ABOUT SCIENTIFIC METHOD AND *EX-POST* RESEARCH EVALUATION

Mario de Marchi

Riassunto

In questo lavoro si sostiene che – data l'assenza di un metodo scientifico rigoroso – il tentativo di incentivare gli sforzi degli scienziati verso una crescita della conoscenza razionale impiegando una severa misurazione ex post dei risultati di tali attività potrebbe risultare controproducente e condurre a una Politica della Scienza piuttosto inefficace.

Abstract

Here, it is argued that trying to foster scientists' efforts at increasing rational knowledge by ex-post strict measurement of such activities' results might prove in a rather ineffective Science Policy.

Parole chiave: *Politica della ricerca, Valutazione della ricerca, Metodologia della scienza.*

Keywords: *Research Policy, Research Evaluation, Epistemology*.

1. Introduction: about the non-existence of a scientific method

The progress of science is littered with unsuccessful efforts and tentative results. And several attempts made by epistemologists at identifying a simple, general pattern in the history of the production of new, original scientific knowledge have so far proven only partially successful.

Popper proposed that science proceeds through control of hypotheses which. By piecemeal elimination of unfit ones, would lead scientists closer and closer to truth – it should anyway be considered that such philosopher referred to gradual verification of "falsifying hypotheses" rather than a naïve concept of one-shot "falsification" of theories; also, he was well conscious that an ultimate truth may be unattainable and – according to the teaching by Xenophanes – we could be unaware of having reached such truth even if we luckily had (Popper, 1959).

But Lakatos noted that actually the refutation of a prediction does not always bring about the immediate rejection of the corresponding theory: such a theory might as well be in use as long as a new one, providing more accurate predictions, become available (Lakatos, 1978). This idea provides a reasonable account for the stand-off of theoretical physics during the second half of the nineteenth century.

Kuhn, on his turn, sought to describe the most important progresses in scientific knowledge by putting forth the notion of "scientific paradigms", whose changes take place when anomalies can no longer be justified without a radical shift in the structure of the description of reality (idem, 1970). Such description justifies correctly even puzzling, reversible mutations in approaches underlying the foundations of scientific interpretation of the world, such as the double switch in ancient astronomy from Aristarchus' heliocentric system to Ptolemy's geocentric and back again in the Renaissance to a heliocentric, the Copernican one. But this interpretation seems to suffer from the flaw that according to it some changes in scientific paradigms might even be due to irrational swaps in fashions.

A vigorous, thoughtful endeavor to clarify science's aims and their role in establishing a possible axiological set of rules which may underlie the progress of rational knowledge has been made by Laudan, who concludes that such an attempt is practically hopeless (Laudan, 1984).

A view driven by common sense and, more in depth, by methodological thorough analyses of many great epistemologists, appears in the end to be the one proposed by Feyerabend, who straightforwardly argues against the success of any attempts to build up or only find out a scientific "Method".

Summing up, the lack of a method to make easier and more successful the performing of scientific research bring about an idiosyncratic, inevitable uncertainty of R&D outcomes, an uncertainty which tends to show up *ex-ante* regardless of scientists' average capabilities and efforts. In fact, just by singling out the sprinkling of few lucky, successful research projects

within the vast amount of unavoidably failed attempts that mess up the progress of the rational, original theoretical and empirical understanding, it is sometimes impossible to tell apart the many brilliant and hard-working scientists from the few mediocre and lazy ones.

This consideration entails an inescapable, even if perhaps little noticed, consequence for science policy: the need for a very conservative use in *ex-post* penalties to "punish" researchers for their supposed failures, since most of these are not failures, only inevitable steps within the normal process of accumulation of new, original rational knowledge.

2. Conclusions: discoveries without publications

Both the whole process and every single step of the path leading to scientific progress can be labelled as discoveries. This is true within "hard" sciences, in abstract terms when theories are devised and discussed and in empirical modes whereas experiments are designed and performed. Such representation is also correct for social science, regarding the ideation of and debate on models and their tests. Even within humanities, in a sense, the birth of new interpretations which replace current narratives can be described as a consequence of discovery of previously unknown descriptions.

On the other hand, given that science aims a gaining reproducible result, doing research can be characterized as making efforts concerning reproducible discoveries.

Indeed, research consists in efforts at putting forth entirely new, original knowledge by devising advanced theories and novel experiments or in attempts to criticize from within the consistence of already accepted rational knowledge. Many, not to say most, of these efforts inevitably will not result into specific publications in the reviews in the relative scientific fields. In particular, the criticism might not reach the publication or quotation stage in those disciplines where a bias exists against critique of currently accepted knowledge. Shall we perhaps say that those efforts not acknowledged by individual publications do not deserve to be considered as genuine scientific endeavors? If so, a large part of meaningful research activities would probably go unnoticed. This is just the risk inherent in a carpet application of research evaluation only based on uncompromising count of publication and quotations.

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MARIO DE MARCHI

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E-mail address: mario.demarchi@ircres.cnr.it