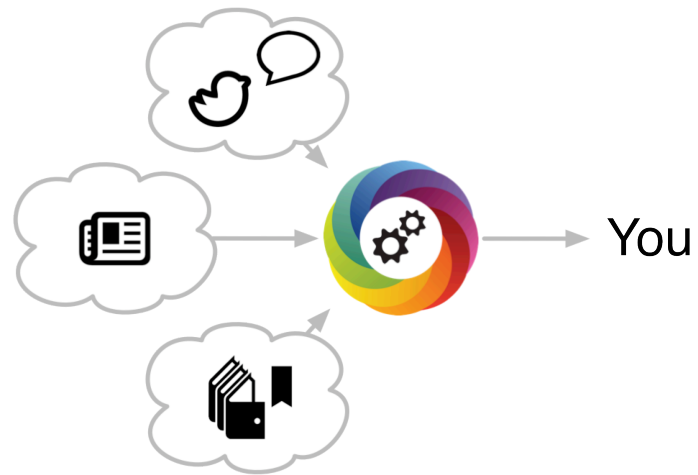
At the bottom left, there is a "Show matching articles" button.

The main content area displays a grid of article cards. Each card features a circular attention gauge with a number inside, followed by the article title and journal name:

- 115: Spectrum of gluten-related disorders: consensus on new nomenclature and classification. **BMC Medicine**
- 35: Does the world need a scientific society for research on how to improve healthcare? **Implementation Science**
- 75: Is there a role for carbohydrate restriction in the treatment and prevention of cancer? **Nutrition & Metabolism**
- 19: All your base: a fast and accurate probabilistic approach to base calling. **Genome Biology**
- 9: Rest versus exercise as treatment for patients with low back pain and Modic changes. A randomised controlled clinical trial. **BMC Medicine**
- 9: A 'Snip' in time: what is the best age to circumcise? **BMC Pediatrics**
- 9: Mindfulness based cognitive therapy improves frontal control in bipolar disorder: a pilot EEG study. **BMC Psychiatry**
- 20: Yabi: An online research environment for Grid, High Performance and Cloud computing. **Source Code for Biology and Medicine**
- 10: Colon cancer risk and different HRT formulations: a case-control study. **BMC Cancer**
- 9: Chromatin structure changes around satellite repeats on the Schistosoma mansoni female sex chromosome suggest a possible mechanism for sex chromosome emergence. **Genome Biology**
- 83: The draft genome and transcriptome of Cannabis sativa. **Genome Biology**
- 23: Extremely short duration high intensity interval training substantially improves insulin action in young healthy males. **BMC Endocrine Disorders**
- 10: Influence of Tertiary paleoenvironmental changes on the diversification of South. **BMC Evolutionary Biology**
- 15: The wider determinants of inequalities in health: a decomposition analysis. **BMC Public Health**
- 2: Can rights stop the wrongs? Exploring the connections between framings of sex workers. **BMC Women's Health**



# What can we do with altmetrics?





## The numbers...

- ✘ Don't represent the quality of research.
- ✘ Don't indicate the quality of individual researchers.
- ✘ Don't tell the whole story – look for qualitative data as well!



Use the conversations behind the metrics to...

- 1 Highlight uptake, engagement, and impact.
- 2 Understand how digital tools are being used to communicate about research.
- 3 Discover new articles to read.



# 1 Highlight uptake, engagement, and impact

The screenshot shows the article metrics page for "Arc in the nucleus regulates PML-dependent GluA1 transcription and homeostatic plasticity" by Erica Korb et al. (2013). The page features a teal header with the journal logo, a search bar, and navigation links. Below the header, the article title and authors are displayed. The "Article metrics for:" section includes a breadcrumb trail and a "Share" button. The "Total citations" section shows three circular icons for Web of Science, CrossRef, and Scopus, all labeled "Data not available". The "Online attention" section features a colorful circular gauge showing a score of 12, with a legend for "Altmetric score (what's this?)" including: 4 tweets, 1 Facebook page, 1 blog, 0 Mendeley readers, and 0 CiteULike readers. A "View more" link is also present.

