

# SCIENCE, METAPHYSICS, RELIGION

*Edited by*  
**Evandro Agazzi**

**E**

*Epistemologia*

**FrancoAngeli**

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La collana intende venire incontro a quell'esigenza, ormai generalizzata, di conoscenza epistemologica che si riscontra a livello di cultura medio-alta e che corrisponde, in senso lato, alla diffusa aspirazione a prender coscienza critica della complessa varietà della nostra civiltà scientifico-tecnologica. Aspirazione che si accompagna, altresì, al desiderio di venire in chiaro circa lo statuto epistemologico di molte discipline le quali solo di recente hanno rivendicato l'impegnativa qualificazione di «scienza», pur riguardando ambiti di ricerca non inclusi nell'alveo delle discipline scientifiche tradizionali.

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# SCIENCE, METAPHYSICS, RELIGION

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*Edited by*  
**Evandro Agazzi**

Evandro Agazzi – Mario Alai – Hervé Barreau –  
Marco Buzzoni – Alberto Cordero – Michel Ghins –  
Pierluigi Graziani e Gino Tarozzi – Hans-Peter Grosshans –  
Gerhard Heinzmann – Peter Kemp – Fabio Minazzi –  
Paolo Musso – Enver Orman – Davor Pećniak – Jure Zovko

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# *Introduction*

Evandro Agazzi

That science, metaphysics and religion have a normal and fruitful interplay has been a deep conviction of Western civilization, and of Western philosophy in particular, from antiquity until the nineteenth century. This situation was originally due to the fact that all of them were concerned with a unique and common object (the World of ordinary life) and with a common interest, that is, understanding this world and explaining its fundamental features. Religions were certainly the first expressions of this situation and endeavor, and in their admitting supernatural entities as causes of the observed natural events and of the World itself were already using at least two fundamental principles of what became later metaphysics, that is, the unlimited application of the principle of causality, and the admission of a dimension of reality that oversteps the limits of sensory experience. It would be inappropriate to say that this fact testifies of a “presupposition” of metaphysics with regard to religion, or that religion has (or had) metaphysical presuppositions, since at that moment there was a perfect identity among the two fields, and metaphysics *as such* was still far from being created. In order this creation to occur it was necessary an additional step, that is, the creation of *science*. This statement sounds astonishing for us today, since as science we have in mind the system of the present different “sciences” (natural and human), but we must remember that the original meaning of science was simply that of *knowledge*, and that knowledge was distinguished from opinion or *belief* not for being true instead of false, but of being *justified* through rational *arguments* (note that this definition of knowledge as justified belief is still largely adopted in contemporary analytic philosophy, with all necessary refinements). This rationalistic approach was originally applied to the understanding of the empirically accessible world, leaving aside (but not denying) the supernatural world: this was the stage of ancient philosophy that (following a denomination introduced by Aristotle), we call of the “physicists”, that is, of those thinkers that investigated the fundamental principles of the *Physis*, i.e. of Nature, in which also humans were included as things among

the other things. *Looking for the causes* was the intellectual endeavor of these thinkers, but one must be aware that under the term “cause” several meanings were covered, such that the best way of translating this concept in modern terminology should be “the reason why”. These causes were first indicated in certain material principles, but already with Plato appears the doctrine that the fundamental causes are not material. In such a way we can say that metaphysics was explicitly born as a sort of maturation of science. This gain was possible thanks to the recognition of the special position of man in nature: he is no longer considered as a thing among other things, but as a being endowed with knowledge and capable of intentional actions, in which immaterial motivations “cause” the oriented movements of the body (as discussed in the *Phaedo*). This conquest offers to Plato the opportunity of rationally (i.e. scientifically) trying to prove one of the most typical thesis of religion, that is, the immortality of the soul whose immateriality had been made conceptually understandable through the discovery of metaphysics, and in this way the whole discourse has at the same time a scientific, metaphysical and religious import. We can also add that in the same dialogue the eschatological closing myth, in which the destiny of the soul after the death of the body is portrayed as depending on the moral quality of the mundane life also satisfies one of the fundamental grounds of religion, that is, that of providing a *sense* to human life (though Plato himself says that this portrayal cannot be taken literally, recognizing in such a way a certain limitation of rationality in the understanding of the supernatural). This circulation, this interplay, however, did not entail a confusion or an identity of the different ontological planes. This becomes particularly clear in Aristotle, who has deeply elaborated the notions of metaphysics and also distinguished the basic different levels of reality, with their specific ontology and, as a consequence, has also distinguished the different sciences. Here again it is significant (but not surprising) that metaphysics is called the “first science” and a little strange appears that among the sciences he also gave the primacy to “theology”. For us this sounds strange because as theology we understand a rational investigation regarding the contents of a revealed religion, but in the case of Aristotle this denomination is simply introduced because, after having distinguished the domain of what is “separate and inmoveable” and recognized that this is the ontologically most perfect domain, he says that “if the divine exists”, it must have such features, where one clearly sees that the notion of the divine is taken from an independent source (that is, concretely, religion), and in metaphysics it is only spoken of its ontological prerogatives.

