Citation metrics versus peer review:

Google Scholar, Scopus and the Web of Science: A longitudinal and cross-disciplinary comparison

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Quick Intro: Anne-Wil Harzing
- My name???.... Yes Anne-Wil is one name and not part of my family name.
- Productive and passionate researcher & research mentor
  - 70+ journal articles since 1995 (160+ publications in total)
  - >9500 Google Scholar citations, h-index 45, ISI citations: >3300, top 1% worldwide in Eco/Business.
  - Passionate about bridging European, Australian and American research traditions.
- Service to the academic community
  - Editorial board membership of 5 IB journals, as well as HRM, EMR, EMJ, IJMR, JGIM, HRDI.
  - My personal website with freely available resources since 1999, 1000-1500 visitors/day.
  - Publish or Perish since 2006, continuous development.
An “amateur” in bibliometrics (1):
Journal Quality

- 1993: Conversation with Head of Department: “How do I know which journals are the best journals, I have no clue?”
- Jan 2000: Bradford Management Centre, UK:
  - “Why on earth are we using this “stupid” VSNU journal ranking list that ranks my JIBS publication C and all other IB journals D (just like Brickworks, magazine for the building trade), I am sure there are better journal rankings lists around”
- July 2000: The first incarnation of my JQL is published on www.harzing.com
- 2015: The 56th edition of the JQL with 18 rankings, >100 ISI cites + 50,000 page visits/year
- 2009: AMLE Outstanding article of the year award for “When Knowledge Wins: Transcending the Sense and Nonsense of Academic Rankings” [most highly cited article in management in 2009]
- 2015: AMLE “Disseminating knowledge: from potential to reality – New open-access journals collide with convention”
  - How predatory Open Access journals completely distorted Thomson Reuters Highly Cited Academics ranking (see also http://www.harzing.com/esi_highcite.htm)

An “amateur” in bibliometrics (1):
Citation analysis

- May 2006: University of Melbourne; Promotion application to professor rejected: “you haven’t published enough in A-journals”
- Oct 2006: Publish or Perish v1.0 released
- Jan 2007: Reapplied for promotion showing my work had more citation impact than that of any of the other professors, recent or longstanding
- 2010: The Publish or Perish Book, self-published through Amazon Createspace, reviewed in Nature, Scientometrics and JASIST
- 2015: 80th or so release of Publish or Perish, >180 ISI cites, 1.7 million page visits to date
- 26 April 2015: Wharton Research Data Services distributes the Publish or Perish Book at the AACSB conference
An “amateur” in bibliometrics (3): publishing in the field

- Published a range of papers relating to Google Scholar and WoS
  


The lesson for academic careers?

- If you want something changed: take initiative, you can change things, even as an individual

- Being generous can sometimes bring unexpected benefits

- I provide many resources for free on my website and spend many hours every week responding to requests for assistance from all over the world

- Many academics now know my name, even though they don’t know my research

- Be prepared for the inevitable confusion and downright nasty reactions

  - “It doesn’t work” support requests (no internet connection, wrong searches etc.)
  - Enter my publications in your “Harzing system” now! CV attached; you have ruined my career by not including my publication in “your database”
  - We are going on strike tomorrow because of the Harzing index, everyone hates you
  - You are discriminating against me because I am not white, your website should be taken down instantly; I don’t understand why you still have a job (I refused personal telephone support after giving extensive email support to an academic who kept maintaining I was wrong and he knew better how Google Scholar worked than I did)

- Accept that your “research hobby” can overpower your “real research”

- Publishing in another field can be great fun and liberating
Increasing audit culture: Metrics vs. peer review

- Increasing “audit culture” in academia, where universities, departments and individuals are constantly monitored and ranked
- National research assessment exercises, such as the ERA (Australia) and the REF (UK), are becoming increasingly important
- Publications in these national exercises are normally assessed by peer review for Humanities and Social Sciences
- Citations metrics are used in the (Life) Sciences and Engineering as additional input for decision-making
- The argument for not using citation metrics in SSH is that coverage for these disciplines is deemed insufficient in WoS and Scopus

The danger of peer review? (1)

- Peer review might lead to harsher verdicts than bibliometric evidence, especially for disciplines that do not have unified paradigms, such as the Social Sciences and Humanities
- In Australia (ERA 2010) the average rating for the Social Sciences was only about 60% of that of the (Life) Sciences
  - This is despite the fact that on a citations per paper basis Australia’s worldwide rank is similar in all disciplines
  - The low ERA-ranking led to widespread popular commentary that government funding for the Social Sciences should be reduced or removed altogether
- Similarly negative assessment of the credibility of SSH can be found in the UK (and no doubt in many other countries)
The danger of peer review? (2)