nature  
neuroscience

Login Cart

Search Advanced search

nature.com > journal home > advance online publication > article > article > Article metrics

Article metrics for:

Arc in the nucleus regulates PML-dependent GluA1 transcription and homeostatic plasticity

Erica Korb, Carol L Wilkinson, Ryan N Delgado, Kathryn L Lovero & Steven Finkbeiner

Nature Neuroscience (2013) | doi:10.1038/nn.3429

Last updated: 10 June 2013 15:56:43 EDT

Total citations

Data not available

Data not available

Data not available

Web of Science CrossRef Scopus

Online attention

Altmetric score (what's this?)

12

- Tweeted by 4
- On 1 Facebook pages
- Blogged by 1
- 0 readers on Mendeley
- 0 readers on CiteULike

View more

Altmetrics accumulate rapidly, within days of publication.

In contrast, citations can take months to years to accrue.



# 1 Highlight uptake, engagement, and impact



**EXAMPLE:** Position paper by the American College of Physicians and the Federation of State Medical Boards on physicians' use of social media



## TWITTER

- 47% of tweets sent from the US.
- 21% of tweets sent by practitioners.
- Tweeted by several professional organizations with many followers.



## NEWS

- Mentioned in 4 reports (including in Forbes and The National Post)



## BLOGS

- Discussed in-depth on 6 medical/physician-led blogs.

2013, *Ann Intern Med*, 158(8), 620

Example from the Altmetric blog post "The Doctor is Online":  
<http://altmetric.com/blog/interactions-the-doctor-is-online>

Altmetric details page:  
[http://altmetric.com/details.php?citation\\_id=1363338](http://altmetric.com/details.php?citation_id=1363338)



# 1 Highlight uptake, engagement, and impact

**EXAMPLE:** An article on the biological impacts of the Fukushima nuclear accident on the pale grass blue butterfly.

TWITTER:

- 68% of tweets sent from Japan.
- 77% of tweets from members of the public.
- 18% of tweets from scientists.
- Twitter had been used to share news alerts during the Fukushima disaster – now it was being used as a scientific news engine.

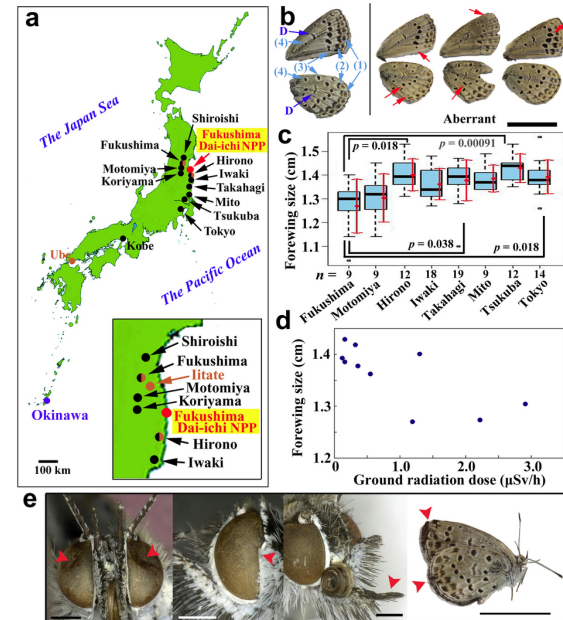


Figure 1 2012, *Scientific Reports* 2, 570



## 2 Understand usage of digital communication tools

**EXAMPLE:** The bench scientists' blogosphere

- Blogs discussed an essay on the importance of stupidity in scientific research
- Essay was extremely popular with bench scientists on social media and blogs.
- Reveals the bench scientists blogosphere, which often talks about:
  - New scientific articles
  - Their own publications
  - Lab/career experiences

2008 *J Cell Sci* 121, 1771.

