

Editorial

Attention, impact and the economy of science

Science has become an industry of information-making, but the research of science as a form of industry is still in its infancy. Science can be viewed as a highly specialized form of market economy, where information is exchanged to attention. The value of scientific hypotheses, observations and theories is comparable to capital in other economies. The market of science regulates the margins within which the researchers try to maximize the attention they get in the eyes of their competitors and authorities (1). In regular economies markets remove capital from unprofitable enterprises. Inefficient use of resources is harmful for the promotion of science in as much as it is hazardous for other forms of business.

The impact factor (IF) may be compared to e.g. Dow-Jones of the New York Stock Exchange as a high IF is liable to increase new scientific investments, i.e. submissions of papers, in the hope of the place in the sun. Having many published papers in high-ranked journals will have direct and indirect consequences in one's career; the possibilities of gaining a position or receiving grants. Doing research on an untrendy subject might be hazardous to one's future. An untrendy subject comes with a risk of low level of current citations, whereas a study on a hot and trendy subject like genetics is liable to attract attention despite the fact that the clinical significance of the results could be the opposite. As the IF ranks journals and gives a higher rating to general journals than specialist journals, there is a higher likelihood of being noticed and cited on the basis of general interest rather than clinical interests in a special field of medicine. The IF is insensitive to clinical significance and usefulness of the information. The IF may thus have inadvertent consequences in shifting research interests from one subject to another. As such, this is not an inherently negative fact, but does the IF provide adequate tools for deciding what is worthy of scientific interest or not?

In practice IF is among the factors influencing choice of topic of research interest. This may be a reason for concern here as demand for high impact may divert science by placing increasing interest in areas, where it is possible to carry out research very quickly. The IF cannot be used for comparisons of quality of production between fields of science, because "judgment is only possible if there is no appreciable subdivision of research practices" (2). Within a field the average number of citations depends simply on the average number of references. The highest ranking scientific journal in

mathematics has an IF comparable to the 51st in cell biology. This is no evidence of quality difference, but reflects the fact that mathematical papers usually include a small number of references. The value of IF is in assessing the relative importance of papers published in one journal compared with those published in another journal of *similar* content (3).

There are clearly subdivisions of research practices between molecular biology and psychiatry, to be more precise, say, between research in functional proteomics and psychotherapy outcome. It would be preposterous to make a comparison statement of quality of science based on the IF. Furthermore, taking into consideration the huge science market of the USA that accounts for 50% of all research within psychiatry and 65% of the citation impact, the IF also is a function of the economy of quantity (4). Such an economy of masses – here number of global citations – cannot be reached by studies that may have a large local importance within the Nordic countries. Thus, use of the IF as a means to guide funding may ultimately dislocate psychiatric research, if the interests of Nordic health services are not taken into account adequately. Geographical subdivisions of research interests should be considered as well as subdivisions of research practices when ranking scientific productions of researchers. Patients, their next of kin and the services, however, cannot be outsourced.

It is of interest that before the Second World War Nobel prizes were granted more commonly to European than American scientists. In his report to the president of the USA in 1945, Vannevar Bush proposed that the federal government should support basic scientific research in all natural sciences including biomedicine (5). He considered these as a first, necessary step towards a healthy economy. This led to an immediate organization of the NIH. Currently, we see how well the golden flower of biomedical research has been cultivated. Should we consider whether the IF is to be used as the only currency to attract investments in the form of submissions?

Jyrki Korkeila

(acting) professor of psychiatry
Finnish national editor of the Nordic Journal of Psychiatry
Psychiatric Department, University of Turku
Kunnallissairaalaantie 20, 20700 Turku, Finland
Harjavalta hospital, the Hospital district of Satakunta
Finland
jyrki.korkeila@pp.inet.fi

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