Nobody Reads, Everybody Cites

I recently came across the story (perhaps apocryphal) of a young aspiring musician from the 19th century who was determined to learn from a renowned teacher and composer resident in a distant town, but lacked the financial means to do so. Undeterred, the boy frequented the route taken by the then King on his weekly perambulations, prostrating and saluting each time their paths crossed. After six months, the King's curiosity was piqued and the boy's persistence was recognized and rewarded; he secured the requisite funding from the King to pursue his interests.

There are several parallels between the boy's pursuit of knowledge, and the pursuit of research funding in the sciences today. Academics continue to rely on the munificence of external agencies to fund their research. A six-month waiting period from grant initiation to decision is almost mandatory for federal funding. While it is perhaps no longer necessary to salute program managers on a weekly basis, a certain amount of networking and relationship building is certainly needed. And, most importantly, principal investigators continue to devote a disproportionately large fraction of their time to secure funding as opposed to actually practicing their art (or science). In this context, it is relevant to look into two factors that can influence the outcome of a grant application, namely bias in the review process, and the assessment of past scholarly performance.

Do subliminal biases exist and, if yes, do they have a statistically significant influence on the outcome of the grant (or paper, or faculty application) review process? A recent study[1] addresses just this question by performing a carefully designed computer simulation of a grant review process. The study concluded that even a 3% total bias in overall grant assessment, a number corresponding to less than half a standard deviation in an individual reviewer's assessment, could result in a statistically significant discrepancy in funding outcome. It is extremely difficult to detect such low levels of bias during the review process, and even the large majority of fair-minded reviewers are not immune to subliminal influences.

An increasingly pervasive subliminal influence is the ever-growing use of scientometric indicators such as the Journal Impact Factor (JIF) and the h-index to assess scientific performance and standing. The ease of calculation and ready availability of such indicators has reduced the assessment of a scientist's body of work to a few numbers. One can argue, persuasively,[2] that such indices must be used with utmost caution. As one example (among many that are possible) of the inherent flaws of such indices, the distribution of citations across papers within a journal is typically highly skewed, rendering an average measure such as the JIF quite meaningless in the context of evaluating the quality of an individual article.

However, the root cause for concern is that both these indices, and a raft of other popular indicators, are based on the (rather flawed) assumptions that all citations to an article represent an equivalent measure of its impact, and that all the work cited within an article has had an equivalent impact on the authors and on the construct of the work performed. Perhaps there is a case to be made to require authors to classify citations as primary or secondary, wherein the primary articles cited are indispensible sources from a scientific viewpoint, without which the work could not be conceptualized or completed, while the secondary articles cited help describe the background and acknowledge/dispute prior work in the field. The various scientometric indicators can then be defined based on primary citations. This approach will at least provide a more meaningful relationship between citation and impact.

In closing, we would be remiss to ignore outright the probability that important outcomes such as funding and faculty hiring decisions are at least subliminally biased by sub-optimal indicators of quality (JIF, h-index). As a Society, we should explore and popularize more meaningful metrics of quality and impact, and certainly shun the more irresponsible measures. And, while it sounds archaic, we should continue to promote the viewpoint that there is no substitute for good, old-fashioned reading when it comes to assessment of scholarly work.

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