This unity in the difference reflected itself in all the intellectual manifestations of classical culture, from ethics to politics, to astronomy and cosmology, and when the Judeo-Christian tradition came into contact with this Greek worldview, adding the novelty of the conception of a personal God creator of the universe and of man (and who had manifested himself through a revelation) theology started to become itself a science (actually the highest science) and its concepts deeply influenced certain metaphysical doctrines as well. But it

is no less true that the “scientific-metaphysical” categories and principles of Greek philosophy were amply used for the elaboration of the original Christian theology (so that in the twentieth century certain authors ventured to speak of an “Hellenization of Christianity”).

One of the most significant (perhaps the most significant) features of modernity was the breaking of that unity of the differences, and the progressive creation of several *autonomies*, that is, of different fields each of which had to be organized according to specific “internal” methods of inquiry, criteria of evaluation, and rules of conduct: politics, art, law, economics, but especially philosophy and *science* were among such fields whose autonomy, in particular, excluded any interference and hierarchical ordering. The juridical principle attributed to Bartolo da Sassoferrato, and explicitly formulated by Jean Bodin in 1576 (*superiorem non recognoscens*, i.e. “that does not recognize any superior authority”) and which was used to define the concept of sovereignty was tacitly and implicitly applied in all the autonomized domains and was among the obstacles to the reconstruction of some unity among them.

The major obstacle, however, came from a strange presupposition that appeared in modern philosophy, that is, the unproved tenet that we know our representations and not reality, so that we must look for a warranty that they actually correspond to reality. This wrong problem could not receive a solution, as it appeared from the fruitless efforts that rationalists and empiricists spent in order to find the “bridge” between representations and reality. Finally Kant explicitly admitted that we cannot know reality in itself but only phenomena (i.e. our sensory impressions, organized by the categories of our intellect and in such a way receiving a universal foundation). But in such a way metaphysics understood as the doctrine of “reality as such” was deprived of any cognitive status, and even more in its second sense of being the science of the supersensible. Therefore, any genuine circulation between science, metaphysics and religion was broken, and different *separate* paths had to be invented in order to save the legitimacy of these fundamental branches of the human approach to reality. For example, Hume maintained that belief is the ground for the acceptance of the metaphysical principle of causality that can be safely used in ordinary life despite not having the solid backing of empirical evidence. Kant had to resort to moral reasons for justifying the acceptance of the existence of the things in themselves, of the immortality of the soul and of the existence of God.

Of course, this does not mean that modern scientists or philosophers were unable to defend a compatibility between these three domains. And even to use the worldview of modern science in an apologetic way as a proof of the existence of God. Even Voltaire, who is often pictured as a champion of atheism, explicitly declared (in his *Treatise of Metaphysics*) that the existence of God is proved with certainty by the consideration of the order of the universe, along the same lines of the reasoning that had been developed by Newton and many others authors that had suggested the image of a God as “watchmaker”.

