

## EVANDRO AGAZZI'S *SCIENTIFIC OBJECTIVITY AND ITS CONTEXTS*

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### Abstract

Evandro Agazzi's volume *Scientific Objectivity and its Contexts* is here introduced. First, the genesis and the content of the book are outlined. Secondly, an overview of Agazzi's philosophy of science is provided. Its main roots are epistemological realism in the Aristotelian/scholastic tradition, and contemporary science-oriented epistemology, especially in Logical Empiricism. As a result, Agazzi's thought is nicely balanced between empiricism and rationalism, it avoids gnoseological dualism by stressing the intentionality of knowledge, and it insists on the operational and referential character of science. Finally, an account is given of Agazzi's view of the origin and nature of scientific objects, which allows to understand how his sophisticated and "perspectival" realism differs both from naïve realism and constructivism.

### Keywords

Evandro Agazzi; empiricism; gnoseological dualism; intentionality; operationism; perspectival realism; rationalism; scientific objectivity; scientific realism.

### 1. Overview of the book

Evandro Agazzi's volume *Scientific Objectivity and its Contexts* (pp. xvii+482) was published by Springer in 2014. This was a remarkable and long awaited event, for till then we lacked (at least since the early Seventies) a comprehensive presentation of the ideas of today's most prestigious Italian philosopher of science, and one of the most distinguished in the world: formerly the only comprehensive account of his philosophy of science was the book *Temi e problemi di filosofia della fisica*, published in 1969 in Italian. So, in spite of the huge number of articles and books written by Agazzi in the meanwhile, there was no synthetic overview of the results of his work since then, especially there was none for an international audience.

Agazzi started to work on this book in 1977, and he developed it during his visits in Pittsburg, Düsseldorf and Oxford, discussing his ideas with, among others, Wilfrid Sellars, Karl Popper, Larry Laudan, Nicholas Rescher, Patrick Suppes, Hans-Georg Gadamer, and Craig Dilworth. So, in this monumental work we find the developments of his thought over almost forty years. This is why even those who have followed his research in the last years will probably know already part of its contents, but will welcome the opportunity to reach a better grasp of his overall position, by tracing the various nexus of implication, consequence or presupposition among his different theses.

Although the book is written from the particular viewpoint of scientific objectivity, it offers a general overview of the philosophy of science. It is deep and systematic as a treatise, but clear as an handbook. It offers a complete account of all the main questions and approaches since the crisis of Logical Empiricism up to now, discussing problems and solutions in the unitary perspective of an original theoretical approach. While arguing for Agazzi's positions, it discusses and evaluates a range of alternative positions in contemporary literature. Some of the ideas defended in this book, but published much earlier in separate works, actually anticipated some of the turns of the philosophy of science in the last quarter of the past century, like the modelist conception of theories, Putnam's idea of the continuity of reference through scientific change, the recovery of the pragmatic aspects of science in post-positivism, Giere's perspectival realism and the experimentalist turn of Giere, Cartwright and Hacking.

Quite naturally, the book also deals with the other disciplines intertwined with philosophy of science: chapter 1 discusses the history of science and the history of philosophy of science; in chapter 2 the Author introduces gnoseology, with two main topics: the doctrine of objectivity, which is the basis of his philosophy and gives the volume its title, and the critique of gnoseological dualism. In chapter 4 we find semiotics, philosophy of language, and the theory of truth, with Agazzi's own version of dualist semantics, and his approach to truth as correspondence. Finally, chapter 10 deals with metaphysics.

These discussions provide the bases on which the main problems of philosophy of science are analyzed: the theoretical–observative distinction (ch. 3); scientific realism (ch. 5); the nature of scientific objects, laws, hypotheses, theories and experiments, scientific change, and the comparability of theories (ch. 7); the role of prediction and explanation, and the nature of scientific truths (ch. 8). Eventually Agazzi focuses on the main contexts of science: historical and hermeneutical (ch. 6); social and ethical (ch. 9); and metaphysical (ch. 10).

