

Wanted: Transparent algorithms, interpretation skills, common sense

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Once upon a time

In 1988 the book “*The Timetables of Science*” by A. Hellemans, London and B. H. Bunch was published by *Simon and Schuster* and in 1990 its German translation by *Droemer Knaur*. The authors presented about 10’000 science events from 2’400’000 B.C. to 1988 in chronological order for 10 subject areas. The index included ca. 3600 names; it still is a great overview of highest quality research.

In the same year I became head of the newly founded journals division of the society owned publishing house *VCH-Verlagsgesellschaft*, today known as *Wiley-VCH*; we published about 45 journals, many of which on behalf of societies, foremost the *Gesellschaft Deutscher Chemiker* (GDCh, German Chemical Society). Some of our time-honored journals like *Liebigs Annalen der Chemie* had a glorious history and of course the boards of GDCh/VCH discussed these journals a lot. Key Performance Indicators (KPIs) in those days were: Source of submitted manuscripts, types of manuscripts, their origin: industry, research institutes, West Germany/East Germany (!), number of pages and number of articles published, rejection rates, publication times, numbers of subscriptions inside/outside of Germany.

For most of the journals there was no peer review system, but a group of dedicated in-house desk editors worked very closely with a dedicated group of professors acting as “*Herausgeber*”, primarily in Germany. No monitoring of Impact Factors/citation numbers, no *Nature Indexes*, no *Scopus*, no *Altmetrics* scores, no download numbers, no Hirsch (*h*) factors, no counting of app installa-

tions, no correlation with university rankings.

As a chemist by training I was always interested in experimenting and measuring the outcome in order to learn and gain more insight and also to inform our Editorial Boards. Thus, we soon started discussing impact factors, citations as well as later download numbers, and we realized for instance that such numbers can be correlated, but for good reasons sometimes they are not correlated at all; and they can be “gamed”!

Today

More research is done and published under enormous time and “return-on-investment” pressure in more countries by more scientists than ever. Big data is a buzz word for a growing group of scientists and companies, complex proprietary and confidential self-learning algorithms are influencing our daily lives: We see ourselves in the machine learning age and are more or less silently evaluated by software of various companies; we are in the hands of the GAFAs (*Google, Apple, Facebook, Amazon*) and more.

If you can't beat them, join and influence

Having served science and scientific societies from the publishing side for three decades, my experience is: What can be counted will be counted, what can be analyzed will be analyzed; it just varies how much we are prepared to pay for it and invest in it – time, energy and money wise. Realistically you can't stop this trend. Every responsible participant of “the publishing/science scenes” has to bring his or her knowledge, pragmatism, and com-

mon sense to the table to establish and maintain quality standards, a set of general values, and guard the ethics.

For the future

1. We need transparency about algorithms used to “calculate” metrics.
2. We need to understand their strengths and weaknesses, pros and cons – including how they can be influenced and “engineered”.
3. We need to teach science administrators and other decision makers how the “metrics business” works, also students and early career researchers.
4. Ethical guidelines and standards have to be implemented by funding organizations, universities, and all other research institutions.
5. Basic rules like the Pareto principle or “less is more” as well as a culture of reading instead of downloading/importing references have to be applied.
6. Good research as well as good teaching have to be rewarded, not an increase in *h*-factors, for example.

When these or similar sets of rules are followed, distorting and distorted metrics will less distract from high quality research. It will be understood that:

1. Simple addition of impact factors for all articles published by members of an institution is not a metric for its innovation power.
2. Sex sells also science! High Altmetric scores are to be expected for scientific articles with headlines about the evolution of female orgasm or the length of penises, usually accompanied by press releases, social media storms by

3. authors and bloggers with many followers.
4. Some new services and their related KPIs are simply another layer of work and bureaucracy creating only additional noise without supporting science.
5. Some indexes and rankings are *l'art pour l'art*, at best good marketing following another “crazy” business idea. Less metrics is more, and what should rather be valued is common sense and risk taking. For this, reading and direct communication from scientist to scientist is the key.
6. High h-factors can be the result of publishing many innovative papers – but they can also be obtained by somebody writing many (mediocre) review articles about fashionable topics.

I would like to end with two quotes: “*Don't be dazzled by data or the latest technology. Big data has the aura of precision but often obscures the story*” (graphic designer Nigel Holmes), and “*We didn't know what we knew when history happened*” (historian Fritz Stern).

I would like to thank many board members of our journals, many journal editors as well as bibliometric experts like Hans-Dieter Daniel, Zürich, and colleagues like Iain Craig, Oxford, for many experiments and discussions.



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