# THE AR-INDEX: COMPLEMENTING THE H-INDEX


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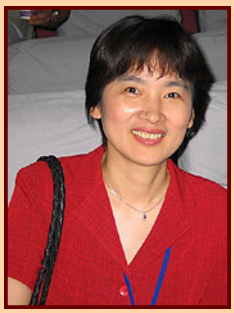

The h-index was introduced by J. E. Hirsch (2005) as an indicator for lifetime achievement. Considering a scientists list of publications, ranked according to the number of citations received, the h-index is defined as the highest rank such that the first h publications received each at least h citations. All publications ranked between ranks 1 and h form the Hirsch core (in case of ties preference is given to younger articles). Although the h-index has several advantages, it has also some disadvantages such as the fact that it lacks sensitivity to performance changes. In particular it can never decrease and does not take the actual number of citations into account.

For this reason I propose the AR-index as a complement of the h-index. The AR-index is defined as the square root of the sum of the average number of citations per year of articles included in the h-core. As a formula this is:

$$AR = \sqrt{\sum_{p \in H} \frac{cit_p}{a_p}}$$

where H denotes the Hirsch core, p denotes a publication, and $cit_p$ and $a_p$ denote the number of citations received and the age of article p, respectively. The term AR-index refers to the fact that this is an **a**ge-dependent index calculated using a square **r**oot. If all $cit_p$ are equal to h, and all $a_p$ are equal to one then AR = h (explaining the reason for taking a square root).

Besides employing the actual number of citations to articles belonging to the h-core as a parameter, the AR-index also takes the age of publications into account. In this way, the h-index is complemented by an index that can actually decrease. Such behaviour is, in my opinion, a necessary condition for a good research evaluation indicator. Consequently, the pair (h, AR) is proposed as a meaningful indicator for research evaluation. Of course, as the definition of h is not changed, only the second element of this pair may possibly decrease. When using this pair for research evaluation I, moreover, suggest applying a suitable publication and citation window.

## Reference


Hirsch, J.E. (2005b). An index to quantify an individuals scientific research output. *Proceedings of the National Academy of Sciences of the USA*, 102(46), 16569-16572.



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