

### Reflections on Scientific Objectivity

A Conversation with Evandro Agazzi<sup>1</sup>

1. As the acknowledged philosopher of science, I would like to ask you an unusual welcoming question at the beginning of our conversation for *Distinctio*: How do you explain the development of philosophy of science in the 20<sup>th</sup> century? What has become of this philosophical discipline that advocated a “scientific conception of the world” (Manifesto of the Vienna Circle), the rigour of argumentation, a stringent connection with logic, but ended up in the fairway of relativism and skepticism? The most common complaint against philosophy of science is that it has forgotten scientific practice. I cite as an example that Stephen Toulmin (1922 - 2009) raised a sharp objection against philosophy of science, namely that its subtly elaborated logical reasoning has almost nothing in common with the practice of empirical sciences and scientific research, such as physics, chemistry, biology, physiology, medicine.

Indeed, in order to understand the reasons why logical empiricism has had little weight among professional scientists, it is necessary to take into account at least two main factors. The first is the fact that this movement has remained in the old groove of 19th century positivism. This fact is reflected in the expression “neo-positivism” by which it is often denoted in Italian, which is not common to other languages. This expression emphasizes the well-known succession of the three stages (theological, metaphysical, positive) that - according to Auguste Comte - runs through every discipline that reaches maturity, but which are not irreversible and, on the contrary, one must always guard a discipline against the risks of returning to earlier stages. This scientific and anti-metaphysical standpoints can be found in Carnap’s famous article entitled *Refutation of metaphysics by*

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*means of the logical analysis of language*, in which the great novelty of the linguistic turn in philosophy appears: when confronted with a metaphysical doctrine, one must first check whether it does not contain any logic errors, and this is possible thanks to the new calculi of mathematical logic. If this examination is passed, one proceeds to examine the concepts employed and discovers that some of them are meaningless, since they do not denote any empirical data. It is thus the synergy of linguistic turn and radical empiricism that underpins Carnap's discourse. After all, he always maintained that his aim was to propose an ideal reconstruction of scientific discourse and not an analysis of concrete scientific theories, and several scientists considered themselves satisfied with this privileged attention that old and new positivism reserved for the sciences. Not everything, however, was pacific, and it was precisely on the question of determining the meaning of terms that Duhem-Quine's semantic holism presented itself, according to which the meaning of a term depends on the entire context in which it appears, and this implies a substantial uncertainty in translations that import concepts from other theories. Quine cared much about this holism and was even ready to tolerate that in his theory there was no possibility of making room for modal logic. As for logic, it was merely a tool for the transformation of propositions, realized by means of rules formalized in appropriate calculi, but the use of which could not produce anything new: the logic machine could not add anything to the premises, but only transform them into mutually equivalent statements. Even the highest analytical rigour cannot produce new results because if they are truly new, they are incomparable to the previous theory. This was the start of a whole series of criticisms of the idea of scientific progress, of the cumulativeness of knowledge, of methodological rigour, which soon marked the end of the respect that scientists had for the research of the Vienna Circle. There seemed to be a chance for a revival when Hans Reichenbach, a Berlin physicist, appeared on the scene. He offered valuable analyses of relativity and quantum theory, and also made contributions to the respective branches of physics and the theory of probability, but his work, although of high epistemological value, did not receive the international resonance it deserved. We may well say that by locking itself up in the analysis of the language of theories, the philosophy of science of the Vienna

Circle had laid the preconditions for its own self-dissolution. That approach lacked the acceptance of a *synthetic use of reason*.

2. It is nice that you mention Reichenbach's unrecognised merits in the field of philosophy of science. The Berlin circle around Reichenbach did not want to eliminate metaphysics as efficiently as possible, as the philosophers of the Vienna circle endeavoured to do, but to correct metaphysics according to the model of science, following Kant's conception. This is where the difference between "logical positivism" and "logical empiricism" becomes apparent. In contrast to the philosophers of the Vienna Circle, who advocated a positivist model of science, Reichenbach, as an empiricist, was a peculiar follower of Kant: he believed that only induction and probability could help us to recognise something; this aspiration was obviously a remnant of Kant's influence. In fact, Kant's main question "What can I know?" was also Reichenbach's - even the name of the journal "Erkenntnis" goes back to Reichenbach and obviously has Kantian connotations.

I completely agree with your remarks, as it will also appear from the rest of our interview. What is typical of Reichenbach is to engage in a specifically philosophical discussion of some difficult and controversial issue of contemporary science. Let me only mention his essay *Relativity theory and apriori knowledge*. Nothing of the same kind and philosophical level can be found in the production of the members of the Vienna circle.