Essay 1771

### The importance of stupidity in scientific research

**Martin A. Schwartz**  
Department of Microbiology, UVA Health System, University of Virginia, Charlottesville, VA 22908, USA  
e-mail: maschwartz@virginia.edu

Accepted 9 April 2008  
*Journal of Cell Science* 121, 1771 Published by The Company of Biologists 2008  
doi:10.1242/jcs.033340

BLOGS

### Bug Girl's Blog

June 12, 2011

#### How Undergraduate and Graduate School are different

Since I got so many questions, I thought I would pontificate a bit longer on the graduate school question, and turn it into a series of posts. Let's start with the decision to go to graduate school, and how graduate study is very different from being an undergraduate.

Several jobs ago, I wrote up a chart that laid out how undergraduate study and graduate school are different. It's surprising to me how many undergraduates I talk to think that grad school is just a bunch more classes at a higher level.

Here's my original comparison chart:

Undergraduate	Graduate
Many courses outside the field are required as general education requirements. Classes are the sole means of evaluation for graduation.	Students complete an in-depth study of one field and enter into an extended research apprenticeship with a faculty member. The primary means of evaluation for graduation is a research project or thesis, judged by a faculty committee.

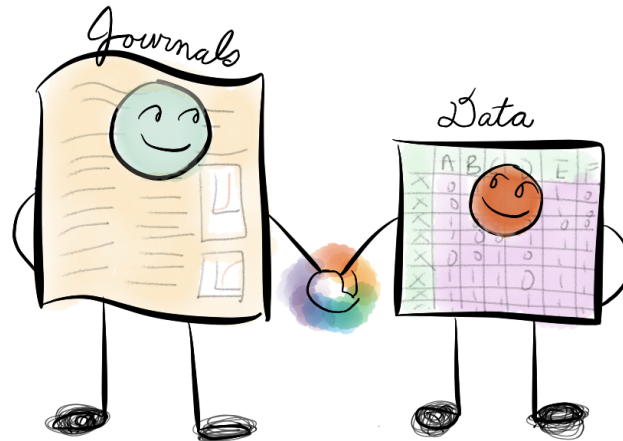
**CHANGE COURSE:** communication, evidence, digital education, research, electricity, fun, gender, hands-on, higher education, higher education, how people learn, humor, inquiry, K-12, light, math, misnomers, missings, perception, podcast, psychology

Example from the Altmetric blog post "It's OK, Scientific Stupidity is Normal":  
<http://altmetric.com/blog/interactions-its-ok-scientific-stupidity-is-normal>

Altmetric details page:  
[http://altmetric.com/details.php?citation\\_id=174125](http://altmetric.com/details.php?citation_id=174125)



