Overview

1. The citation debate
   1. The classic debate: Do citations indicate quality of research?
   2. My perspective: The ‘performative’ perspective on citations

2. General example: Disciplinary practices of citing references

3. What impact does bibliometric measures have?
   - At three levels: National, within academia and individual levels

Focus on the citation, but it is argued that other measures (e.g. Journal Impact Factor, H-index) are implied.
Science Citation Index

- Introduced in *Science* 1955 by Eugene Garfield
  - The citation as a construction
- Citation ≠ reference
- A “social” indicator


Merton’s norm system of science

- Communalism
- Universalism
- Disinterestedness
- Originality
- Scepticism


© 2014 Gustaf Nelhans
CUDOS vs. PLACE

- Communalism
- Universalism
- Disinterestedness
- Originality
- Scepticism
- Proprietary
- Local
- Authoritarian
- Commissioned
- Expert


Number scientific journals

© 2014 Gustaf Nelhans
Price on finding the power law distribution (1983)

“"I took the beautiful calf-bound volumes [of Philosophical transactions of the Royal Society of London] into protective custody and set them in ten year piles on the bedside bookshelves. For a year I read them cover to cover, thereby getting my initial education as a historian of science. As a side product, noting that the piles made a fine exponential curve against the wall, I counted all the other sets of journals I could find and discovered that exponential growth, at an amazingly fast rate, was apparently universal and remarkably long-lived."" (Price 1983)

Merton and Price ”strangely attracted”

- Merton:
  “After having read the offprint you were good enough to send me, I am persuaded that your materials should be a rich source for the sociologist of science. As it happens, I am now in the midst of working on a problem in this field which needs precisely the kind of evidence you are putting together in your Citation Indexes. Perhaps we can get together on my return from the Pacific Coast in a few weeks. What would you say to that? (Merton, citerad i Merton 1982; Garfield 2004b)."
  – They never met at that time!

- Price: "inoculated with Citation Fever" (early 60's):
  “personally was immediately struck by the realization that citation links represented a radically new kind of data with far-reaching potential. Though we couldn’t predict with absolute certainty how much a citation index might be used, or even to what purpose, it seemed clear to me that such an index must be developed. It also seemed clear to me that such an index would have a good chance of becoming a commercial success, instead of becoming a permanent burden on the federal budget; though a new immigrant to the land of federal fiscal matters, I was able to recognize that prospect as being nearly unique. (Price 1980c)"
  – Did not receive any NSF budget
Bernal: SCI what need?

- The value of the Science Citation Index was immediately apparent to me because I had tried to do the same thing in reverse order in writing about various aspects of the history of science. The publications of science effectively form a network of mutual reference which can be traced out from any particular point from which one chooses to start. It is a graph in the mathematical sense. The Citation Index is constructed so as to produce an almost infinite number of such graphs. Its value as an index is another matter altogether. The real question is what is such an index needed for? It is simply to find out where a certain paper is, the existing one-way indices contained in the Abstracts should be sufficient. However, an index has more functions than this: it should give the relationships of any given paper to all other papers that are appearing, not necessarily on the same subject or in the same detailed field but anywhere in science, and this function the Science Citation Index admirably fulfils. (Bernal 1965)
Ämnes- vs citeringsindex

Citering ≠ Referens
Från referens till citering

Referens i text:
Garfield (1955) hävdade att citeringsindexet kunde betraktas som ett ”associationsnätverk av idéer…”

Post i referenslistan:

Post i citeringsindexet:
GARFIELD E, 1955, SCIENCE, V122, P108

Villkor för transformation

1. Den refererande artikel måste vara indexerad i citeringsindexet
2. Normalt bör även den refererade artikeln (som erhåller citeringen) vara indexerad.
3. Referensen måste vara korrekt angiven så att referensen kan matchas till den refererade texten.
Key arguments for using citations for evaluation

Classic debate:
• Citations as influence vs.
• Citations as indicator of rhetorics/persuasion

Citer motivations:
– Negative citations
– Perfunctory (slentrianmässig)
– Redundant
• But of course also
  – Conceptual/operational
  – Evolutionary or
  – Confirmational
  (from a classification by Moravcsik and Murugusan, 1975)

The citation as an indicator of quality

• Eugene Garfield (1963):
  – “One purpose of this communication is to record my forewarning concerning the possible promiscuous and careless use of quantitative citation data for sociological evaluations, including personnel and fellowship selection”
  
  – “Impact is not the same as importance or significance”

• At the same time, he also argued SCI to be used to evaluate Journal performance
  – Journal Impact Factor (JIF)

Kessler and F. E. Heart

- The warning reads: "CAUTION! Any attempt to equate high frequency of citation with worth or excellence will end in disaster; nor can we say that low frequency of citation indicates lack of worth."

