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H-Index

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II

H-Index

Travis Bartosh

The h-index is a metric that uses both the number of an author's publications along with the number of times those publications have been cited by other authors in an attempt to gauge an author's perceived academic authority in their given fields of research. Balandin and Stancliffe explain how the h-index functionally operates: "If all of a researcher's total of N publications are listed in order of the number of times they have been cited – from most to least – then that researcher's h-index is the number of papers (h) that have been cited h or more times."¹ For example, an author with eight publications and those papers have been cited 10, 10, 9, 8, 8, 3, 2, 0 the author's h-index would be five because they have five papers that are cited five or more times.

The h-index was originally developed by a Jorge Hirsch, a physicist at University of California at San Diego. He developed the index, which is sometimes called the Hirsch index or the Hirsch number, in order to determine a physicist's academic impact on the field.² Due to the simplicity of the single digit number the index is able to produce, scientific journal editors have been a main audience that have taken notice of it; *Nature* and *Science* use the index to measure

1 Susan Balandin & Roger J. Stancliffe, "Impact Factors and the H-Index: What Researcher and Readers Need to Know," *Augmentative and Alternative Communication* 25, no. 1 (2009): 1-3.

2 Jorge E. Hirsch, "An Index to Quantify an Individual's Scientific Research Output," *Proceedings of the National Academy of Sciences of the United States of America* 102, no. 46 (2005): 16569-72.

research performance.³ Although the index was originally intended to measure the academic authority of an individual within physics, many departments and researchers outside of the sciences also use the h-index in the promotion and tenure processes.

Strengths & Weaknesses

Let us now shift to a deep look at both the strengths and weaknesses the index provides as a metric to measure academic authority. One of the primary strengths of the index is its ability to measure two dimensions of scholarly impact in one metric. Although I am against harming animals the appropriate phrase to use for this is 'Killing two birds with one stone'. Due to how the h-index measures the overall impact of an author's contribution to a given field by not only taking into account the number of publications an author has, but also how the rest of the field accepts the author's writing through citations the metric purports it is able to measure both breadth and depth in one number.

Bornmann, Wallon and Ledin note, "The h index is a valid indicator for research performance at the micro and meso levels, and a promising rough measurement of the quality of a young scientist's work as judged by internationally renowned scientists."⁴ Bornmann and company further point out three key advantages for using the h-index as a measurement tool: 1) It provides a sense of the robustness of the author's overall impact on the academic community as a whole and it also is able to present a comprehensive picture of an academic's research career; 2) Hirsch's 2007 follow-up study on the h-index shows not only did the metric provide a sense of an author's past productivity, but it also represents a prediction of future productivity; 3) The data used to calculate a researcher's h-index is easy to access. Both the Thomson Reuters Web of Science database and SCImago which uses the Scopus database are able to provide information without any off-line data processing.

In Philippe Baveye's article, "Sticker Shock and Looming Tsunami: The High Cost of Academic Serials in Perspective," he outlines three key weaknesses of the h-index developed by Hirsch.⁵ The first weakness identified by Baveye is the is-

3 Lutz Bornmann, Gerlind Wallon & Anna Ledin, "Is the H Index Related to (Standard) Bibliometric Measures and to the Assessments by Peers? An Investigation of the H Index by Using Molecular Life Sciences Data," *Research Evaluation* 17, no. 2 (2008): 149-56.

4 Bornmann, Wallon & Ledin, "Is the H Index Related," 155.

5 Philippe C. Baveye, "Sticker Shock and Looming Tsunami: The High Cost of Academic Serials in

sue of time. With how the index works it may take a long time for three key actions to occur before your personal h-index is reflective of your contribution. First, you must write an article or paper worthy of being published—this is a process that can take several years. Secondly, another scholar needs to search for your writing and use it in a project they are working on themselves. Lastly, the individual who seeks out your original publication must then themselves be published with your citation in their paper. Thinking of an extreme example of this situation happening over a long period of time I am reminded of an article I recently read published in 1962. If I was to cite content from that author's article and have a paper published there would have been a forty-eight year lag time on the original author's h-index!

The second weakness laid out by Baveye concerns the metric's indifference regarding whether a target article was used in a positive or negative fashion, as "the h-index does not distinguish between positive citations and references made to an article to point out that it is fundamentally flawed or erroneous."⁶ This is a major concern that could consequently reward people who have developed a false authority in scholarship. For instance, an author could potentially have an article published where many of the other academics in their field do not agree with its findings. Consequently, those other academics write negative responses to the original article, citing it to argue it is not going in the right direction or flat out wrong. However, the h-index does not factor in this seemingly major difference. Without recognizing the difference the h-index rewards and gives more academic credibility to the original author who 'got it wrong' and/or did not add to the discipline.

