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Methodological Critique in Science: A Geometric and Algebraic Approach to Evaluating Research Quality

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Oral presentation

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Abstract

The aim of this presentation is to introduce a model of methodological critique based on the analysis of deviations from a locally or generally accepted standard of methodological correctness. A key element of this model is the concept of visibility, which defines the scope of responses on the part of both the sender and the receiver of a scientific statement. The model takes into account the awareness of errors and the methodological rigor within a given discipline, which influences the environmental legitimization of deviations.

The presented model enables the prediction of the behaviour of the creator, recipient, and disciplinary community in which a given scientific statement operates. Furthermore, it allows for an analysis of the persuasiveness of scientific communication through empirical reports. In the literature, methodological critique most often appears in a prescriptive form, whereas the proposed model has an analytical character and allows for its systematic study.

This model has two main versions: geometric and algebraic. The geometric version allows for tracking relationships between key conditions of methodological critique, such as awareness of errors, their identification, and the degree of rigor within the scientific environment. Based on these factors, it becomes possible to predict the communicative situation in which critique occurs. In contrast, the algebraic version enables the objectification of evaluations of scientific statements by analysing the ordering relations within sets of assessments or preferences. This approach allows for the construction of rankings and the estimation of their validity, supporting a more objective assessment of the quality of scientific statements.

The presentation will discuss three main groups of tools used within this model: ordering metrics, a statistical ranking model, and a ranking model based on an ideal vector. Their application will be illustrated through a comparison of the effectiveness of these methods and an analysis of their practical use in scientific evaluation.

In conclusion, the proposed model of methodological critique serves as an innovative tool for analysing scientific communication. Its structure enables a precise determination of the conditions under which methodological critique occurs and facilitates the quantification and objectification of the quality of scientific statements. The results of the conducted analyses may contribute to a better understanding of the mechanisms of acceptance or rejection of specific methodological deviations in different scientific environments and serve as a foundation for further refinement of tools used to assess research quality.

Keywords

methodological critique, rigor, legitimization, evaluation

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