Even more elaborated were the constructions of interrelations between science, metaphysics and religion proposed by those creators of authentic metaphysical cathedrals who were the representatives of rationalist philosophy, from Descartes to Malebranche and Leibniz. Yet the widespread tenet that all these constructions regarded the world of the “ideas” and not reality, accompanied by the historical evidence that the new natural science, instead, by using in full autonomy only the concepts of matter, motion and force, had acquired in less than one century an amazing amount of knowledge, was a powerful stimulation for the diffusion of a materialistic worldview in which metaphysics and religion appeared as residuals of an ancient and historically dead culture. A culture that had inspired that “*ancien régime*” (in which religion had realized a strict alliance with the absolute monarchy and the upper aristocratic class) which the Revolution was about to destroy.

German transcendental idealism had overcome the splitting between thought and reality, and tried to reconstruct a synthesis of science, metaphysics and religion, but in a hierarchical dependence in which philosophy had not only the primacy, but even the pretension of deductively justifying the (limited) approaches of science and religion. It was historically inevitable that this philosophy could not oppose the triumphal train of science that in the meanwhile was also producing spectacular technological applications deeply changing the life conditions of people and the structure of societies. This irresistible trend produced the philosophy of positivism, that clearly separated science from metaphysics and religion, consigned to science the monopole of knowledge and progress and also maintained that this progress had to be secured by a constant fight against metaphysics and religion.

This is the situation that, until recently, has influenced several philosophers (even those that defend philosophy and metaphysics often believe that they have to fight against science) and has penetrated large sectors of public opinion. Today the situation seems in process to change, and the many serious problems that the uncontrolled development of science and technology has created to humankind clearly indicate that techno-science is unable by itself to face these challenges. Therefore, ethics, philosophical anthropology, reference to values, human dignity, human rights, the sense of life are more and more substantial parts of the present approach to science and technology. This is the reason that has pushed the International Academy of Philosophy of Science (whose statutory goal is precisely that of fostering an intellectual synthesis of scientific, philosophical and spiritual approaches) to devote its annual meeting – that took place in Široki Brijeg on July 24-27, 2013 – to the theme “Science, Metaphysics, Religion”. The present book contains the revised version of the papers presented at that meeting.

The *First part* includes papers focusing the theme of the volume from a very general point of view.

**Evandro Agazzi's** paper, *Science, metaphysics, religion: re-opening the horizons* considers the present cultural situation as an heritage of positivism and proposes a critical examination of the history of modern science. The Galilean revolution consisted in a drastic "restriction" of the traditional metaphysics of nature, focusing on a limited amount of attributes of physical bodies and implying a specialization of traditional metaphysical notions. The same ontological restrictions and refinements were realized during the development of Newtonian mechanics and their presence was at the root of the crisis of classical physics at the end of the 19<sup>th</sup> century. A similar analysis is devoted to the metaphysical presuppositions lying at the ground of evolutionist theory and the theories of evolution. All such restrictions and specializations entail the determination of "regional ontologies" for the different sciences, and the general ontology of empirical science can be identified with "the whole of experience", whereas metaphysics, understood as the study of reality as such, considers "the Whole" in which the whole of experience is included, but that can include also a meta-empirical dimension. In this way metaphysics opens a conceptual space for religion, but the specific horizon of religion must include in addition elements such as faith, miracles, supra-rational dimensions and a special space for the sense of life, and it must also rely upon a special kind of "religious experience".

**Hervé Barreau's** paper, *Metaphysics as standing half-way between Science and Religion* considers that the idea to join science and religion together was recently defended by Stephen Jay Gould. But his idea to coordinate two magisteria does not seem viable. The interface is in metaphysics. Metaphysics is not only a place for discussion and integration of knowledge; it is also a full right discipline, half-way between science and religion.