The ideas of this book are deeply intertwined with Agazzi's thought in other philosophical disciplines, and a detailed discussion of the various aspects of his philosophical system is offered by the 23 articles of a collective volume appeared exactly one year later: *Science between Truth and Ethical Responsibility. Evandro Agazzi in the Contemporary Scientific and Philosophical Debate*, edited for Springer by Gino Tarozzi, Marco Buzzoni and the author of this review.

## 2. Agazzi's philosophy of science

There are two main theoretical roots of Agazzi's philosophy: one is realism in the Aristotelian/scholastic tradition, which he mainly absorbed through the teachings of Gustavo Bontadini. The other root is contemporary science-oriented epistemology, especially Logical Empiricism, which he first studied during his education at the Catholic University in Milan, and then discussed with Ludovico Geymonat, the philosopher who did most to introduce it into Italy. Agazzi's thought is thus a balanced synthesis of the best traits of these traditions.

From the former he draws the idea that the object of scientific research is reality, and truth is its aim. This checks both the antirealist tendencies of Neopositivism, and the relativist trends in many antipositivistic reactions. Scholasticism also provides the cues for the characteristic doctrine of scientific objectivity, the unifying theme of this volume, which Agazzi opposes to the naïve or dogmatic forms of realism, stressing that scientific objects are formal objects, i.e., structured by us. Of course, this is also the key idea of Kantism and constructivism; but in those philosophies it leads to antirealistic conclusions, because they couple it with gnoseological dualism, the idea emerged in modern philosophy that actually we don't know reality, but our own representations (§ 2.1). For Agazzi, instead, the notion of *formal object* is perfectly compatible with realism, because he rejects gnoseological dualism, stressing that our epistemic approach to reality is *direct*. This an idea, in turn, is based both on the scholastic doctrine of intentionality, and on the neopositivistic conception of the operational character of science.

The second root of his thought is equally important: first of all, Agazzi makes an extensive and very sophisticated use of the most advanced procedures and results of contemporary science, which of course are absent from the scholastic tradition. Besides, he largely employs the tools of formal logic and the conceptual and epistemological apparatus of Logical Empiricism, so that his work would be unimaginable without the latter. Finally, he shares with the neopositivists a strong basic empiricism, and he continuously insists that experience and rational argumentation are equally important as sources of knowledge.

In fact, in my view, his good balance between an empiricist and a more rationalist approach occasionally even risks to be tilted in favor of the former, because of the special role assigned to operational procedures. For instance, in his view the basic predicates of each scientific discipline are defined by the operational procedures for their attribution (pp. 405-406; § 5.6.2). Consequently,

he maintains that theories based on different instruments, operations, measuring instruments, etc., talk of different objects; therefore even old superseded theories, like classical mechanics, or even the Ptolemaic system, can still be true of their objects (pp. 401-405).

This however should not be taken to imply that theories are just about operations (as held by the operationists), or about objects of their own making (as held by the constructivists), for that would be incompatible with Agazzi's scientific realism. Rather, operations should be understood as *criteria* for the attributions of verification-transcendent properties. Besides, old discarded theories should be considered as only *partly* and *approximately* true: while false overall, they make approximately true claims about the selected areas or levels of reality upon which they are more directly focused; and the entities described by these approximately true claims are real entities, because theories do not *construct* them, but simply "clip them out" of the independent reality (p. 181). This is better explained by a brief account of Agazzi's views on the objectivity of knowledge.

### 3. The objectivity of scientific knowledge

As mentioned above, Agazzi's doctrine of the nature of objects and objectivity takes roots in the Scholastic tradition, but he applies it to an original analysis of scientific method. He explains that each scientific discipline studies things exclusively from the point of view of some basic attributes of its own concern. For the attribution of these basic attributes, each science has its own specific criteria, which are nothing but operations of a certain type. They usually include observation and measurement, but more generally involve some form of interaction with things.

*Observative* or *protocollar* propositions are those which say that an object has or lacks a basic attribute, and they can be immediately tested by the operational criteria. Besides, each particular science introduces its own theoretical attributes, by defining them through relations among basic attributes.