Kessler, M.M., and F. E. Heart (1962) 'Concerning the probability that a given paper will be cited', Report (Massachusetts Institute of Technology, Cambridge).

Argument for the use of citation analysis as a quality indicator:

"The observation that citations indicate use, and therefore usefulness as well as impact, is the basic argument for using them as an indicator of quality."

Citations as performativity - “being cited”

Traditionally:
- Citations as reward, (passive)
- Citation Index as representation of publication patterns

My proposal: **Performativity** of “being cited”
- What research **work** do citations do?
- Citations as construction and epistemological **networking**
- The citation viewed as an outcome of active achievement or “**performance**”
- Reflexive, active actors

**Citation index** as a **performative arena**
- for publishers, authors, citers, publications and articles; indeed the whole “citation culture”
- Authors **actively** position themselves by choosing journal/field to publish in & research problems to publish on
- Making themselves “**cite-able**”
## Importance of Journals

<table>
<thead>
<tr>
<th>Field</th>
<th>Importance of Journals (%)</th>
<th>ISI coverage of journal literature</th>
<th>Overall ISI coverage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Molecular biology &amp; biochemistry</td>
<td>96</td>
<td>97</td>
<td>92</td>
</tr>
<tr>
<td>Clinical medicine</td>
<td>93</td>
<td>90</td>
<td>84</td>
</tr>
<tr>
<td>Physics and astronomy</td>
<td>89</td>
<td>94</td>
<td>83</td>
</tr>
<tr>
<td>Other social science ~ medicine &amp; health</td>
<td>75</td>
<td>80</td>
<td>60</td>
</tr>
<tr>
<td>Other social science</td>
<td>41</td>
<td>72</td>
<td>29</td>
</tr>
<tr>
<td>Humanities &amp; arts</td>
<td>34</td>
<td>50</td>
<td>17</td>
</tr>
</tbody>
</table>


### Tentative suggestions: Different roles

#### Different disciplinary uses of citations:

- In **Natural science**, citations mark **influence**
  - *(to a higher degree)*

- In **Social science**, citations mark **rhetorics**
  - *Argumentative*

- In **Humanities**, citations mark **textual aspects**:
  - *‘conversation with the cited texts’*
Part 2: Referencing practices

*In natural science, social science and the humanities*

Biochemistry

'cumulative'

Theoretical philosophy

'textual'

Political science

'rhetorical'
Theoretical philosophy
Part 3: Resource allocation models in Sweden

Torn between qualitatively different systems of research impact measures

Present performance based funding model (2008)

Performance based share (10%)

i. External funding (5 %)

ii. Publication performance (5 %) as normalized data for publication & citation rates

Comparable:

- Four year moving average
- Author fractionalization
- Normalization:
  - Publications: Waring Distributions
  - Citations: Field Normalized Citation Level
- Additional Weighting

Weighting

The Ministry of education and research introduced an additional (arbitrary) weighting factor:

<table>
<thead>
<tr>
<th>Subject area</th>
<th>Weighting factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medicine and engineering</td>
<td>1.0</td>
</tr>
<tr>
<td>Natural sciences</td>
<td>1.5</td>
</tr>
<tr>
<td>Humanities and social sciences</td>
<td>2</td>
</tr>
<tr>
<td>&quot;Other&quot; areas</td>
<td>1.1</td>
</tr>
</tbody>
</table>

(Prop. 2008/09:50 2008, 57)

Motiv till viktning

“— Vi har gjort en hel del körningar när det gäller vilka effekter olika varianter av anslagssystem skulle ge. /.../
— Jag kan bara säga att ett stort problem för mig var att detta system rent och naket skulle slå negativt mot humaniora och samhällsvetenskap. Vi införde denna fördublingsfaktor för att se till att ha en kupa, en skyddande hand, inte minst över humaniora.

— (Applåder)

Criticism against Swedish model

Criticism from the Swedish Research Council (VR 2009)

1. The bibliometric model not robust enough
2. The problem of humanities and social sciences

Does the model represent humanities and social science (HSS) realistically?

– Publication data available (although at low level)
– Citation data not comparable (in practice)
  • Solution: citations don’t count for humanities (normalized to ‘1.0’)

• Additionally: The Government arbitrarily introduced a weighting factor awarding double score for each HSS article

The ’problem of the humanities’

Citing practices differ and are not comparable

– between different disciplines, e.g. natural sciences, social sciences & humanities

There is order of magnitude

– handled by weighting (normalization, fractionalization...)

