The Antiphysical Review

A method of estimating the scientific value: the logarithmic index

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The method presented here is applicable to any form of output of fundamental research, such as papers, preprints, scientific reports, etc, published or not; we call them output units of scientific research. From the general principle of fundamental scientific research it follows that an output unit must be new and valid. These elements can be identified at four levels: theme, problem, result and method.

Any output unit of fundamental research addresses a theme, formulates a problem, gets a result and employs a method. Where it is not aberrant (in which case it is not measurable) the theme is unique, autonomous and raises problems. It appears in two forms-new or trivial-, both measurable. The problem is a meaningful question-new or trivial-, measurable in both cases; when meaningless it is almost always non-measurable. An aberrant theme does not exclude a new problem, but a new theme seldom produces a meaningless problem, since a theme is mainly determined by the problems it raises. The theme and the problem reflect the creativity of the output unit.

The relevance and the originality of the output unit of fundamental research are expressed by the result and the method, respectively. Where not viciated by an incorrect method (in which case the result is null), the result is invalid; correct but trivial; or correct and significant. As an answer to the problem the result is seldom correct for a meaningless problem (and, very likely, never significant); but it is often invalid, even there where the problem is trivial or, especially, new. When not wrong (in the context of the problem), the method is original or trivial. A trivial method, or, especially, an original one, does not exclude an invalid result. The measurability of the method and the result depend very much on the measurability of the theme and the problem. In the case, not very infrequent, where the theme, the problem, the result and the method are all trivial the output unit of research is not measurable.

On the basis of the description given above one may use the four first natural exponents of 10, in reverse order, for measuring the hierarchy theme, problem, result and method. The value of a new theme is 10^4, the aberrant theme gets -10^4, and the trivial theme is given a conditional.1. The value of a new problem is 10^3, the meaningless problem gets -10^3, and the trivial problem is given a conditional 1. The value of the correct and significant result is 10^2, the invalid result gets -10^2, the null result gets 0, and the correct but trivial result is given a conditional 1. The value of an original method is 10, the wrong method gets -10, and the trivial one is given a conditional 1. If all the members of the hierarchy are trivial the conditional 1 becomes minus ten to the exponent of the hierarchy member; otherwise a conditional 1 is 1. The decimal logarithm of the sum of

these four numbers represents the class index of the output unit of research. If the logarithm does not exist, *i.e.* if the sum is negative, the output unit is not measurable, and, consequently, it is not a scientific output. There are 44 class indices for the output units, from $\log 13 = 1.1$ to $\log 11110 = 4.0457$.

The classs index of a researcher is the maximum value of the class indices of all the output units he/she (co)authored; his/her performance is the average of the class indices of the output units he/she (co)authored over his/her active life measured in years. If the distinction between author and coauthor is felt to matter the above exponents may be evenly divided among the coauthors.