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JUDGING QUALITY OF PAPERS

ASK any editor of a journal what is the most challenging part of his or her job. Most will answer : "Proper reviewing of submitted papers". Almost all scientific journals get the quality of submitted papers examined by the members of the Editorial Board or by external referees. This is known as the Peer Review System (PRS). It is known that PRS is not a fool-proof system. It fails in many cases to prevent duplicate or fraudulent publication. More seriously, it fails to appreciate unconventional ideas or unexpected observations in many cases. I believe that preventing innovative work from being published is even worse than allowing mediocre work to be published. There are evidences that many important, original and innovative papers, many of which earned the Nobel prize for the authors at a later time, had been rejected by the referees under PRS. Documented cases are of Hans Kreb's account of the citric acid cycle, Rosalind Yalow's initial work on radioimmunoassay, Pavel Alekseevich Cherenkov's article on the radiation named after him, Henry Taube's work on inorganic complexes, Murray Gell Mann's work on quarks, Harmut Michel's research on photosynthetic processes, K. Alex Mullers and J. Georg Bednorz's work on high temperature superconductor *etc.* The list could go on and on. According to many critics PRS tends to "favour unadventurous nibblings at the margin of truth rather than quantum leaps", mainly because it often finds it difficult to accept new ideas and unexpected observations.

In order to go beyond the cited examples and comments, which are reported in more or less anecdotal literature, systematic investigations are now being carried out to assess quantitatively the reliability of PRS. In one such study, author's commentaries on important and highly cited papers have been used to analyse peer's resistance to accept important findings. These commentaries are taken from the Citation Classics^{R} featured in *Current Contents.* Every week since 1977 *Current Contents* featured highly cited articles under the name Citation Classics^{R}. Citation Classics^{R} represents an article which is extraordinary for the large number of citation it has received.

Citation data on articles and journals are computed by the Institute for Scientific Information (ISI) and can be obtained from the Science Citation Index. This index records citations of a particular article every year in about 4000 most influential journals. To evaluate a scientist's merit, people now rely more on the number of citations rather than the number of publications. It has been found that citation rate correlates well with the award of prizes and is also a pointer to the scientific merit of an article, as opined by the scientific community. Often citation data have been used to determine the salaries of scientists. However, on the negative side, controversial or wrong papers may also have the possibility of large citations.

The author of the Citation Classics^{R} paper is requested to write a commentary where he or she explains the work, motivation of undertaking the work, contribution of the coauthors and often sometimes the obstacles they faced in conducting the work and/or during publication. It has been said that Citation Classics^{R} are "the human side of science". On an average more than 300 commentaries are published every year. Although a typical article is cited an average of 15 times (Ref : Foreword to the Citation Classics^{R} feature of Current Contents, 1991), only 0.05% of the over 32 million articles which were cited at least once between 1945 and 1988 were cited more than 500 times and only 0.004% articles were cited more than 1000 times.

Garfield and others conducted research to identify, from the commentaries of the Citation Classics^{R}, the resistance or difficulties authors face to publish their papers. It has been found that about 11% experienced some resistance in publishing their papers. In good many cases referees and editors' comments helped to make better papers. These referees and editors deserve recognition for the work they did in reviewing papers in the right perspective. In other

instances, however, the PRS is considered as a barrier to promote innovative ideas or good results.

The purpose of this research is not to criticize the PRS; the purpose is to find ways by which PRS could be improved and journals can publish more good scientific work. Editors and referees should not be embarrassed by these findings because this research is based on just a selected database of most-cited papers and referees do not evaluate papers on the understanding of which will be heavily cited. Most of the referees and editors are doing a stupendous job and that also without any remuneration. The problem is not with the persons but with the whole system. Sometimes it is hard to understand the difference between a good, potentially useful, innovative technique and one which turns out to be a wrong or insignificant finding. In one of the Citation Classics^{R} commentaries, the author mentioned that he himself did not realize that his work will be judged so important in later years.

People are now seriously looking at the philosophic foundation of PRS. It is to be noted that even with initial difficulty most, if not all, papers have been finally published either by defending the author's view with the referee or by sending the manuscript to other journals. It is not an exaggeration when the ISI President Eugene Garfield commented that "the author is the ultimate referee". Reviewers' comments may at best impede or delay the diffusion of new idea or knowledge. Some proposed that a portion of the referee's report be published along with the published manuscript. In addition, rating of referee's wisdom, understanding and usefulness of comments by authors may also improve the PRS. It is understood that PRS requires a balance between quality control and encouragement of innovative ideas. One school of thought suggests that referring could be removed from journal's practice. The practice, which was considered as impractical a few years back due to tremendous load of publications otherwise, now seems to be a reality with technological improvement and with the WEB boom. The idea has been floated that authors would put up their publications in a given website and is subjected to 'open referring' by all interested scientists of the world. Chances are that defects and deficiencies of the paper will be pointed out immediately by some scientists while the usefulness of the paper will be appreciated or will be used by others in subsequent publications in future. Who knows it may also lead to a healthy, multi author, global collaboration on a new or challenging subject. ❐

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