3. Your book *Scientific Objectivity and Its Contexts* (2014) is conceived as an *opus magnum* with the intention of bringing reliability and objectivity into the field of philosophy of science. In the preface, you compared the book to the Ship of Theseus because of its constant reworking and reshaping. I have the impression that you have remained in the territorial waters of scientific realism (Chapter 5). Chapter 5 on scientific realism is followed by the chapter on scientific objectivity. My question is whether, after the Husserlian profound critique of objectivism in the field of philosophy of science, it would not make more sense to talk about the intersubjectivity of

knowledge or consensus in the field of philosophy of science, then about “the objectivity”?

It is true that my volume on scientific objectivity is the fruit of decades of work of in-depth study and completion, but it is also true that it attained a degree of rigour that allows it to be placed in the domain of analytic philosophy. If one considers its contents, however, many differences from the doctrines of the best-known analytical philosophers become apparent. Suffice it to mention my explicit defense of metaphysics in its classical sense, which implies an openness to transcendence, or the distinction between a weak and a strong sense of objectivity and the discussion of the passages that allow to connect them and that require careful clarification of semiotic notions and ontological discourses, introducing *operations* as non-linguistic criteria to anchor science to the notion of truth. Using then the *referential* aspect of truth, I could defend a strong form of realism. I will only add the prominence given to the historical dimension of science. Husserl’s philosophy has provided concepts and perspectives that are largely present in this volume, particularly interested in intersubjectivity to which Husserl made an original and important contribution. However, it remains true that Husserl did not elaborate a doctrine of the object, and therefore his and my discourse have no points of contact in this respect.

4. Although your book is imbued with the idea of how to defend scientific realism in terms of objectivity, one gets the impression that you have not relied on inference to the best explanation in terms of methodology. You have preferred to use the formulations: rational inference, practical inference, causal inference, syllogistic inference, commonsense inference. Do you also doubt the effectiveness of inference to the best explanation after a sharp and plausible critique by Bas van Fraassen and Nancy Cartwright, which is now accepted in anti-realism circles? In my opinion, the problem with proponents of inference to the best explanation is that they discuss intensely the universality of the rules and criteria that are supposed to guarantee the success of the method, while forgetting Kant’s warning that there is no rule for how to apply the rules. Even if the rules and criteria are perfectly balanced, their selection and application does not mean that the conclusion is successful, let alone

the best one. In your opinion, is there a single method in the field of philosophy of science or is it absolutely necessary to accept the methodological pluralism of complementarity?

I will first say why I use the term inference: I do so because I consider it synonymous with 'demonstration' without the tacit reference to *deductive* reasoning that goes with it. I include in the concept of inference tools such as induction, deduction, abduction, analogy and other possible methods that we use in our arguments depending on the domain of discourse. It is a warning that Aristotle formulates in the first book of the *Nicomachean Ethics* when he clarifies that in his discourse there will not be the deductive rigour of a mathematical type, but this is correct, just as it would not be correct that in mathematics only probable demonstrations were accepted:

*It is the mark of an educated man to look for precision in each class of things just so far as the nature of the subject admits; it is evidently equally foolish to accept probable reasoning from a mathematician and to demand from a rhetorician scientific proofs.*

In so doing, he distanced himself from Plato, who had claimed the status of *science* for ethics. The problematic point of this question concerns the notion of *the best* explanation, where it is clear that the concept of scientific explanation is univocally used, and then it is added that the different explanations can be compared. It is precisely this very problematic aspect that advises against embarking on this undertaking. It is well known that it is possible to propose different explanations of a given phenomenon, each of which has its strengths and weaknesses, and the choice between them can be guided by certain principles (e.g. the principle of not introducing additional entities), but these in turn must be tempered. Is there a way out of this impasse? Actually there is not, and the most reasonable position is to seek complementarity between the proposed solutions. As has been mentioned, Kant had already recognized that there is no rule for choosing between different rules and this corresponds to the fact that, after having presented our reasons, we realize that the opposite thesis also has its reasons and the enrichment of knowledge is achieved by reconciling the different reasons.

5. In contrast to most philosophers of science, you are very open to the application of the hermeneutic method in the philosophy of

science, especially after Duhem-Quine's thesis of the underdetermination of hypotheses was established. Do you agree that hermeneutic judgement can help overcome the problem posed by the thesis of underdetermination. Could hermeneutic reflection, as advocated by Mary Hesse & Wolfgang Wieland, be helpful in choosing theories and confirming them?