A third weakness of the h-index is its constructed bias towards quantity over quality. According to Balandin and Stancliffe, "The h-index represents an imperfect attempt to consider both the number of publications and their 'quality.'"⁷ This is a significant distinction to make as it has the potential to, in a way, discredit an author's overall contribution to a given field. Essentially the h-index penalizes authors who have few articles, even though those articles are widely cited by others. Imagine an author who spent ten years researching a topic and then released a ground-breaking publication on their research, and consequently that one study impacted an entire direction of a given field and was cited heavily by other authors. Although this person shifted an entire thought pattern within

Perspective," *Journal of Scholarly Publishing* 41, no. 2 (2010): 191-216.

6 Baveye, "Sticker Shock."

7 Balandin & Stancliffe, "Impact Factors and the H-Index," 1-3.

their discipline due in part to the time they put into the project, they would not be rewarded in the h-index. The author would be awarded a h-index of one even though they were cited numerous times and their contribution to society was much larger than others at the same level. Consequently, another author who published a flurry of less impactful articles could potentially have a very high h-index.

Results & Conclusion

At this point in the writing I am inclined to offer my own judgment on the h-index as an academic authority metric. Although the metric is able to measure two dimensions involved in the academic writing process (publication and citation by others) it overlooks one of the main reasons why we research and why many schools and universities are (publicly) funded in the first place—to disseminate information to the general public. Unfortunately the h-index ignores the potential impact an article can have as a teaching tool. For instance, I am reminded of one instructor in the field of Communication Studies who uses Peggy McIntosh's groundbreaking essay "White Privilege: Unpacking the Invisible Knapsack" to teach the topic of identity to a classroom of mostly white young adults at a large midwestern university. One of the main quotations taken away from the article by the students is where McIntosh writes, "I was taught to see racism only in individual acts of meanness, not in invisible systems conferring dominance on my group."⁸ After that quote McIntosh then enters into a list of fifty points where she experiences white privilege in everyday life. Needless to say this is very impactful on the students in the classroom, many of whom have never thought about their own white privilege or institutionalized racism. Due to the impact of Peggy McIntosh's article on the students they begin to look at life with a more critical lens and will hopefully engage in praxis with their new found education.

Unfortunately, like many of the metrics and indices that measure academic authority, the h-index appears to ignore the impact of a researcher's publication on students and the general public at large, and consequently comes off as an elitist measurement tool that only takes into account what other academics within the institution deem is worthy. Although academics' citation of their peers' writings act as a type of peer-review process in order to develop the strongest ideas pos-

8 This excerpt is taken from Peggy McIntosh's essay, "White Privilege: Unpacking the Invisible Knapsack." It is part of her larger collection of writings, "White Privilege and Male Privilege: A Personal Account of Coming to See Correspondences Through Work in Women's Studies."

sible, we need to look to how we can factor in what students experience as impactful in their own lives. One direction that may prove beneficial to think about for the future of academic authority metrics is the idea of the multiple stakeholder model developed by the organizational communication theorist Stanley Deetz.⁹ The multiple stakeholder model is an organizational tool that attempts to take into account the voices of all of those who are vested in the organization. For instance, if a lumber company in a given city made a business decision the multiple stakeholder model would have the management of the company acting as liaisons between all of those who have an interest in what the company does (lumber supplies, employees, citizens of the city, land conservationists, etc.) to come to a solution that is beneficial or at least agreed upon by all. However, I digress, as this writing does not offer a new academic authority measurement tool, but I do think these are important aspects to be cognizant of when developing or improving new indices and metrics.

As I write this as a member of the field of Communication Studies I am also inclined to provide a thought on the appropriateness of the h-index in the field. Overall I am troubled by the weaknesses the index provides, but specifically I am concerned it will not benefit the field of Communication Studies. The h-index was originally developed in the field of physics and designed to be used by others in the sciences. Consequently, authors' publication patterns in the hard sciences are different as opposed to those in the social sciences and humanities. A researcher in Communication Studies may find their h-index number to be much lower than their counterparts in the sciences due to the amount of articles they publish contrasted to those in Communication Studies. Another possible negative side effect of researchers within Communication Studies using the h-index is the inconsistency of self-harvesting data in attempt to gain a higher h-index by including publications that may be questionable in particular departments or universities. As other forms of publication are being recognized for the tenure and promotion process the h-index will show to be an inconsistent tool in measuring academic authority.

9 Stanley Deetz, *Transforming Communication Transforming Business* (Cresskill, NJ: Hampton Press, 1995).