Marco Buzzoni's paper, *Science, philosophy, and interfaith understanding* discusses two central topics in the philosophy of science, namely the demarcation problem and the distinction between the context of discovery and the context of justification, in order to solve the problem of pluralism, not only in science but also in philosophy and in interfaith understanding. On the one hand, the discussion of the neo-positivist verifiability principle will show that it can only be consistently adopted by admitting a wider notion of reason, from which neither philosophy nor religious belief are excluded. On the other hand, the inquiry into the distinction between the context of discovery and the context of justification leads to define more accurately this wider concept of reason and to apply it to the problem of the mutual understanding between different scientific, philosophical and religious traditions. Not only in the empirical sciences, but also in other cultural fields, all discussions are guided by the underlying assumption that some settlement of different opinions or rival interests is in principle always possible because things are as they are, quite independently of our opinion on the subject. However, this pre-operational (or transcendental) validity claim would be devoid of any meaning and truth, in the absence of

specific procedures that allow us to retrace in the first person the methodical steps that guide participants in that discourse to their conclusions. Without this methodical moment, which is essentially neglected by Popper and the Logical Empiricists, any dialogue between groups holding rival views would be de facto impossible.

**Fabio Minazzi's** paper *Kant's critique of science, metaphysics and religion* maintains that, thanks to Kant's "Copernican revolution", the relations between philosophy, science, metaphysics and religion have changed profoundly. Kant broke with the tradition, which held that metaphysics was the foundation of religion. On the contrary, Kant thought that philosophy had to develop a rigorous critique of metaphysics in order to construct a new critical philosophy that would be founded on a meta-reflection. From this point of view two new ideas arise. First, Kant's "critical metaphysics" makes it possible to see the existence of theoretical and conventional assumptions in scientific theories. Thanks to these theoretical and conventional assumptions, every scientific discipline acquires its own structure. Second, metaphysics no longer underpins religion, hence religion can arise only from an honest faith. By returning to the Christian Gospel, in Kant's opinion, religion will be founded on an honest choice of faith. Moreover Kant's transcendentalism makes it possible to see the limits of the positivistic tradition, which elaborated contradictory theories of the problem of metaphysics. From Kant's critical point of view, also Popper's philosophy is unable to comprehend the role of critical metaphysics in scientific theories. Kant's criticism makes it possible to rethink the relations between philosophy, science, metaphysics and religion in a new critical horizon. In this way human liberty is better defended, both in the choice of faith and in the choice of laicism.

The *Second Part* contains papers more specifically related with the relations between science and metaphysics.

**Michel Ghins'** paper *Causal powers as metaphysical grounds for laws of nature* notes that, as Bas van Fraassen clearly put it in his *Laws and Symmetry* (1989), any adequate philosophical account of laws of nature must at least solve two main problems: the problem of identification and the problem of inference. After a short presentation of these two problems and a brief survey of several, in his view unsuccessful, regularist and necessitarian philosophical attempts to solve them, the author offers a neo-Aristotelian necessitarian account of laws, which resorts to dispositions or causal powers, and which, he submits, provides an attractive solution to the two problems raised by van Fraassen. Such neo-Aristotelian account also explains why there are regularities in nature and why laws support the truth of counterfactual conditionals. He concludes with a succinct discussion of the connection of dispositions with experience.

**Mario Alais's** paper, *Explanatory realism*, begins by distinguishing various kinds of realism, especially commonsense, scientific and metaphysical realism.

Then argues that all of them can be supported by explanationist arguments, among which are distinguished abduction, inference to the best explanation, and various forms of “no miracle” argument. Some of these arguments are based on first level explananda (empirical regularities and scientific phenomena), others on meta-level explananda (the success of science). Some are scientific inferences, some are philosophical. The “no miracle argument” is a meta-level philosophical argument, but some of its forms can be derived by equivalent transformations from first-level scientific arguments, so naturalists claimed that it is a scientific argument. While granting its scientific bases, however, the author argues that it is distinctly philosophical, and philosophy is distinct, even if continuous with science. The no miracle argument is usually taken to explain scientific success by postulating the truth of theories, but both this explanandum and this explanans are found to be problematic. Instead, the author takes as explanandum the success of scientists in finding theories with unexpected predictions, and as explanans (so as conclusion of the argument) the actual finding of partially true theories, through reliable scientific method, thanks to the simplicity, uniformity and rationality of nature. Moreover, he claims that these explanations are not available to the various forms of idealism. Hence, while scientific and metaphysical realism are logically independent of each other, one can hardly support scientific realism by the “no miracle” without also accepting metaphysical realism.

