

## Popular method for measuring research performance produces inconsistent results

The *h*-index, one of the most frequently used methods for measuring the performance of researchers, has been shown to produce inconsistent results. Because of this, the index is not suitable as a tool in research evaluations. This is the conclusion of a publication by CWTS researchers Ludo Waltman and Nees Jan van Eck in an upcoming issue of the *Journal of the American Society for Information Science and Technology*, the most important journal in the field of information science. According to CWTS Director Paul Wouters, “Universities and funding agencies need to look for better methods for measuring the performance of researchers. They should abandon the use of the *h*-index.”

Measuring research performance based on publications and citations is a common phenomenon in many fields of science. The *h*-index is among the most popular measures. The index increases with the number of publications a researcher has written and the number of citations these publications have received. A researcher has an *h*-index of, for instance, 12 if he or she has 12 publications that have each been cited at least 12 times and if his or her remaining publications each have no more than 12 citations. The *h*-index was introduced by physicist Jorge Hirsch in 2005, and has rapidly gained popularity since then. Nowadays, the *h*-index of a researcher can easily be found in publication databases such as Web of Science and Scopus. A special computer program has even been developed to determine the *h*-index of a researcher based on Google Scholar. Scientific search engines also sometimes rely on the *h*-index. The *h*-index is regularly used in research evaluations and appointment procedures. In the Netherlands, for instance, registering a new candidate member of the Royal Netherlands Academy of Arts and Sciences requires his or her *h*-index to be reported. An influential ranking of Dutch economists has also been produced based on the *h*-index.

The introduction of the *h*-index has had an enormous influence in the field of bibliometrics, the field which is concerned with the analysis of publication data. Nowadays, in important bibliometrics journals, one out of four publications refers to the *h*-index. Bibliometricians put a great deal of effort into investigating

the advantages and disadvantages of the *h*-index and into finding ways to improve the index. However, the work of Waltman and Van Eck (preprint available at <http://arxiv.org/abs/1108.3901>) shows that the *h*-index has fundamental shortcomings. When two researchers write a number of publications jointly, the *h*-index of one researcher may benefit from these publications much more than the *h*-index of the other researcher. This may affect the assessment of the two researchers in an essential way. Researcher Smith may initially have been assessed more favorably than researcher Jones, but writing a number of joint publications may result in researcher Smith being assessed less favorably than researcher Jones. Thus, without any logical reason, the *h*-index reverses the assessment of the two researchers. Based on this, Waltman and Van Eck conclude that the *h*-index produces inconsistent results.

The research by Waltman and Van Eck makes clear that the *h*-index may produce illogical and sometimes even unfair assessments of research performance. For this reason, CWTS strongly advises against the use of the *h*-index. As shown by Waltman and Van Eck, better alternatives are available. Inevitably, measuring research performance based on publications and citations causes all kinds of inaccuracies. It is essential to reduce these inaccuracies as much as possible. An important step can be taken by abandoning the use of the *h*-index.

Note for press: Further information on this research and on alternatives to the *h*-index can be provided by Ludo Waltman, tel. +31-71-5275806 and e-mail [waltmanlr@cwts.leidenuniv.nl](mailto:waltmanlr@cwts.leidenuniv.nl).

Press contacts: Ed Noyons, tel. +31 71-5273909 and e-mail [noyons@cwts.leidenuniv.nl](mailto:noyons@cwts.leidenuniv.nl).

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The Centre for Science and Technology Studies (CWTS) is a research institute of the Faculty of Social and Behavioural Sciences of Leiden University. The main area of interest of CWTS is the quantitative analysis of scientific research (scientometrics and bibliometrics). More generally, CWTS investigates the various dimensions of the impact of scientific research. Many evaluations of scientific institutes and organizations use bibliometric indicators of CWTS. More information: [www.cwts.leidenuniv.nl](http://www.cwts.leidenuniv.nl).



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