But could these be compensated for?

– By quantitative measures?
– or qualitative measures?
The ’Flodström Inquiry’

New model proposed to be introduced 2014. Dismisses qualitative “peer review” evaluations.

Introduced an alternative performance-based model for distribution:
1. Scientific publishing impact of published research (50 %)
2. External funding (35 %)
3. Public engagement (15 %)

Bibliometric model: national data base for publication.
- Points based on “impact factors” (JIF & “negotiated”)
- Reminiscent of the “Norwegian” model:
  • publication channel
  • level of the channel

‘Norwegian system’

• Two dimensions:
  – publication channel
  – level of the channel
    • (0: not scientific)
    • 1: ordinary scientific
    • 2: highly prestigious publication channels

<table>
<thead>
<tr>
<th>Publication channel</th>
<th>Level 1 (80%)</th>
<th>Level 2 (20%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monograph</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td>Article in journal or serial publication</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Article in edited work</td>
<td>0.7</td>
<td>1</td>
</tr>
</tbody>
</table>

Arguably:
• ‘Secondary peer review’
• ‘Impact factor’ based system
Research and innovation bill 2013-2016
‘Research and innovation’ (Prop. 2012/13:30)

Key points:
• Performance based share doubled (20 %)
• ‘Peer review’ instead of bibliometrics?
  – Cf, the British RAE/REF system or
    Univeritetskonslerämbetets “kvalitetsutvärderingssystem för högre utbildning”
• But, implemented "not before 2018"
• Meaning:
  – two general elections (2014, 2018)
  – one innovation bill (expected in 2016)
    • ...will pass before the new model is implemented.

Bibliometric ”issues” by stakeholders 2013

Proposed alternatives:
1. Qualitative peer review model (VR)
2. Impact factor instead of citation based metrics
   – Consequences for Humanities and Social Science
3. ”Field normalization” of impact factor measures
4. Combining citation & impact-factor based models
   1. “combining the citation data of the WoS with SwePub data with negotiated weighting factors” (KB)
   2. Proposed multiplex model (Lund University)
5. Open access 0.2 bonus for ”freely available research” (KB)

Transparency vs. Obfuscation?
Performance based allocation models on three levels

*Torn between qualitatively different systems of research impact measures*

- National level:
  - Field normalized publication and citation measures
- Within universities
  - Norwegian ”impact factor” model based on secondary peer review
- Individual level
  - H-Index
At the departmental level

• A large number of universities within higher education sector have adopted a system based on the ’Norwegian model’

• Allocation and re-allocation:
  – at the faculty level
  – department level
  – (individual level)

Comparison Sw/No model

**Swedish model**

- **Transparency:**
  - Variables in the calculated model are relative
- **Selection:**
  - Only published material that is indexed in WoS ISI
- **Measure of quality**
  - Citation measures, field normalized
- **Source of data:**
  - Already available data (WoS ISI)

**Norswegian modell**

- **Transparency**
  - Pre determined ‘point system’
- **Selection**
  - More research channels (Monographs, conf. Proc, journal articles)
- **Measure of quality**
  - “Secondary peer review”
- **Sources of data:**
  - An authorization index must be created (Cristin, NSB) and publication lists must be updated.
Individual level

H-index

- Introduced as “an index to to quantify an individual’s scientific research output” (Hirch, 2005)

- Measure of individual performance

- Calculated as the break point value for an individual’s publications where No. of published papers meets frequency of citations

![](image)

’H’ = citations = published papers = 13

What are the results

’curriculum vitae AND h-index’

’Gaming the system’

Techniques

- self (colleague) citation
- editor coercion
- citation cartels

Research policy advice:

Division of Analysis and Evaluation, GU

In response to university rankings:

- “another way of advancing on the list would be to appoint highly cited researchers, since they ‘bring with them’ their earlier citations…”

(2012, my literal translation)
Conclusion

- Bibliometrics in research evaluation:
  - Quantitative or
  - Qualitative solutions?
  - Prevalent both in ’citation’ & ’impact factor’ based models.

- ”Field normalization” and other bibliometric techniques solves quantitative aspects, but what about qualitative differences in citation practices?

- Policy focus on question of individual performativity
  - E.g. ”being cited” – how well researchers make themselves cite-able in citation based metrics

Literature

- Merton, R. (1974). Norms and Counter-Norms in a Select Group of the Apollo Moon Scientists:
- A Case Study of the Ambivalence of Scientists. American Sociological Review 39, 579-595
- Wouters, P. 1999. The Citation Culture. Diss. Faculteit der Sociale Wetenschappen, Universiteit van Amsterdam.