- More generally, peer review might lead to what I have called “promise over proof”

- Assessment of the quality of a publication might be (subconsciously) influenced by the “promise” of:
  - the journal in which it is published,
  - the reputation of the author's affiliation,
  - the sub-discipline (theoretical/modeling vs. applied, hard vs. soft)

- [Promise] Publication in a triple-A journal initially means that 3-4 academics thought your paper was a worthwhile contribution to the field. But what if this paper is subsequently hardly ever cited?
- [Proof] Publication in a “C-journal” with 1,000+ citations means that 1,000 academics thought your paper was a worthwhile contribution to the field.

What can we do?

- Be critical about the increasing audit culture

- But: be realistic, we are unlikely to see a reversal of this trend. Hence in order to “emancipate” the Social Sciences and Humanities, an inclusion of citation metrics might help. However, we need to:
  - Raise awareness about:
    - Alternative data sources for citation analysis that are more inclusive (e.g. including books, local and regional journals, reports, working papers)
    - Difficulty of comparing metrics across disciplines because of different publication and citation practices
    - Life Science and Science academics in particular write more (and shorter) papers with more authors each; 10-15 authors not unusual, some >1000 authors
  - Suggest alternative data sources and metrics
    - Google Scholar or Scopus instead of WoS/ISI
    - hIa (individual annualised h-index), i.e. h-index corrected for career length and number of co-authors
    - measures the average number of single-author equivalent impactful publications an academic publishes a year (usually well below 1.0)
Need for comprehensive empirical work

- Dozens of studies comparing two or even three databases. However:
  - Focused on a single or small groups of journals or a small group of academics
  - Only covered a small number of disciplines
  - Largest study was Delgado-López-Cózar & Repiso-Caballero (2013), but only included a single discipline
- Very few studies doing longitudinal comparisons
  - Harzing (2014): 2012-2013 for 20 Nobel Prize winners (GS only)
- Hence our study provides:
  - 2-year longitudinal comparison (2013-2015) with quarterly data-points
  - Cross-disciplinary comparison across all major disciplinary areas
  - Comparison of 4 different metrics:
    - publications, citations, h-index
    - hIannual (h-index corrected for career length and number of co-authors)

The bibliometric study (1): The basics

- Sample of 146 Associate and Full Professors at the University of Melbourne
  - All main disciplines (Humanities, Social Sciences, Engineering, Sciences, Life Sciences) were represented. 37 sub-disciplines
  - Two full professors (1 male, 1 female) and two associate professors (1 male, 1 female) in each sub-discipline (e.g. management, marketing, accounting, economics)
  - Collected data on education, career trajectory, international experience, internal/external promotion, and career interruptions through survey (not reported here)
- Citation metrics in WoS/ISI, Scopus and Google Scholar
  - Collected citation data every 3 months for 2 years
  - Google Scholar data collected with Publish or Perish (http://www.harzing.com/pop.htm)
  - WoS/ISI and Scopus collected in the respective databases and imported into Publish or Perish to calculate metrics
- The final conclusion: with appropriate metrics and data sources, citation metrics can be applied in the Social Sciences
  - ISI H-Index: Life Sciences average lies 200% above Social Sciences average
  - GS hI index: Life Sciences average lies 8% below Social Sciences average
The bibliometric study (2): Details on the sample

- Sample: 37 disciplines were subsequently grouped into five major disciplinary fields:
  - Humanities: Architecture, Building & Planning; Culture & Communication; History; Languages & Linguistics; Law (19 observations).
  - Social Sciences: Accounting & Finance; Economics; Education; Management & Marketing; Psychology; Social & Political Sciences (24 observations).
  - Engineering: Chemical & Biomedical Engineering; Computing & Information Systems; Electrical & Electronic Engineering; Infrastructure Engineering; Mechanical Engineering (20 observations).
  - Sciences: Botany; Chemistry; Earth Sciences; Genetics; Land & Environment; Mathematics; Optometry; Physics; Veterinary Sciences; Zoology (144 observations).
  - Life Sciences: Anatomy & Neuroscience; Audiology; Biochemistry & Molecular Biology; Dentistry; Obstetrics & Gynecology; Ophthalmology; Microbiology; Pathology; Physiology; Population Health (59 observations).

- Discipline structure followed Department/School structure at the University of Melbourne
- Overrepresentation of the (Life) Sciences and underrepresentation of Social Sciences beyond Business & Economics
- Overall, sufficiently varied coverage across the five major disciplinary fields.

