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“The Evaluation of Research by Scientometric Indicators”

by Péter Vinkler (Chandos, 2010) ISBN 978-184334-572-5.

The Reviewer

Michael Parkinson (Subject Librarian: Mathematics & Statistics),
Science Information Services, University of Auckland, New Zealand

SUMMARY: Dr Vinkler is respected for his work in both chemistry and bibliometrics.

“The Evaluation of Research by Scientometric Indicators” is warmly recommended to librarians and academics as an interesting, well-structured, albeit deliberately limited, introduction to the topics inherent to the title. The author frequently illustrates theory with apt examples (often from chemistry) including well-designed tables that lucidly summarise relevant research results. Technical terms are introduced at appropriate points along the logical course of the book — however, a good index and meticulous use of terms and formula symbols also permit an impatient reader to leap to specific items of interest.

The topic

Vinkler defines scientometrics as

[...] a field of science dealing with the quantitative aspects of people or groups of people, matters and phenomena in science, and their relationships, but which do not primarily belong within the scope of a particular scientific discipline ... The aim of scientometrics is to reveal characteristics of scientometric phenomena and processes in scientific research for more efficient management of science. (p. 1)

References and other idiosyncrasies

From the many citations through the text, a reader may get the impression that, like a latter-day Disraeli, if Dr Vinkler needs a good reference then he writes it himself. Spot-checking several such self-references for *broad* statements (e.g., to his own 1998 paper for the assertion that “References made by the authors can be assumed to be proof of the use of the information in the publication references”), reveals that Vinkler’s papers adequately recap that particular statement — even if sometimes somewhat datedly or superficially. Nonetheless, when finer details later become necessary (for instance, the *motives* for making references and the relative frequency of those motives), Vinkler

succinctly summarises, often in clear tables, the results of appropriate research including material published after his own broad reference. Conversely, sometimes Vinkler is indeed the origin or major source on the concept discussed (e.g., his π and π_v -indexes). Some of Dr Vinkler's work is well-cited (a superficial search giving him an *h*-index of 15 and a *g*-index of 23), however his idiosyncratic suggestion that [2-year] *impact factor* be instead called the *Garfield Factor* (GF) has been solidly ignored by others in the field, and will naturally remain ignored as long as *Journal Citation Reports* use the more tradition term — even though *Garfield Factor* obviously makes it easy to divorce concepts of “impact” from that otherwise ubiquitous factor.

Structure

After reading Chapter 2 (pp. 7-9: Basic categories of scientometrics) and at least skimming Chapter 3 (pp. 11-21: Classification of the indicators...), the reader is in a position to look up specific indicators or topics of interest in the subject index. Nonetheless, the book is best used in its printed order — especially if the reader wishes a good overview of scientometrics. *Publication growth* naturally leads to both *journal eminence* and the *ageing of scientific information*, which give the tools to consider *indicators assessing publications*; and so on. It may seem that a myriad of terms, some rather contrived, are foisted upon the reader — but Vinkler's standard technique is to introduce technical terms and indicators at the point where they enhance the reader's understanding or are a necessary step to the next, core concept. Admittedly, the reviewer often failed to appreciate the relevance or importance of a term when it was first introduced: should other readers feel the same, may one recommend that they lightly skim that section and carry on in the assurance that the significance will become apparent later?

The concluding chapters are topics that are core to Vinkler's interests (standardising scientometric indicators and assessments; applying them to science policy; and modelling how scientific information is institutionalised) and which reflect his expertise. In discussing the grant process, he emphasises that time and effort on participants, successful or otherwise, is considerable:

In my opinion, the costs of *time* and *effort* required of the applicants should be lower than the possible loss caused by distributing grants without sophisticated evaluation systems and offering also undeserved grants. Bearing in mind Occam's principle, *some scientometric indicators* evaluating past activities, pieces of information on *recent activity* and data on the *project suggested* would give sufficient information for a proper decision on the granting of fundamental

research projects. Maintaining a simple system as described above would cost less than the sophisticated procedures currently applied worldwide, and would lead to similar successful results. (pp. 222-3)

