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
- Started at Middlesex in 2014, previously in Melbourne (since 2001), professor since 2007, 1991-2001: Bradford (UK), Maastricht, Tilburg & Heerlen (Netherlands)
- 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% world-wide 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, JGM, HRDI
  - My personal website with freely available resources since 1999, 1000-1500 visitors/day
    - Journal Quality List since 2000, 56th edition
    - Publish or Perish since 2006, continuous development

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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 with18 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)

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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 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

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An "amateur" in bibliometrics (3): publishing in the field

- Published a range of papers relating to Google Scholar and WoS
  - Harzing, A.W.; Wal, R. van der (2008) Google Scholar as a new source for citation analysis?, *Ethics in Science and Environmental Politics*, 8(1): 62-71
  - Harzing, A.W.; Wal, R. van der (2009) A Google Scholar h-index for Journals: An alternative metric to measure journal impact in Economics & Business?, *Journal of the American Society for Information Science and Technology*, 60(1): 41-46.
  - Harzing, A.W. (2013) A preliminary test of Google Scholar as a source for citation data: A longitudinal study of Nobel Prize winners, *Scientometrics*, 93(3): 1057-1075.
  - Harzing, A.W. (2013) Document categories in the ISI Web of Knowledge: Misunderstanding the Social Sciences?, *Scientometrics*, 93(1): 23-34.
  - Harzing, A.W.; Alakangas, S.; Adams, D. (2014) hIa: An individual annual h-index to accommodate disciplinary and career length differences, *Scientometrics*, 99(3): 811-821.
  - Harzing, A.W. (2014) A longitudinal study of Google Scholar coverage between 2012 and 2013, Scientometrics, 98(1): 565-575.
  - Harzing, A.W.; Mijnhardt, W. (2015) Proof over promise: Towards a more inclusive ranking of Dutch academics in Economics & Business, *Scientometrics*, 102(1): 727-749.
  - Harzing, A.W. (2015) Health warning: Might contain multiple personalities. The problem of homonyms in Thomson Reuters Essential Science Indicators, 105(3): 2259-2270 *Scientometrics*.

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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

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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

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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)

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The danger of peer review? (2)

- More generally, peer review might lead to what I have called "promise over proof"
  - Harzing, A.W.; Mijnhardt, W. (2015) **Proof over promise: Towards a more inclusive ranking of Dutch academics in Economics & Business**, *Scientometrics,* vol. 102, no. 1, pp. 727-749.
- 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

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What can we do?

- Be critical about the increasing audit culture
  - Adler, N.; Harzing, A.W. (2009) **When Knowledge Wins: Transcending the sense and nonsense of academic rankings**, *The Academy of Management Learning & Education*, vol. 8, no. 1, pp. 72-95.
- 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)

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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
  - De Winter et al. (2014): WoS and GS 2005 & 2013 for 56 classic articles
  - 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
    - hI,annual (h-index corrected for career length and number of co-authors)

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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 hIa index: Life Sciences average lies **8% below** Social Sciences average

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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 & Biomolecular 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 (44 observations),
  - **Life Sciences**: Anatomy & Neurosciece; Audiology; Biochemistry & Molecular Biology; Dentistry; Obstetrics & Gynaecology; Ophthalmology; Microbiology; Pathology; Physiology; Population Health (39 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

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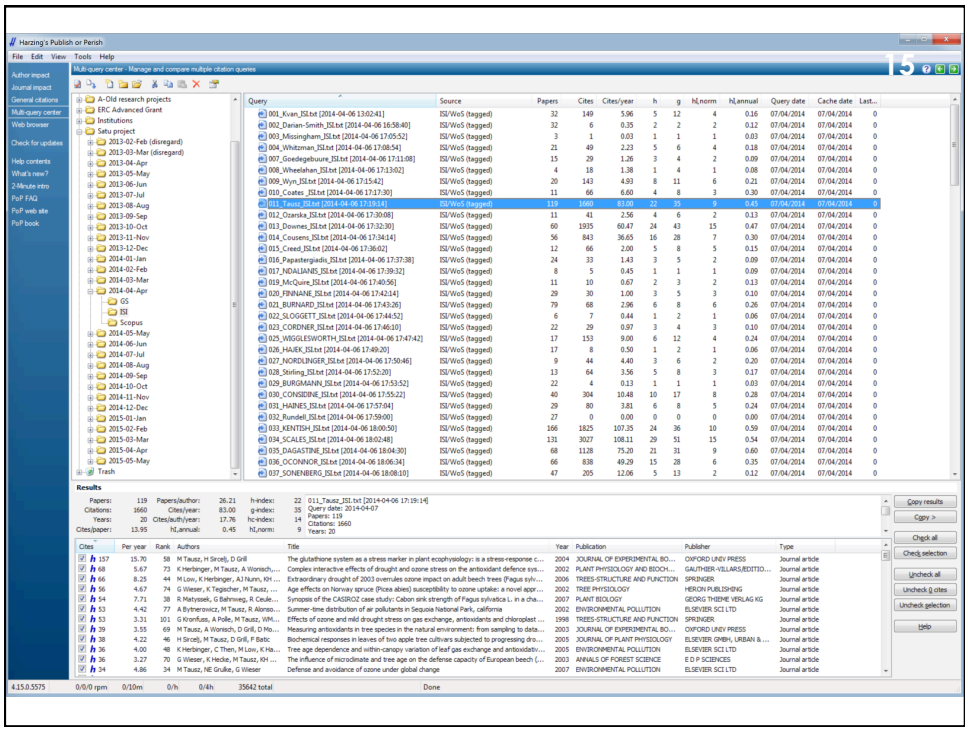
The bibliometric study (3): Descriptive statistics

