

SCIENCE AND RELIGION

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Summary

Science and religion are often presented as antagonists today. This opposition goes back to the positivistic philosophy of the 19th century, but lacks historical support since science and religion have normally been cultivated by the same persons, notably in several ancient cultures. Regarding “modern” natural science, several scholars have stressed that its birth was favored by the fact that Christian religion had promoted within Western culture the view of a universe reflecting the plans of an intelligent creator. Two notorious clashes occurred between natural science and religion: the trial and sentence of Galileo, and some controversies related with evolutionism. Both depended on an insufficiently clarified distinction between the scope and ends of revelation, and of natural science. A separation of these two domains, advocated by Descartes and renewed by Kant, permitted a peaceful coexistence of science and religion, and even the adoption of the results of science as apologetic arguments in favor of the existence of God. Science, however, does not support religion rather than atheism: both can be defended through philosophical arguments and can influence opposite interpretations of the results and theories of science. Being a valid but consciously delimited knowledge,

science is unable to handle issues regarding the “whole” of reality that specifically concern philosophy and are of paramount importance for every rational being because they are deeply connected with the existential need of giving a sense and a value to one’s life, or to the “Life World”. Religion tries to satisfy this same need through a faith that, however, is not “blind” because it has been largely supported by rational arguments especially in the long tradition of Christian theology. Since science itself belongs to the “Life World”, scientific knowledge and activity are subject to value judgments that can be legitimately sensitive also to religious concerns.

1. Introduction

The opinion that science and religion are antagonists is rather widespread in our present cultural environment and this view can be seen as an inheritance of positivism, a philosophical doctrine originated by Auguste Comte at the beginning of the nineteenth century and then rapidly penetrated in almost all European and American countries. The main reason for the favor encountered by positivism was its being an explicit celebration of science as the most perfect form of knowledge, a fact that seemed obvious in a historical period in which mathematics and the natural sciences were accumulating an astonishing harvest of new knowledge that was also producing a great display of useful technological applications. Typical of Comte’s positivism was the thesis that, in those fields of knowledge where humankind has been able to make real progress, a transition has taken place from an initial stage (that he calls *theological*) in which the explanation of phenomena was sought in the causal action of supernatural entities, to a successive stage (called *metaphysical*) in which such an explanation was found in some alleged fundamental principles of reality (such as the principle of causality, of the simplicity of nature, of the rational order of the world), to a third and final stage (called *positive*) in which scientists are content with an accurate description of phenomena, refraining from any interpretation, and at most recording those “regularities” occurring among the phenomena that we call natural laws. This seems to be simply a historical understanding of the course of human knowledge, but is much more than that since the transition from one stage to the subsequent is presented as the result of a hard struggle, a struggle that is never finished because theological and metaphysical efforts of interpreting reality are always alive in society, and in order to promote human progress it is necessary never to dismiss the battle against metaphysics and religion. Especially the second, owing to its much broader social diffusion, is seen as the major enemy of science, the force that tries to oppose the progress and freedom of science. There are also many people, however, who do not subscribe to this antagonism between science and religion, and among them there are plenty of scientists, so that it is not possible to say, for example, that scientifically uncultivated persons think that religion and science are compatible while scientists are of the opposite opinion. Indeed, beside persons who feel that no contrast between religion and science exists, simply because religion is a question of faith with respect to which scientific knowledge is irrelevant, there are, among scientists and non-scientists, many persons who even believe that science is a good support for religion. The consequence of this ambivalent situation is that the issue whether science and religion are antagonists or not cannot be settled through a sociological investigation. In order to seriously discuss this issue we need first a conceptual analysis regarding a few basic points: (1) what do we mean by science, (2) what do we mean by religion, (3) what can we extract from historical

information regarding the relations between these two fundamental “forms of life”, (4) what special novelties are implicit in the constitution of *modern* natural science in the West (that is, within a culture where religion was concretely Christian religion). We shall consider these points before passing to more detailed aspects of our problem.