The paper by **Pierluigi Graziani and Gino Tarozzi**, *Physics, metaphysics and the reality of nothing in quantum mechanics* proposes to extend the possibility of reformulations endowed with empirical meaning of metaphysical principles, like realism, causality, mind body relation, holism, even to the archimetaphysical concept of nothing, highlighting how the reality of nothing, implied by a recent quantum paradox, represents a strong argument against the idea that (only) macroscopic properties are real. The paper discusses moreover a generalization of Renninger’s paradox of negative result measurements from the measurement of nothing to the interaction with nothing.

**Alberto Cordero**’s paper, *Naturalism as science and philosophy* discusses the rise of naturalism in contemporary philosophy of science. The early sections present naturalism as an offspring of the scientific empiricism advanced by physicist-philosophers in the early years of the 20th century, notably in Albert Einstein’s papers of 1905. Subsequent sections connect the appeal and fruitfulness of naturalism to the public level of discourse natural science began to adhere to in the 17th century. The paper ends with a brief commentary on critiques that dismiss naturalist efforts as hopelessly naïve, specifically ongoing challenges to the way naturalist moves eschew calls for radical justification and related charges of fatal vicious circular argumentation.

The *Third Part* contains papers dealing with issues typically occurring in religion and its philosophy.

**Hans-Peter Grosshans'** paper, *Contingency – Religion – God. A paradigmatic reflection on the relation of science, metaphysics and religion* points out that contingency is an almost ideal concept to reflect on the relation of science, metaphysics and religion in a symposium of the International Academy of Philosophy of Science, because this concept has its place in various academic fields. In this paper reflections on this concept are presented in the perspective of philosophy of religion and of theology. In doing so the term “contingency” at first is used as a summary of various similar concepts like coincidence, accident, chance or randomness. Among them contingency seems to be the most abstract one.

**Davor Pećnjak's** paper, *God, nothing, and purposeful universe* concerns the traditional teleological argument for the existence of God. In the first part it considers two most general objections to the teleological or design argument for the existence of God which are made by Ayer and Russell; in the second part it considers some philosophical implications which possibly follow from the physical cosmological theory that universe popped out from „nothing“ and are offered by Krauss (2012); and in the third part examines some implications which follow if we accept the ontological argument for the existence of God. The author does not defend in any detail any version of the traditional arguments for the existence of God. Aim of this paper is only to show that some objections made to these arguments can be rebutted or that we can employ and apply standard cosmological arguments for the existence of God to the physical cosmological theory which try to say that universe can grow from nothing.

**Peter Kemp's** paper, *From science of language to understanding of religion* shows how the science of language and texts has made it possible to understand the formation of religious language and its capacity to transcend not only ordinary language but also scientific and metaphysical language and create what has been called a semiotic cathedral. Therefore, a philosophy of religion today must rest on a philosophy of language that includes the sciences of language. These sciences can explain linguistic capabilities and, in particular, the capacity of language to transcend ordinary language and move towards a poetics of existence.

**Jure Zovko's** paper *Philosophy of religion without metaphysics?* discusses the relationship between metaphysics and religion, and attempts to prove that the metaphysics of subjectivity raises questions that represent the essence of the philosophy of religion. Metaphysics of subjectivity explores the epistemic conditions of understanding and explanation of reality – it remains a fundamental segment of philosophy and a constituent of modernity. The primary task of metaphysics is to consider and explain the questions which arise in our consciousness – whether these are questions from ordinary life or those raised



by scientific research – and to reflect on their ground and their connectedness. For in metaphysics of subjectivity, the human being is considered primarily from the standpoint of its finitude, uncertainty and mortality, but also as a being which thanks to its conscious life and its transcendental structurality actually constitutes the center of the world. By focusing on the final questions metaphysics of subjectivity deals with that which may provide our conscious life with stability, consolation, peace, responsibility, and accountability for our actions.