	N	Minimum	Maximum	Mean	Std. Deviation
WoS Years active	146	3	47	23.84	9.016
Scopus Years active	146	5	46	23.69	8.969
GS Years active	146	8	46	25.64	8.086
WoS Total # of papers	146	3	309	77.25	64.346
Scopus Total # of papers	146	3	309	86.37	68.304
GS Total # of papers	146	22	519	147.46	97.799
WoS Total # of citations	146	0	11287	1871.68	2238.092
Scopus Total # of citations	146	0	11740	1978.27	2179.222
GS Total # of citations	146	58	16507	3290.88	3122.853
WoS h-index	146	0	54	18.91	13.188
Scopus h-index	146	0	48	16.92	10.920
GS h-index	146	3	65	26.06	13.185
WoS hIa index	146	.00	1.07	.3623	.18991
Scopus hIa index	146	.00	1.11	.4075	.19075
GS hIa index	146	.05	1.75	.5757	.26238
Valid N (listwise)	146				



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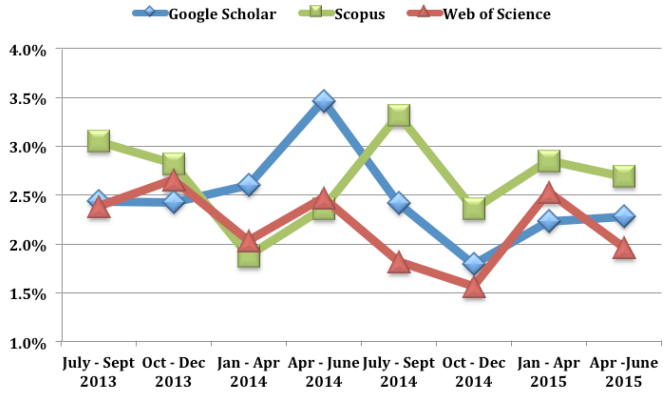
Longitudinal results: quarterly % increase in **papers** per academic in different databases



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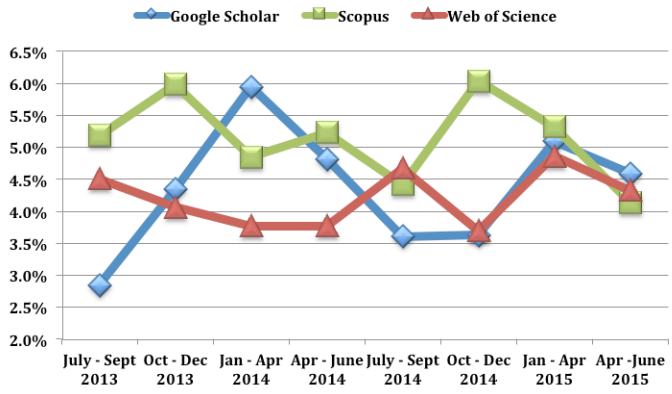
Longitudinal results: quarterly % increase in **citations** per academic in different databases



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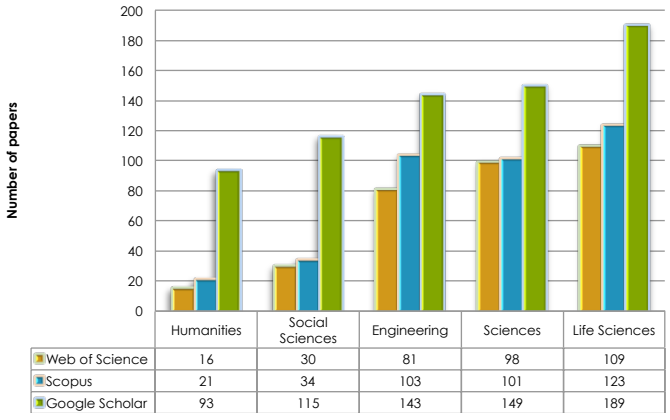
Different data-sources between disciplines: number of papers



	Humanities	Social Sciences	Engineering	Sciences	Life Sciences
Web of Science	16	30	81	98	109
Scopus	21	34	103	101	123
Google Scholar	93	115	143	149	189