2. What Do We Mean by Science?

In our very general context the notion of science must be understood in its commonsense meaning, and not according to more refined epistemological and methodological characterizations that have been elaborated at a more professional level. In this sense science is essentially understood as a rather systematic amount of *knowledge* articulated into a few fundamental sectors, such as mathematics, astronomy, physics, chemistry, biology. We are aware that this system has greatly developed in the course of human history, that the knowledge acquired has been attained by using different methods, that these fundamental sectors are in turn divided into subsectors whose proliferation has been growing with time, and also that today we accept in the catalogue of the sciences much more domains of inquiry than those just mentioned. It is thanks to this unsophisticated notion of science that we can speak of a *history of science*, that is commonly understood as the fact that certain “facts”, regarding for example the properties of the natural numbers, the way of making certain computations, the properties of certain geometrical figures, or the position of the planets in the sky at different times of the year, and several other features of nature were *known* to ancient people and are still kept as part of the knowledge we accept as valid today. Beside these “truths” we also recognize many “mistakes” that were defended in the history of science, but at the same time we are convinced that science has progressed because it has been able to increase the domain of truth and eliminate many mistakes. This picture is certainly rough and perhaps a little naïve, but not intrinsically wrong. It is thanks to this picture that we can speak, for example, of “the exact sciences in antiquity” (to mention the title of a famous book of Neugebauer), of the astronomical knowledge of old Chinese or the Mayas, of the mathematical inventions of the Indians. This knowledge was *produced* by human beings, and in this sense was attained within a particular “form of life”, that we can call scientific research or scientific activity. In relatively recent times this form of life has taken the features of an articulated world of “professions”, while in the past this was rather seldom the case; this fact, however, is accidental since what we are interested in considering here is the existence of a certain intellectual attitude, of a certain kind of problems, of a certain amount of statements intended to express real knowledge, that we qualify as *science*, and it is out of doubt that such a complex entity exists and has been in existence during many centuries in the different human cultures.

3. What Do We Mean by Religion?

In an equally general commonsensical way we can qualify religion as an attitude consisting in admitting the existence of a domain of reality that is *sacred*, that is, superior to the visible reality (*supernatural*) and on which the visible reality depends. This supernatural domain, usually called the sphere of the *divine*, can be and has been understood in many ways in the different cultures and times: for example, it has been often articulated into a variety of gods, but sometimes it has been reduced to a unique

god; its nature has been sometimes conceived as totally distinct and separated from the material world in which humans live (transcendence), but sometimes as intimately permeating the material world (immanence). Common to all these perspectives is the belief that the divine is endowed with extraordinary powers and, in particular, can intervene in the course of the mundane events of all kinds and, especially, in the events of human existence. People of all cultures have shared the conviction that it is possible to come into contact with the divine, try to capture the benevolence of the gods, and also receive from them indications regarding what to do in order to avoid dangers and, more radically, to realize a right conduct. The effort of translating these ideas into concrete practices has produced the various religions, such that religion, in a very general sense, can be considered as the way humans have designed in order to establish the appropriate contact with the divine, and they have articulated this requirement through the elaboration of certain practices (rites), of certain norms of conduct (moral codes), and also in certain doctrines regarding the way of the dependence of the world and humankind from the divine. The source of knowledge religions in general accept as a warranty for their “cognitive” and “practical” doctrines is *revelation*, conceived as a particular information that humans in general, but especially certain selected persons in particular, can receive from god and have the task to defend and diffuse. In such a way religions are characterized by the existence of a class of persons (*priests*) who are endowed with the *authority* and the *power* of securing the accomplishment of this task. The adhesion to a religion is grounded in a *faith* that is not at variance with rational arguments, but is not limited to them (this is why the persons adhering to a certain religion are usually called *believers*).