When we speak of hermeneutics today, we are referring to a true doctrinal complex, even though the second treatise of Aristotle's *Organon* bears the title *On Interpretation* and proposes to illustrate how, by combining terms, propositions are constructed whose fundamental characteristic is the fact that they can be either true or false, even in relation to time. The serious problem arises when one finds oneself in the presence of several true propositions concerning the same domain of discourse and seeks how to safeguard them all. At this point, *interpretation* takes on its full importance.

The classic example is that of countries in which religious faiths have public recognition and there are official written texts documenting the revealed content of the respective faiths. As such, they are unchangeable and unchangeable. Sometime, however, they appear at odds with scientific findings or authoritative philosophical theses. This is where interpretation comes into play, not as a means to discredit the religious text, but to overcome its literal reading. This thesis is lapidary expressed by St Paul in his second letter to the Christians in Corinth, (cf. Cor II:3) where we read. "littera enim occidit, spiritus autem vivificat" ("the letter in fact kills, while the spirit gives life"), thus defending his conception of Christianity that projected it as a message for the whole of humanity and not reserved for Jews alone. The remarkable fruits that the hermeneutic method has obtained in the field of theological studies has led me to appreciate it also in wider contexts.

6. You explored the objectivity of the scientific context with the hermeneutic dimension. In doing so, you used the concept of Gestalt, which originates from psychology (Max Wertheimer, Wolfgang Köhler). Reichenbach and representatives of the Berliner circle introduced the term Gestalt in order to avoid the abstract structure of science. Just as a state is not just the sum of its citizens, a scientific explanation or scientific theory must not be a sum of

propositions, but it is necessary to strive in science for what is represented by the term Gestalt, which can best be seen in the example of a work of art, a drawing or a musical composition. In hermeneutic philosophy, the text was viewed as an organic whole and its intention was sought in the context. How do you assess the hermeneutic dimension of Gestalt theory in the field of science and philosophy of science?

The content of my book *Themes and problems of the philosophy of physics* was discussed in several meetings, in particular in controversies with representatives of the Gestalt psychology, and this was well in keeping with many statements of mine regarding scientific theories, in which the notion of “point of view” was dominant and corresponded well to the notion of Gestalt. I do not remember if the very term Gestalt was used by me, but I am ready to admit that it expresses well a core idea of my philosophy of science.

7. For a long time, the role of the thinking subject, who judges, evaluates and analyses scientific theories and forms of knowledge, i.e. explanatory models, was completely neglected in the philosophy of science. In the meantime, it has become obviously plausible that philosophical reflection and evaluation are essential constitutive segments of science and its application in practice, be it “normal science” (Th. S. Kuhn) or models of scientific understanding (M. Friedman, Ph. Kitcher). How do you interpret the shift in philosophy of science from scientific explanation to scientific understanding? As a reminder, the theme of the annual meeting of the International Academy for Philosophy of Science at the World Congress of Philosophy in Rome 2024 is “Scientific Understanding”.

Understanding and explanation are distinct, but not separate, phases of any cognitive process and this is evident if one takes into account the impossibility of explaining what one has not understood. Understanding determines the conceptual space of the discourse and it is not uncommon for two persons engaged in a discussion to realise that they “do not understand each other” because they do not actually share the same meaning of certain concepts and therefore their judgements do not move within the same conceptual space. This applies in general and, in particular, also to scientific discourse.

8. How do you assess the role of judgement in sciences, especially in medicine and economics? In these scientific disciplines, it is clear that the correct and reliable diagnosis is the key to solving the problem. When it comes to diagnoses, there are usually different opinions, so choosing the best option becomes a problem. A solution should be sought with the help of judgement, where practice is the proper judge. Is practice in epistemology and philosophy of science really too burdened with theories? Gadamer has warned against the scientification of practice (*Verwissenschaftlichung der Praxis*).

The irreplaceable role of judgement is included in its very nature, which is to express itself in a *proposition* that is intended to be *true*. The formulation of a judgement is the work of an *individual subject endowed with reason*, who has assimilated a certain wealth of knowledge. This seal of subjectivity cannot be removed, even if the subject can avail himself of cognitive tools to acquire the information he needs in his specific case. These can be drawn from some *expert system*, which, however, never arrives at a judgement, limiting itself to providing information that the individual subject will have to interpret and evaluate. It is precisely in this final synthesis that emerges the varying degree of expertise of the subject, who may either enjoy exceptional innate capacities or limit himself to a rather low level. If this weakness is not excessive, the subject's capacity for judgement can improve with the increase of his theoretical knowledge, but above all with the enhancement of practice. To put it briefly: for rational beings such as humans to *think* consists in producing *Judgments* regarding a certain *subject matter* and the quality of the judgments is proportionate to the exactness of the description of this subject matter that is attained through an *intellectual intuition*.