The bibliometric study (3): Descriptive statistics

<table>
<thead>
<tr>
<th>Metric</th>
<th>N</th>
<th>Minimum</th>
<th>Maximum</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>WoS Years active</td>
<td>146</td>
<td>3</td>
<td>47</td>
<td>23.84</td>
<td>9.016</td>
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<tr>
<td>Scopus Years active</td>
<td>146</td>
<td>5</td>
<td>46</td>
<td>23.69</td>
<td>8.969</td>
</tr>
<tr>
<td>WoS Total # of papers</td>
<td>146</td>
<td>3</td>
<td>309</td>
<td>77.25</td>
<td>64.346</td>
</tr>
<tr>
<td>Scopus Total # of papers</td>
<td>146</td>
<td>3</td>
<td>309</td>
<td>86.37</td>
<td>68.304</td>
</tr>
<tr>
<td>WoS Total # of citations</td>
<td>146</td>
<td>0</td>
<td>11287</td>
<td>1871.68</td>
<td>2238.092</td>
</tr>
<tr>
<td>Scopus Total # of citations</td>
<td>146</td>
<td>0</td>
<td>11740</td>
<td>1978.72</td>
<td>2179.222</td>
</tr>
<tr>
<td>WoS h-index</td>
<td>146</td>
<td>0</td>
<td>54</td>
<td>18.91</td>
<td>13.188</td>
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<tr>
<td>Scopus h-index</td>
<td>146</td>
<td>0</td>
<td>48</td>
<td>16.92</td>
<td>10.920</td>
</tr>
<tr>
<td>WoS h-index</td>
<td>146</td>
<td>3</td>
<td>65</td>
<td>26.06</td>
<td>13.185</td>
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<tr>
<td>Scopus h-index</td>
<td>146</td>
<td>.00</td>
<td>1.07</td>
<td>.3623</td>
<td>.18991</td>
</tr>
<tr>
<td>Valid N (listwise)</td>
<td>146</td>
<td>0.00</td>
<td>1.11</td>
<td>.4975</td>
<td>.19075</td>
</tr>
</tbody>
</table>
Longitudinal results: quarterly % increase in papers per academic in different databases
Longitudinal results: quarterly % increase in citations per academic in different databases

Different data-sources between disciplines: number of papers
Different data-sources between disciplines: number of citations

![Graph showing citations by discipline and data-source.]

1. Web of Science: Humanities 61, Social Sciences 591, Engineering 897, Sciences 2612, Life Sciences 3139
2. Scopus: Humanities 100, Social Sciences 782, Engineering 1132, Sciences 2558, Life Sciences 3313
3. Google Scholar: Humanities 871, Social Sciences 2604, Engineering 1764, Sciences 3984, Life Sciences 4699

Citations
Different data-sources between disciplines: h-index

<table>
<thead>
<tr>
<th>Discipline</th>
<th>Web of Science</th>
<th>Scopus</th>
<th>Google Scholar</th>
</tr>
</thead>
<tbody>
<tr>
<td>Humanities</td>
<td>3.5</td>
<td>4.3</td>
<td>12.3</td>
</tr>
<tr>
<td>Social Sciences</td>
<td>9.6</td>
<td>12.0</td>
<td>21.5</td>
</tr>
<tr>
<td>Engineering</td>
<td>13.5</td>
<td>15.6</td>
<td>20.8</td>
</tr>
<tr>
<td>Sciences</td>
<td>25.6</td>
<td>25.6</td>
<td>30.1</td>
</tr>
<tr>
<td>Life Sciences</td>
<td>27.1</td>
<td>28.3</td>
<td>33.4</td>
</tr>
</tbody>
</table>

hIa index

hIa: h-index corrected for academic age (to accommodate differences in career length) and number of co-authors (to remove discipline bias)
Comparing WoS h-index with Scopus or GS hIa

<table>
<thead>
<tr>
<th>Discipline</th>
<th>Web of Science h-index</th>
<th>Life Sciences = 100</th>
<th>Scopus hIa</th>
<th>Life Sciences = 100</th>
<th>Google Scholar hIa</th>
<th>Life Sciences = 100</th>
</tr>
</thead>
<tbody>
<tr>
<td>Humanities</td>
<td>3.5</td>
<td>13</td>
<td>0.18</td>
<td>38</td>
<td>0.36</td>
<td>56</td>
</tr>
<tr>
<td>Social Sciences</td>
<td>9.6</td>
<td>36</td>
<td>0.42</td>
<td>91</td>
<td>0.66</td>
<td>102</td>
</tr>
<tr>
<td>Engineering</td>
<td>13.5</td>
<td>50</td>
<td>0.41</td>
<td>89</td>
<td>0.53</td>
<td>82</td>
</tr>
<tr>
<td>Sciences</td>
<td>25.6</td>
<td>95</td>
<td>0.45</td>
<td>96</td>
<td>0.57</td>
<td>89</td>
</tr>
<tr>
<td>Life Sciences</td>
<td>27.1</td>
<td>100</td>
<td>0.46</td>
<td>100</td>
<td>0.65</td>
<td>100</td>
</tr>
</tbody>
</table>