## 2 Understand usage of digital communication tools



**EXAMPLE:** Increasingly, researchers are talking about datasets and other research outputs online.

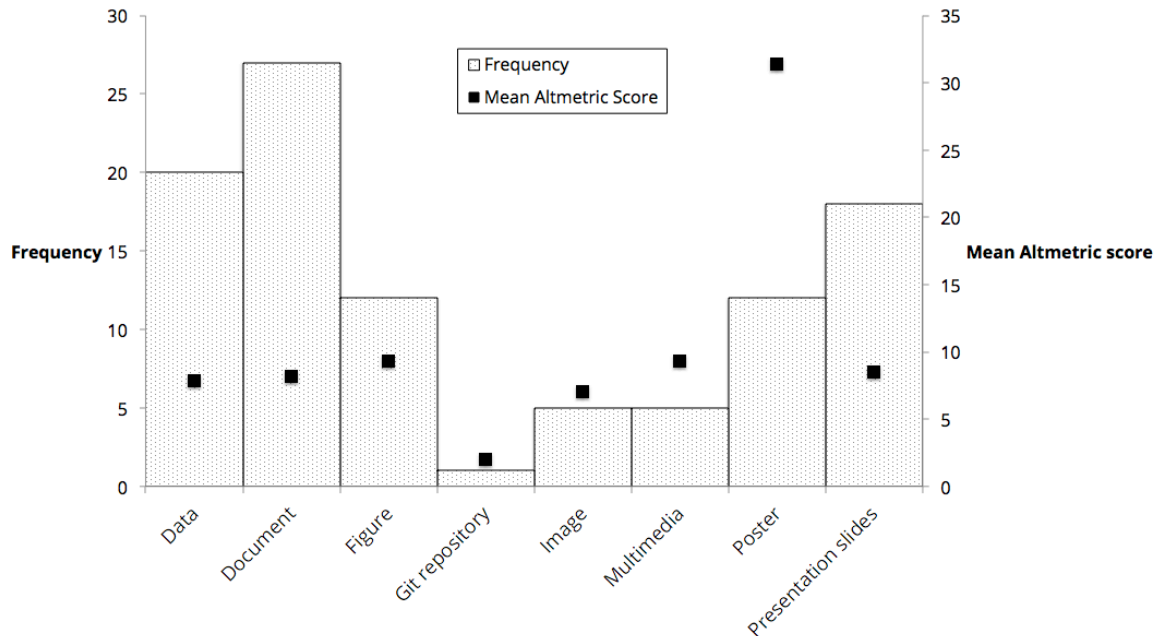
Altmetric tracks items within data repository services like figshare.

What's being said?

- Discussions of data repository services and/or open data
- Promotion and sharing of repository items by author(s)
- Promotion, sharing, and use of repository items by users
- Automated alerts of new repository items



## 2 Understand usage of digital communication tools



**EXAMPLE:** Increasingly, researchers are talking about datasets and other research outputs online.

Altmetric tracks items within data repository services like figshare.

The graph indicates a) how frequently certain kinds of research outputs appeared in the top 100 figshare items ranked by attention and b) the average Altmetric scores. Data are accurate as of 13 March 2013.

Example from the Altmetric blog post "Show Me the Data!":  
<http://www.altmetric.com/blog/interactions-show-me-the-data>





### 3 Discover new articles to read

Filter an expansive body of scholarly literature.

**EXAMPLE:** Filter by MEDLINE subject “neurology” in the Altmetric Explorer



Hallucinations of musical notation  
**Brain**



Men without a sense of smell exhibit a strongly reduced number of sexual relationships, women exhibit reduced partnership security-a reanalysis of previously published data.



Chronic Pain Syndromes After Ischemic Stroke PROFESS Trial  
**Stroke**



Fgf10-expressing tuncytes add new neurons to the appetite/energy-balance regulating centers of the postnatal and adult hypothalamus.

**The Journal of neuroscience :**



Temporal lobe discharges and glossolalia.  
**Neurocase**



Pain measurement and brain activity: will neuroimages replace pain ratings?  
**J Pain**



Meta-analysis of amyloid-cognition relations in cognitively normal older adults  
**Neurology**



Sustained cortical and subcortical neuromodulation induced by electrical tongue stimulation.  
**Brain imaging and behavior**

**EXAMPLE:** Filter by top Altmetric scores in the Altmetric Explorer



Food for thought. What you eat depends on your sex and eating companions  
**Appetite**



The biological impacts of the Fukushima nuclear accident on the pale grass blue butterfly  
**Scientific Reports**



Bright Minds and Dark Attitudes  
**Psychological Science**



South Korea surrenders to creationist demands  
**Nature News**



Primary Prevention of Cardiovascular Disease with a Mediterranean Diet  
**New England Journal of Medicine**



Saudi Universities Offer Cash in Exchange for Academic Prestige  
**Science**



Direct Imaging of Covalent Bond Structure in Single-Molecule Chemical Reactions  
**Science**



Can apparent superluminal neutrino speeds be explained as a quantum weak measurement?  
**Minos**

# Thanks for listening!



E-mail: [jean@altmetric.com](mailto:jean@altmetric.com)



Twitter: [@altmetric](https://twitter.com/altmetric)



Website: [altmetric.com](http://altmetric.com)

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