9. Besides logic and philosophy, much of your work is devoted to *applied ethics* and, more recently, *bioethics*. Ethics is not only a philosophical discipline that deals with the question of how to lead a good, happy and contented life, but it also faces the problem of how to preserve life on earth after brutal exploitation and ecological catastrophes. On the other hand, there are the challenges of biotechnological developments, genetic research, posthumanism, enhancement and transformation of the human species. You have



also been active in many ethical committees, how intensively can ethics intervene in these areas?

Indeed, my most popular book is entitled *Right, Wrong and Science* and has been translated into eight languages. The motivation that drove me to write it was to find a rational mediation between two opposing intellectual attitudes, that is, scientific optimism and the pessimism of anti-science, simply because I considered and still consider the sciences to be a fundamental aspect of human *progress*, but not the only factor, so much so that many authors see in the logic of the unstoppable development of techno-science the most serious threat to the very survival of the human species. Therefore, paraphrasing the title of a famous essay by Nietzsche “Beyond Good and Evil”, I maintain that science does not enjoy such *neutrality*, so that it would always be concerned with controlling its own development and, on the other hand, it would be wrong (as well as concretely impossible) to impose limits and prohibitions on the freedom of science without a specific and precise ethical reflection. My proposal is based on a *systemic approach*, i.e. using the general theory of systems in depth and attributing a specific function, among the systems present in a society, to the *ethical system*, which interacts with all the others in a continuous exchange of demands and responses. Being convinced that ideas alone do not affect the lives of individuals and societies, I have been involved in numerous international institutions, promoting the publication of statutes, by-laws, regulations and standards of various kinds, which, after decades of implementation, continue to produce good effects.

10. For a long time, logic was known as an organ of thought and cognition. In the 20<sup>th</sup> century, it became a framework and scaffolding (Gerüst) for the philosophy of mathematics and the natural sciences, and today it is substantially involved in the development of artificial intelligence. To what extent will artificial intelligence replace and supersede logical reasoning in the near future?

Logic is a technical development of the spontaneous process of argumentation, which consists in starting from the agreement on certain premises accepted as true and deriving from them certain conclusions by applying procedures that *preserve the truth* in a necessary way. Considering the simplest case, that of two premises that can be

differentiated by certain characteristics, such as being affirmative or negative, universal or particular and so on, the amount of possible combination is very high, but the great majority of such schemes does not permit a conclusion. Therefore the final result is that only 16 can satisfy the condition of having a conclusion and necessarily conserving truth. These are the famous “figures” of Aristotelian syllogistics, which are in fact already procedures of calculation, and this computational aspect was explicitly emphasized by Leibniz as a means by which two disputants - once they have stated their respective theses - can simply sit down at the abacus and say “*calculemus*”. The first logical calculi were rather elementary, but developments over the following centuries led to the creation of increasingly powerful calculi, especially in connection with the foundational needs of certain branches of mathematics. Today, logic is articulated in various logical-mathematical calculi that are the subject of study and development. The fortune of artificial intelligence is a recent cultural phenomenon, the substance of which, however, repeats themes already studied in the 1960s.

11. One of your favourite topics in philosophy is prudential judgement, practical wisdom, Aristotle’s *phronêsis*. Do you think that this key philosophical concept of ancient philosophy has been thoroughly neglected in contemporary discourse and academic life, especially in the context of the application of science and technology to our lifeworld (*Lebenswelt*)

Prudential judgement is an essential part of my mentality, partly because of the extensive knowledge I have accumulated of antithetical positions on ethics and the values that inspire people in practical life, and partly because I consider it appropriate, even after I have argued a thesis that I consider to be true, to try to consider its negation and recognize that even this has its reasons. In essence, prudential rationality is the one that best suits coexistence in a world in which pluralism and tolerance are becoming increasingly important.

12. You will soon celebrate your 90<sup>th</sup> birthday, the Editorial Board of *Distinctio* journal congratulates you on this wonderful anniversary. You have spent much of your life in academic engagement within prominent associations and academies: You were the long-time president of the International Academy for the Philosophy

of Science (Brussels), the president of the most prestigious philosophical association Institute International de Philosophie (Paris-Nancy) and the president of FISP (International Federation of Philosophical Societies). Today you are the honorary president of all these philosophical associations. How do you see this part of the philosophical commitment that has been an important part of your academic biography?

You have mentioned some of the most important positions I have held in international institutions and I could add others, but it would not change the picture of the motivations that drove me to get involved in those institutions. It is simply a matter of the fact, which I have already mentioned, that even good ideas alone are not able to have an impact on concrete life, and that people who truly believe in certain values must be willing to invest a lot of time and energy in the actions necessary to see those ideas applied and functioning.