**Enver Orman's** paper, *Religion, metaphysics and science in Hegelian philosophy* is of an historical character. Religion is the second moment of the absolute spirit in Hegelian system which has the same content with philosophy. Both religion and philosophy deal with the absolute truth and its relation with contingent reality. In other words both of them deal with the infinite being and its relation to finite beings, but, according to Hegel, the forms of religious thinking and philosophical thinking are different. Religion, specifically, the religious mode of thinking, uses representations, metaphors and mythological elements in order to explain and to describe absolute being and truth. Philosophy, on the other hand, uses abstract concepts and speculative thinking in order to understand absolute being and absolute truth.

**Gerhard Heinzmann's** paper, *The concept of forgiveness: a case study on the interrelation between metaphysics, faith and logic* brings out first the rationality of forgiveness as a secular virtue and secondly offers some comparison with a religious view of the subject. However, conscious of the lack of any consensual definition of forgiveness, the author will not pursue an empirical examination and will omit the discussion of the difficult problems how to recognize that someone has really and sincerely forgiven or what practical circumstances favor the act of forgiveness. Finally, his concern is human and not Divine forgiveness. So, his aim can be expressed in three main questions: (1) Are there necessary symptoms for offering forgiveness? (2) How forgiveness is motivated? and (3) How can this motivation be philosophically (rationally) justified? In order to answer these questions, a dialogical model of rationality is introduced, which is based on interaction and belief revision. In this metaphysical frame a logical argument is presented for the central thesis: forgive others their debts as you forgive yourself in order to be yourself.

**Paolo Musso's** paper, *Maths, God and the immortality of the soul* notes that In the history of philosophy, mathematics has often been considered a privileged path to transcendence. However, in the last decades, due to the use of the axiomatic method (and above all to its ideological abuse by many analytic philosophers), the perspective has been completely inverted: nowadays, indeed, it seems that mathematics has nothing to do with metaphysics, and very often that it has not even a real meaning, being nothing

more than a conventional combination of empty symbols. On the contrary, the present paper tries to show that precisely the most recent developments of mathematics, as Gödel's Theorem, fractal geometry, and axiomatic method itself, if correctly understood, demonstrate that most of the classical paths leading from mathematics to transcendence are still valid (even if sometimes they should be based on partially different grounds), and can even suggest some new ones.

Evandro Agazzi – President of the International Academy of Philosophy of Science

# 1. General framework

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## *Science, Metaphysics, Religion: Re-opening the Horizons*

Evandro Agazzi

### 1. A positivist portrayal of human knowledge

The order of succession in which occur the three concepts mentioned in the title is the reverse of the order that, according to positivist philosophy, characterizes the maturation of human knowledge. Auguste Comte, the founder of positivism in the nineteenth century, had proposed a general pattern of the maturation of knowledge in the different fields of human investigation (the famous “law of the three stages”), according to which our efforts of understanding reality start with a “theological” stage (in which humans try to understand and explain what they observe by resorting to supernatural causes, that is, to the action of supernatural beings or deities, that are concretely depicted by religions. The further step takes place when the explanation of facts and events is found in the admission of certain principles that are believed to preside over the intimate structure of reality and whose generality makes them non-material, abstract, and in this sense “metaphysical”. Such principles are, for instance, those of causality, finality, uniformity of nature, permanence of substance, existence of a natural order, non-contradiction, ontological purport of logical inferences, and so on. This second stage constitutes a progress with respect to the first inasmuch as it expresses the advent of rationality, of intellectual strength over simple arbitrary imagination, yet it is not final since the abstract character of metaphysical principles, the pretension that they hold everywhere in reality has the flavor of a dogmatic tenet for which no warranty is offered. Therefore the final stage (called “positive” by Comte) is that in which humans content themselves with the scrupulous ascertainment of data, i.e. with “phenomena”, that are the content of sensory experience, without trying to interpret or explain them, but at most recording certain “regularities” in their occurrence (that must not be promoted to the status of “laws”). In this view the final stage is that in which a certain domain of research attains the status of a *science*. This transition, however, does not occur in all domains of inquiry at the same time:

certain disciplines have reached the final stage much earlier than others, and there are fields of inquiry that are still in need of realizing the full transition (according to Comte, for example, society had still to become the object of a positive investigation, and he took over the task of starting such a new science, that he called “sociology”)<sup>1</sup>. This doctrine has the appearances of a simple historical picture, but is actually much more than that since, in the view of Comte, the theological and the metaphysical approaches are by no means only “dated” perspectives relegated to the past, but are mental attitudes that can also affect our time and against which a permanent vigilance and a continuous fight must be kept active in order to ensure the progress of science that is the ground for the progress of humankind altogether.