Different data-sources between disciplines: Statistics

- For the ISI h-index gender, rank and discipline differences explain nearly 60% of the variance
- For GS hIa, the explained variance is only 14%
- Reduction of differences across levels of appointment
- Reduction of differences across disciplines

<table>
<thead>
<tr>
<th></th>
<th>ISI h-index</th>
<th>Google Scholar hIa</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Stand. Beta</td>
<td>Significance</td>
</tr>
<tr>
<td>Gender = Female</td>
<td>-0.066</td>
<td>0.222</td>
</tr>
<tr>
<td>Rank Professor</td>
<td>0.361</td>
<td>0.000</td>
</tr>
<tr>
<td>Humanities</td>
<td>-0.591</td>
<td>0.000</td>
</tr>
<tr>
<td>Social Sciences</td>
<td>-0.491</td>
<td>0.000</td>
</tr>
<tr>
<td>Engineering</td>
<td>-0.357</td>
<td>0.000</td>
</tr>
<tr>
<td>Sciences</td>
<td>-0.045</td>
<td>0.468</td>
</tr>
<tr>
<td>Adjusted R-square</td>
<td>0.591</td>
<td></td>
</tr>
</tbody>
</table>
Quick comparison across disciplines

- H-index ISI data
  - Life Sciences vs. Humanities: 27 vs. 3.5
  - i.e. nearly 8 times as high
  - Life Sciences vs. Social Sciences: 27 vs. 9.5
  - i.e. nearly 3 times as high

- h-index GS data
  - Life Sciences vs. Humanities: 0.61 vs. 0.34
  - i.e. nearly 2 times as high
  - Life Sciences vs. Social Sciences: 0.61 vs. 0.66
  - i.e. 8% lower

Individual comparisons for the three databases

<table>
<thead>
<tr>
<th>Metric</th>
<th>Higher than WoS</th>
<th>&lt; 5% Lower</th>
<th>5%-10% Lower</th>
<th>10%-25% Lower</th>
<th>&gt;25% Lower</th>
<th>Affected academics</th>
</tr>
</thead>
<tbody>
<tr>
<td>GS publications</td>
<td>143</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>None; differences are caused by Web of Science errors + one mega-authored paper</td>
</tr>
<tr>
<td>GS citations</td>
<td>145</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>GS h-index</td>
<td>145</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
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</tr>
<tr>
<td>GS h-index</td>
<td>146</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>Scopus publications</td>
<td>133</td>
<td>3</td>
<td>5</td>
<td>4</td>
<td>1</td>
<td>Older academics Social Sciences 13% Humanities 21% Life Sciences 28% Sciences 43%</td>
</tr>
<tr>
<td>Scopus citations</td>
<td>110</td>
<td>6</td>
<td>7</td>
<td>15</td>
<td>8</td>
<td></td>
</tr>
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<td>Scopus h-index</td>
<td>115</td>
<td>9</td>
<td>8</td>
<td>11</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Scopus h-index</td>
<td>113</td>
<td>3</td>
<td>10</td>
<td>17</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>
Conclusion

- Will the use of citation metrics disadvantage the Social Sciences and Humanities? 
  - No, if you use a database that includes publications important in those disciplines (e.g. books, national journals) 
  - No, if you correct for differences in co-authorships

- Is peer review better than metrics (in large scale research evaluation)?
  - Yes, in a way…. The ideal version of peer review (informed, dedicated, and unbiased experts) is better than a reductionist version of metrics (ISI h-index or citations)
  - However, the inclusive version of metrics (GS $h_I$ or even Scopus $h_I$) is probably better than the likely reality of peer review (hurried semi-experts, potentially influenced by journal outlet and affiliation)

- In research evaluation at any level use a combination of peer review and metrics wherever possible, but:
  - If reviewers are not experts, metrics might be a better alternative
  - If metrics are used, use an inclusive database (GS or Scopus) and career and discipline adjusted metrics

Want to know more?

- The resulting article has been resubmitted to Scientometrics yesterday after a second round of revisions
- So hopefully it will be accepted and in press soon 😊
- Any questions or comments?