Vinkler's technique illustrated

The boggy field of journal *eminence* or *prestige* is a danger to all who charge into it on a high horse; but Vinkler leads the reader by smaller, measured steps and the gains made are illustrated with pertinent examples. He begins his chapter on the subject with "Relevance, validity and applicability are the main factors used to characterize the scientific eminence of journals". After quickly explaining those points, he continues, "The *citedness* of publications may be used to represent the extent of use", and shortly arrives at the 'impact factor' (Garfield Factor). There is the perfunctory warning about the multitude of measure of impact, and the conflicts between them [which is picked up several chapters later] and the Garfield Factor (GF) is clearly defined and an example given. Which, as a defined mean, leads on to how diversely papers are cited and the GF is then proven to be the "mean chance for citedness" — which is not strictly true, since the GF is actually a biased *overestimate*, due to its inflated numerator (Seglen 1997, 500). At this point, Vinkler brings us back to concrete examples: the mean number of references per paper has increased over time, and the GF [impact factor] also increased, although this does not mean that the proportion of recent citations has increased ... as is illustrated by yet another example. And the chapter continues similarly.

Vinkler states "it may be concluded that the GF of journals is an appropriate scientometric measure for characterising relative international eminence within a set of journals with similar bibliometric features" (p. 51); however the subsequent list of bibliometric features is long and detailed (p. 163ff), appeasing even the harshest critic of impact factors.

Deliberate omissions

Vinkler deliberately ignores almost all of the indicators of journal eminence, other than a decidedly incomplete table (5.14) of "some indicators and methods". No definition, explanation, or interpretations are given. That chapter, *Scientific Eminence of Journals*, ends:

It should be noted that also Eigenfactor Score and Article influence Score and 5-year Journal Impact Factor for the journals in the JCR are available in Journal Citations Reports (Thomson Reuters Co) for JCR years 2007 and later. (p. 62)

It should be noted, actually, that Vinkler's writing style and logical argument normally

flow more elegantly than in this example. Why mention those indicators, if no explanation is given? Why not add the corresponding values to the various tables of journal indicators and add brief descriptions to the text earlier in the chapter. Similarly Vinkler ignores the SCImago Journal Rank (Falagas *et al.*, 2008), or SJR, which may make his book seem dated now that SJR and Source-Normalized Impact per Paper (SNIP) are available in Scopus, produced by Elsevier, from January 2010 and later. The [extended] h -index appears as a measure of journal prestige only to show how inferior it is to Vinkler's own π_V -index. Whereas the g -index, superior in that aspect to the h -index, doesn't even make it into Table 5.14 — although common sense demands, and the references of his original papers on the π and π_V -index prove, that Vinkler is quite aware of the g -index.

However, in Vinkler's defence, there are instructive advantages in concentrating at this point on only two diverse indicators of journal eminence or prestige that generate surprisingly similar rankings: a long-established, apparently "average" measure of impact [the Garfield Factor] and a novel indicator derived solely from the small, high-performing elite set of papers [the π_V -index]. Moreover, other GF-derived indicators are discussed in later chapters.

Precision

The editorial proofing is to a high standard. Typographical errors are rare and insignificant (e.g., "power low" for "power law"). Grammatical irregularities are minor. The author's meanings are clear; in the rare case when the reviewer was confused by a phrase or sentence, the successive sentence or two would clarify the sense of the puzzling passage.

Although the mathematics is occasionally rough or used to illustrate a trivial statement (e.g., pp. 28-30), the definitions of terms are clear and the corresponding formula definitions use consistent and *unique* codes, and the same codes are also clearly explained when used in the many tables. Despite a close examination, no error was detected in the equations. In the rare case where a previously used symbol was slightly ambiguous, the precise meaning was often explicit in the text &/or obvious in context — e.g., whether " t " was being measured forward or backwards; whether " y " indicated a specific epoch/date or a relative count of the year with respect to a reference period. This exemplary practise, together with a thorough subject index, make it easy for the reader to leap ahead to a topic of interest or, more likely, to refer back to technical terms that have been briefly forgotten. There is also a comprehensive author index. The reviewer's only quibble is that — unlike, for example, Moed (2005) — the dates of the various authors' work are *not* indicated in that index, making it difficult to follow

Vinkler's use of items of interest, especially for heavily cited authors such as Braun, Glänzel, Moed, etc.

Conclusion

Dr Vinkler has produced a short, well-written book that covers a lot of ground. Combining theory with apposite examples, *"The Evaluation of Research by Scientometric Indicators"* does not require of its readers any detailed prior knowledge or advanced mathematical skills, while being relevant to scientific researchers and their support staff, including librarians and science administrators.

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