The Potential of Academic Social Network Sites for Scientific Impact Assessment

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Background: Scientific Impact Assessment
«What gets measured gets done»

- The way we assess the impact of our research influences resource allocation in academia: how much time and money do we spend on the research of which phenomena, and how do we conduct this research?
Peer-review is "an inherently conservative process ... [that] ... encourages the emergence of self-serving cliques of reviewers, who are more likely to review each others' grant proposals and publications favourably than those submitted by researchers from outside the group."

UK Parliamentary Office of Science and Technology, 2002
"However, despite the popularity of this measure [Journal Impact Factor], it is slow, narrow, secretive and irreproducible, open to gaming, and based on journals, not the articles they contain."

Priem & Hemminger, 2010
New media provide new opportunities

- As scientists and their audiences adopt new media to share, discuss and evaluate research, new opportunities for impact assessment arise.
- New media are characterized by speed, immediacy, transparency, personalization.
Example: Altmetrics
A structural perspective

- Critics point out that traditional forms of impact assessment (and even altmetrics) overlook the importance of social capital in academia.

- «Members [of invisible colleges] convene meetings; talk to and write other members; battle over claims and theories; exchange drafts, preprints, and reprints of their articles for critical scrutiny; and routinely enter into various forms of collaboration, including co-authorships.» (White, 2011:275)

- RQ: *What is the relationship between network centrality measures derived from the analysis of academic SNS and established measures of scientific impact?*
Development of Scientific Impact Assessment (?)

Publication-based: Impact Factor

Contribution-based: Citations, h-Index, ...

Person-based: Prominence, Reputation?
2 Methods: The Research Project
• Biggest SNS for scientists with 2.8 million users.

• Based in Berlin, founded in 2008 by virologists Iljad Madisch and Sören Hofmayer and computer scientist Horst Fickenscher.

• More than 30 million publication entries.

• Vivid community, especially popular with young researchers in developing and emerging countries.
Sample

- 55 colleagues from the business department of our university signed up for the pilot project.
- Wide range of academic positions; from twelve independent organizations (institutes) covering various fields of research, such as media and communications, technology management, pedagogy, IS or marketing.
- 50 percent doctoral students/research associates, 30 percent post-docs/junior/assistant professors, 20 percent full professors.
- Data collected between Sep 2012 and Feb 2013.
Measures

Seniority
doctoral students (1), post-docs and project managers without professorship (2), junior/assistant professors (3), and full professors (4)

Publication success:
h-index (ISI Web of Knowledge, complemented by Google Scholar)

Publication resonance (RG):
weighted index of #publication views, #downloads, #upvoted publications, #bookmarked publications

Network centrality (RG):
(in)degree centrality (sample and network), Freeman’s closeness/farness centrality, betweenness centrality and eigenvector centrality

Online activity (RG):
normalized index of #uploaded fulltext publications, #followings, #questions, #answers
The Sample Network

<table>
<thead>
<tr>
<th>Measure</th>
<th>Value</th>
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<tbody>
<tr>
<td>Average Degree Sample</td>
<td>3.04</td>
</tr>
<tr>
<td>Average and Median Indegree Overall</td>
<td>9.98 / Median: 5</td>
</tr>
<tr>
<td>Average and Median Outdegree Overall</td>
<td>7.74 / Median: 1</td>
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<tr>
<td>Density</td>
<td>0.06</td>
</tr>
<tr>
<td>Clustering Coefficient</td>
<td>0.48</td>
</tr>
<tr>
<td>E-I Index for Institute Membership</td>
<td>-0.08 (expected: 0.69)</td>
</tr>
<tr>
<td>Average Distance</td>
<td>2.43</td>
</tr>
<tr>
<td>Diameter</td>
<td>6</td>
</tr>
<tr>
<td>Isolates</td>
<td>10</td>
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</tbody>
</table>
Network and Institute Membership

E-I Index: -0.08
(expected: 0.69)

Clustering: 0.48 (0.27)
Network and Institute Membership

Blue=PhD
Black=Postdoc/Project Leader
White=Assistant Professor
Red=Full Professor
### Correlation Analysis

<table>
<thead>
<tr>
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<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
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<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Activity (RG) (1)</strong></td>
<td>.64***</td>
<td>.54***</td>
<td>.35***</td>
<td>.59***</td>
<td>.55***</td>
<td>n. s.</td>
<td>n. s.</td>
<td>n. s.</td>
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<tr>
<td><strong>Centrality (RG)</strong></td>
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<td>Overall Indegree (2)</td>
<td>.79***</td>
<td>.56***</td>
<td>.44***</td>
<td>.74***</td>
<td>.48***</td>
<td>.51***</td>
<td>.53***</td>
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<tr>
<td>Sample Indegree (3)</td>
<td>.71***</td>
<td>.61***</td>
<td>.94***</td>
<td>.30*</td>
<td>n. s.</td>
<td>.36***</td>
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<tr>
<td>Closeness (4)</td>
<td>n. s.</td>
<td></td>
<td>.71***</td>
<td>.39**</td>
<td>n. s.</td>
<td>.44***</td>
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<tr>
<td>Betweenness (5)</td>
<td>.49***</td>
<td>n. s.</td>
<td>n. s.</td>
<td>n. s.</td>
<td>n. s.</td>
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<tr>
<td>Eigenvector (6)</td>
<td>.33*</td>
<td>n. s.</td>
<td>.42***</td>
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<tr>
<td>Publication Resonance (RG) (7)</td>
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<td></td>
<td>.65***</td>
<td>.79***</td>
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<tr>
<td>Publication Success (8)</td>
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<td>.54***</td>
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<td>Seniority (9)</td>
<td></td>
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Summary & Conclusion

- Only activity correlates with network centrality: engagement and prominence go hand in hand. No correlation with publication success or resonance.
- Publication resonance correlates with publication success and seniority (altmetrics argument).
- Seniority correlates with centrality (except betweenness): social capital.
- Only overall indegree centrality correlates with publication success.
- Betweenness centrality a more “junior” phenomenon.
Thank you for your attention!
Welche Impact-Masse bietet die Netzwerkanalyse?

• **Indegree**: Anzahl Follower/Freunde, «Prominenz»

• **Betweenness**: Brückenfunktion / Verbindung verschiedener Cluster, «Kooperation»

• **Closeness**: Nähe zu anderen Mitgliedern, «Zentralität»

• **Eigenvector**: Verbindungen erster und zweiter Ordnung, «Einfluss»