Positivism wanted to present itself as the paladin of science but was rather its parasite, since science is not in need of any special philosophical defense in order to show its credentials, whereas positivism quickly proved to be a poor philosophy that could take advantage of the exceptional cultural prestige historically acquired by science and technology in order to attain audience and also wide acceptance among the general public. Indeed the idea that modern science could establish itself and make its prodigious advances thanks to a “liberation from metaphysics”, and that “metaphysical speculations” can only produce useless confusions and futile discussions in science is almost a commonplace also today, not less than the tenet that religious views are intrinsically irrational or dogmatic, so that their acceptance is an objective obstacle to the progress of science.

## **2. The dogma of radical empiricism**

A tacit, but not very hidden, epistemological presupposition lies at the root of this positivist portrayal of the evolution of human knowledge, that is, *radical empiricism* that reduces knowledge to the content of sensory perceptions and does not recognize to reason the capability of contributing to a real acquisition of knowledge. This, by the way, reflects itself also in the very conception of science that positivists advocate, a conception that is already very clear in Comte but is still present in the mainstream philosophy of science derived from the Logical Empiricism of the Vienna Circle and continued in the analytic philosophy of science of the twentieth century. This conception is, in a certain sense, schizophrenic for, on the one hand, it attributes to science the status of the most perfect form of human knowledge, but, on the other hand, maintains that science is unable to know reality as it actually is (anti-realism), and this is tantamount to claiming that the most perfect form of knowledge fails to satisfy the specific goal of knowledge, that is, making us acquainted with reality. Moreover this prejudicial tenet leads to a fully distorted portrayal of the

1. See Comte (1830-1842).

historical progress of science itself since is unable to appreciate the paramount role played in this progress by the *theoretical activity* of scientists. To express it in a simple statement: progress in science is the consequence of *thinking hard*, more than of *looking hard*, also because scientific observation – though being absolutely indispensable – is never a purely passive one (as it might sometimes happen in common sense observation) but is always oriented, directed and interpreted within a theoretical framework. If positivists were right, they would be led to subscribe to the statement of one of their main adversaries (Heidegger) who said that “Science does not think”.

### 3. The restriction of horizons

Once this radical empiricist presupposition is clarified, the order of succession proposed by Comte becomes easy to understand: it mirrors the transition from a cognitive approach where reason’s constructions are prevalent and little empirical references are used to a cognitive approach in which empirical reference is dominant and rational constructions are marginalized. This order of succession presents a vague flavor of plausibility (if due role is recognized to the theoretical side of science) if it is taken as a *historical* sketch of the course of human investigation in certain *well delimited* domains. In such cases the landing to a scientific stage can be seen as the last step in a progressive *restriction of the horizon* in the application of the powers of reason and the modalities of empirical ascertainment. This restriction, however, does not mean nor entail an opposition or de-legitimation of the foregoing broader approaches, to the extent that these apply to kinds of issues that are not encompassed by the restricted domain in question. Nevertheless, since this domain is usually embedded in some broader domain, it is almost inevitable that concepts, principles, intellectual tools of this broader domain be (often implicitly and tacitly) adopted in the more restricted one. This occurs in particular in the relations between science and metaphysics, since it is not difficult to see how certain fundamental concepts, principles and laws of a special scientific discipline are “specializations” and refinements of certain corresponding metaphysical concepts and principles<sup>2</sup>.

### 4. The Galilean revolution

This procedure of “restriction” can be found explicitly and consciously in that proposal of Galileo which constituted the foundational move for the start of modern natural science. The subject matter of such an investigation is the domain of physical objects (that he calls “natural substances”), and he distinguishes two cognitive proposals regarding them. One is the proposal

2. A work in which this kind of discourse is duly developed is Dilworth (2007).