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Guest editor's introduction

(Introducción del editor)

Vincenzo Politi*
CEA - French Alternative Energies and Atomic Energy Commission

* ***Correspondence to:*** Vincenzo Politi. CEA-Saclay, bat. 703, 91191 Gif-sur-Yvette, France. – vin.politi@gmail.com – http://orcid.org/0000-0002-5753-3196

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The idea behind this special volume is to answer some general questions about science and scientific knowledge. Such questions cannot be answered from within one or some of the many philosophies of the special sciences but, instead, by what is known as 'general philosophy of science'.

When it emerged and was institutionalised, at the beginning of the XIX century, the so-called general philosophy of science aimed at providing the criterion to demarcate proper science from pseudo-science. With the demise of the demarcation problem, decreed by the failure to uncover the universal and infallible 'scientific method', philosophy of science began to fragment in a plethora of philosophies of the special sciences, each devoted to its own narrow field of investigation. After decades in which the tendencies toward specialization seemed to prevail, however, recently the philosophical debates about science in general have been regaining momentum.

On the one hand, it must be said that traditional topics such as scientific realism *vs*. anti-realism, unity *vs.* pluralism, laws and explanations, or the nature of scientific theories have never really disappeared from the arena of the philosophical discussions. Instead of pursuing a priori analyses, however, contemporary philosophers of science look at the results of the special sciences in order to develop, from there, a more general framework. In this sense, claims about some general issues in science are obtained by generalising from the observation of what goes on in some particular sciences.

On the other hand, it looks like some philosophers of science are now attempting to do something more than just generalizing. Trying to define the essential features of 'scientific knowledge', as recently done Hoyningen-Huene (2013), for instance, is no longer considered unthinkable (or even unworthy). As argued by Psillos (2012), underlying this type of efforts there is the belief that the individual sciences share something important and unique which makes them, indeed, 'scientific'.

The contributions to the present volume are partial answers to the following general questions about science and scientific knowledge:

— What is scientific knowledge? What does it mean to know scientifically?
— If there is something called 'scientific knowledge', does it mean that there is also 'scientific ignorance'? And what is the role of scientific ignorance in the development of science?
— How is science done? What is scientific practice? How is scientific knowledge produced?

Traditionally, 'knowledge' is defined as 'justified true belief'. Philosophical debates about science often revolve around the problem of establishing in which sense, or even whether, scientific claims are true. However, while every piece of knowledge is a true belief, not every true belief can be counted as proper knowledge: accidentally stumbling on some truth, for example, cannot possibly be counted as a moment of growth of scientific knowledge. This is the reason why, in his work, the philosopher Alexander Bird puts a major emphasis on the necessity of returning to discuss the methods of justification of our true beliefs.

Bird already developed his epistemic view of science in several writings, most notably in his work on scientific progress, which he defines as the accumulation of knowledge rather than of truths (see Bird 2007). In his contribution to this volume, he integrates his previous considerations by arguing that the aim of science is, indeed, the production of knowl-

edge. This does not mean that science or scientists cannot have other aims, but what distinguishes science from other human enterprises is that knowledge is its constitutive aim. For Bird, science is an institution the function of which is to produce true beliefs in the correct way. By reconciling the teleological and the normativist interpretation of the notion of 'aim of beliefs', he maintains that the goal of a belief is truth and that, furthermore, that such a goal also dictates the norms governing the correctness of beliefs *qua* beliefs. In conclusion, the conditions of the proper functioning of science as a knowing institution are the same as those for a cognitive system: namely, the production of knowledge (that is, true beliefs justified in the correct way).

While the pursuit of knowledge is one of the main goals of scientific research, or even its constitutive goal, science not always serves the most epistemically fruitful goals. As investigated by the nascent field of agnotology, sometimes the production of ignorance is just a byproduct of scientific research. Other times, ignorance is deliberately constructed in order to produce some results rather than other, as in the case of frauds.

Manuela Fernández Pinto clarifies what scientific ignorance is. Instead of presupposing that scientific ignorance is something negative which should be avoided at all costs, she provides a detailed taxonomy of the possible sources of scientific ignorance. She finds that scientific ignorance is not only either the byproduct of scientific research or something deliberately constructed for the pursuit of extra-scientific aims. Methodological biases, in fact, are sources of scientific ignorance which represent a sort of grey area: they can be both deliberately introduced or simply followed by the scientific community without notice. Fernández Pinto's chief examples come from clinical research. Methodological biases in this field may have damaging epistemological as well as ethical and social consequences. Fernández Pinto concludes her paper by suggesting some ways of avoiding this particular type of scientific ignorance.

The paper by Sophia Efstathiou, with Rune Nydal, Astrid Lægreid and Martin Kuiper examines so-called "computational knowledge management" (KM), a new field emerging from the need of managing the ever increasing amount of scientific data. By focusing on how KM works in the life sciences, the authors illustrate how the 'second-order knowledge' obtained through KM can actually contribute to the production of new first-order biological knowledge. But what is meant by 'knowledge' in the context of KM? The authors argue that the first-order knowledge KM produces is explicit, explicable and computable. In other words, KM produces the kind of knowledge described by objectivist epistemology. While KM offers invaluable opportunities of knowledge production, therefore, it risks to disregard the type of knowledge defined by more practice-based epistemologies.

As Efstathiou, with Nydal, Lægreid and Kuiper mention at the end of their paper, it is often said that scientific research is now moving toward the 'new paradigm' of data-intensive informatics-based science, as evidenced by the emergence of fields such as KM. The Kuhnian idea of a succession of paradigms, which in turn recalls Kuhn's notion of a scientific revolution as a change of paradigm, is also employed in the discourse about new modes of scientific knowledge production, such as, for example, interdisciplinary science.

In the final contribution to this volume, Politi analyzes the rhetorics surrounding interdisciplinarity, which is often described as bringing forth a revolutions in science. If interdisciplinarity does represent a revolutionary change, the change is not intra-disciplinary. The revolution brought forth by interdisciplinarity would affect the whole 'paradigm of science', similarly to what happened in times when new conceptions of science and scien-

tific method emerged. However, contrary to what happens during some scientific revolutions, the rhetoric with which interdisciplinarity is often promoted does not seem to be accompanied by a strong agreement about what 'interdisciplinarity' and the 'interdisciplinary method' actually are. Lacking this agreement, it is not clear whether interdisciplinarity is an actual 'paradigm' science can move toward, nor is it clear which kind of knowledge such a new paradigm is capable of producing.

In a time of diffuse scepticism towards scientists' expertise, we believe, it makes sense to try to understand what is distinctive about science, scientific knowledge and scientific knowledge production. The papers collected in this volume represent a contribution to the philosophical understanding of science as well as to the project of a general philosophy of science.

I am very grateful to the authors who, with their commitment and their rich papers, made this special volume possible; to the referees, for their great work; and to the editors of *Theoria*. Finally, I wish to thank Atocha Aliseda, Alexei Grinbaum and David Teira for their support during different stages of this work.

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Vincenzo Politi (PhD in Philosophy 2015) is a postdoctoral researcher at the CEA - French Alternative Energies and Atomic Energy Commission (Paris-Saclay, France). Before holding this position, he was a postdoctoral researcher at the Instituto de Investigaciones Filosoficas at UNAM (Mexico City, Mexico). His research is mainly on special types of scientific change, such as specialization and interdisciplinarity. He has published papers in journals such as *Synthese*, *International Studies in the Philosophy of Science* and *Studies in History and Philosophy of Science*.

Address: CEA-Saclay, bat. 703, 91191 Gif-sur-Yvette, France. Email: vin.politi@gmail.com