Different data-sources between disciplines: number of citations

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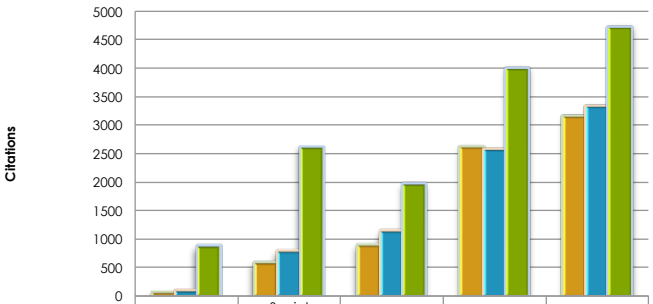

	Humanities	Social Sciences	Engineering	Sciences	Life Sciences
Web of Science	61	591	897	2612	3139
Scopus	100	782	1132	2558	3313
Google Scholar	871	2604	1964	3984	4699

Different data-sources between disciplines: number of citations

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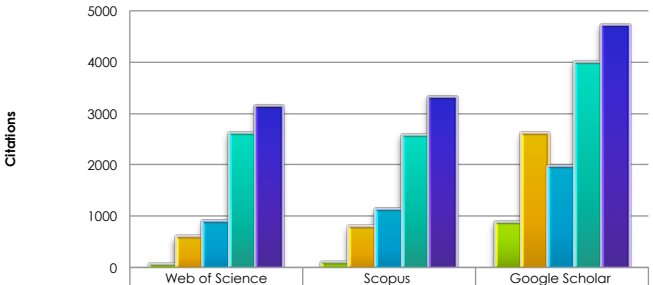

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Different data-sources between disciplines: h-index

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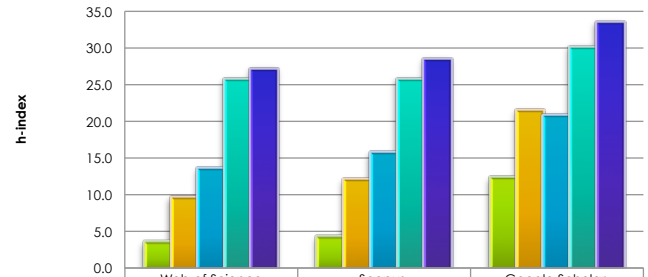

	Web of Science	Scopus	Google Scholar
Humanities	3.5	4.3	12.3
Social Sciences	9.6	12.0	21.5
Engineering	13.5	15.6	20.8
Sciences	25.6	25.6	30.1
Life Sciences	27.1	28.3	33.4

Different data-sources between disciplines: hla index

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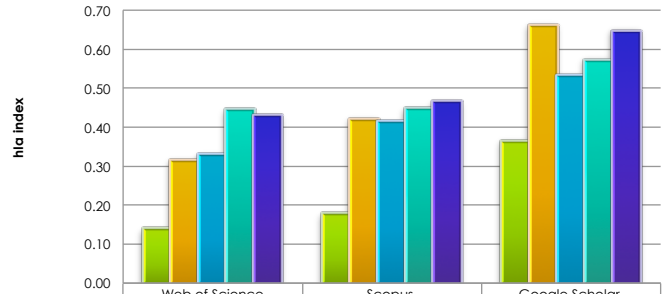

	Web of Science	Scopus	Google Scholar
Humanities	0.14	0.18	0.36
Social Sciences	0.32	0.42	0.66
Engineering	0.33	0.41	0.53
Sciences	0.44	0.45	0.57
Life Sciences	0.43	0.46	0.65

hla: h-index corrected for academic age (to accommodate differences in career length) and number of co-authors (to remove discipline bias)

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Comparing WoS h-index with Scopus or GS hIa

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

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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

	ISI h-index		Google Scholar hIa	
	Stand. Beta	Significance	Stand. Beta	Significance
Gender = Female	-0.066	0.222	-0.017	0.822
Rank Professor	0.361	0.000	0.217	0.006
Humanities	-0.591	0.000	-0.356	0.000
Social Sciences	-0.491	0.000	0.020	0.816
Engineering	-0.357	0.000	-0.149	0.087
Sciences	-0.045	0.468	-0.123	0.178
Adjusted R-square	0.591		0.139	

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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
- hIa-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

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Individual comparisons for the three databases

	number of academics (out of 146) for whom the metric in question is higher or lower than the corresponding metric in the WoS					
	Higher than WoS	< 5% Lower	5%-10% Lower	10%-25% Lower	>25% Lower	Affected academics
GS publications	143	2	0	0	1	None; differences are caused by Web of Science errors + one mega-authored paper
GS citations	145	0	0	1	0	
GS h-index	145	1	0	0	0	
GS hIa	146	0	0	0	0	
Scopus publications	133	3	5	4	1	Older academics Social Sciences 13%* Humanities 21% Life Sciences 28% Sciences 43%
Scopus citations	110	6	7	15	8	
Scopus h-index	115	9	8	11	3	
Scopus hIa	113	3	10	17	3	

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Conclusion

- Will the use of citation metrics disadvantage the Social Sciences and Humanities?
  - Not, if you use a database that includes publications important in those disciplines (e.g. books, national journals)
  - Not, 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 hIa or even Scopus hIa) 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

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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?