*Theoretical* propositions deal with theoretical attributes, and they can be supported by rational inferences from protocollar propositions and further theoretical propositions (§§ 2.5-2.6). Finally, the specific *scientific objects* of each discipline are nothing but the things of ordinary experience when considered only from the point of view of the attributes of that discipline; therefore they are *structured bundles of attributes*.

For instance, an apple may become an object of botany, but also of mechanics (as Newton's anecdote goes), or of chemistry, of economics, etc., depending on which of its attributes are considered. Thus, scientific objects are *abstract* (or "*partial*") entities, but they are exemplified by *concrete* objects, which consist of a complete totality of attributes. Concrete objects are the referents of scientific objects (§§ 2.7.4, 5.4.1):

In physics we define the term "electron" through a structured set of mathematically formulated properties which together constitute a certain abstract object. But this does not entail that these are meant to be properties of the abstract object; they are meant to be properties of the single electrons, which are the intended referents of the mathematical model we have constructed (p. 113).

Scientific objects are, so to speak, "clipped out" from *things*, but even things themselves are constructs, i.e. concrete objects viewed in a certain perspective, by considering only certain attributes. The difference is just that things can be easily identified within common sense, independently of any scientific theory. In other words, once a scientific theory becomes universally accepted and almost matter of course, its objects become things of common sense. For instance, electric current existed before being known at all; then it was introduced as a scientific object by the early theories of electricity, and now it has become a thing of common sense (p. 170, § 4.3).

Therefore on the one hand, *pace* naïve realism, in our cognition we never encounter purely given or unstructured materials, but we always work with something which is already couched in some subjective framework. Agazzi even says that we must not imagine "a reality 'in itself,' which

should on the one hand have its intrinsic fixed structure, independent and unaffected by language and thought, while on the other be such as to be mirrored by thought and language” (p. 229; §§ 4.5.1, 4.5.3, etc.).

On the other hand, contrary to what held by radical constructivists, since the basic predicates that constitute the objects are based on practical interactions with the world, objects are nothing but an abstract reconstruction of a concrete and subject-independent reality (§ 4.2). Therefore “objects are clipped out of things” (p. 181). Hence, “objects are *part of reality* (i.e., that part which has been ‘objectified’ through the operations), [they] are not something ‘behind’ which or ‘under’ which reality remains hidden, as in the case of Kant’s noumena” (p. 97). The intervention of the human subject

results in the determination of attributes which are known as they are brought to light, and, at the same time, are those actual aspects of reality which are effectively known through a particular intervention. Under different conditions, reality would manifest itself under different aspects or in the form of other attributes, but these too would be real” (p. 229).

Therefore “(a) science attempts to represent a reality independent of science itself, and ... (b) what science states is an adequate representation of this reality ‘as it is’” (p. 263).

Both Kant and more recent constructivists denied the possibility of referring to an independent reality and *knowing* it. For them knowledge is the construction of phenomonic entities which cannot be taken to represent or resemble the independent reality, if it exists at all. Similar conclusions have also been reached by those forms of hermeneutics for which there are no facts, but only interpretations, and by various approaches in philosophy of language: the thesis of “language as the universal *medium*”,<sup>1</sup> according to which we cannot ever exit from our language to reach out and refer to a non-linguistic reality; the view that our expressions have only sense, no reference; verificationist semantics, for which meaning is constituted by epistemic conditions; and the contextualist idea that the meaning of a word is determined just by the web of relations with the other words (§ 5.3.1).

But Agazzi holds that in one way or another all of these are forms of epistemological dualism, whereas he shares the conviction of classical philosophy that knowledge is a direct relation to reality. But while ancient and medieval authors described this as an intentional identity of thought and reality (§ 5.1.1), for him this direct relationship is secured by the key role played by *reference* in language, and more basically, by the operational character of knowledge, i.e., by the interactive relation established between the subject and the object of knowledge. Once more, therefore, he pours the good old wine of ancient thought in the new wineskins of the contemporary science-oriented philosophy of language and knowledge.

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<sup>1</sup> See Hintikka MB, Hintikka J (1986) Investigating Wittgenstein. Blackwell, Oxford-New York.