4. Relations between Science and Religion in History

The sketchy presentation outlined above is certainly sufficient to show that science and religion are two *different* human forms of life, two different intellectual attitudes, but it is not sufficient to prove whether they are in agreement or in opposition. Indeed, if they were really *totally* different, no contrast between them could occur, because a contrast implies a common ground on which the opposition could manifest itself, some points of friction where the respective points of view come to a clash. But the same holds also for agreement, that cannot obtain unless some “points of agreement”, that is, points of contact where a common view comes to light, are available. The fact that the question of the compatibility or incompatibility of science and religion has actually been debated for a long while obviously indicates that the two domains, though being different and distinct, are not totally *separated* so that they can come to a comparison that can even result in a serious confrontation.

These reflections indicate that the first step (perhaps not the decisive step) in order to see whether religion and science are compatible or not is to consider their respective histories in an objective spirit. The result of this consideration is very clear: in practically all non-Western cultures where the existence of science can be found, we see that the persons who cultivated the sciences were initially the priests, and this obviously shows that the two “forms of life”, far from being incompatible, were strictly linked together. Just to mention civilizations that have been closer to the Western one and have “prepared” its flourishing, we can recall that the very advanced astronomical and computational knowledge accumulated within the so-called Babylonian civilization was

the work of generations of priests, who wanted to use this knowledge especially in order to draw from the study of the heaven information regarding the course of events on earth and especially of human life. One could be tempted to deride this kind of studies, that obviously correspond to what we call astrology today, but such a derision would be naïve indeed, since the only difference with regard to our present scientific investigation of the cosmos is that we limit “celestial” influences on earth to exchanges of matter and energy, discarding spiritual influences, but this is just a *metaphysical* tenet that cannot eliminate the fact that (within a different metaphysical framework that in particular also included a religious perspective) those ancient people were able to conceive of a mathematically ordered cosmos and objectively uncover several of its features, that is, to construct a piece of exact science. The same story must be repeated for the ancient Egyptians, in whose case science was also practiced by priests, and not accidentally or, let’s say, simply for sociological reasons (i.e., because they had enough ease for devoting themselves to intellectual activities), but really as an essential aspect of their form of life: according to Jamblicus, Egyptians priests devoted twenty two years of their formation to the study of geometry and astronomy. Similar considerations could be repeated (with suitable contextualizations) regarding other great civilizations, such as those of India, China, the Mayas.

As we have said, this did not happen in the case of Western civilization, whose origins we normally locate in the ancient Greek culture and whose most salient characteristic is often considered to be that “rationalistic” trend that started in the sixth century B.C. and gave birth to what was called then philosophy and also to what we now call science in a much more restricted sense, that is, to a form of knowledge in which *rational proofs* are required beside empirical observation. It is true that this Greek science was developed without any direct reference to supernatural or religious factors, but it is also true that it was never considered *at variance* with religious perspectives. Quite the contrary, Greek mathematics and astronomy were not only deeply intertwined with *philosophical* perspectives and doctrines but were also often enriched with interpretations of a religious flavor (as is patent and well known, e.g., in the case of Pythagoras and Plato). We find here a symmetric situation with regard to the one considered in the case of the pre-Greek cultures: there priests were deeply concerned with science, here some scientists are deeply concerned with religious issues (and sometimes do even belong to religiously characterized communities). This is not, however, the most important point: what makes Greek science a real novelty with regard to previous scientific practice is the fact of having conceived it according to a *rationalistic* pattern. Indeed the Greek term *episteme* (that is normally translated by *science*) actually means *knowledge* in the fullest sense and in general (i.e. not restricted to particular subject matters). Such a knowledge must be expressed in *true* propositions, but this is not sufficient, since their truth must be *rationally justified* through arguments capable of *giving the reason* of this truth. This means that pure factual knowledge is not full knowledge or “science”, until adequate justifications are provided for it by means of logical *deduction*: science is “demonstrative knowledge” (Aristotle). This ideal of genuine knowledge reflects the core of the fascinating commitment that characterized the ancient Greek culture, that is, the effort of mastering the changing variety of phenomena that appears in the world by uncovering some stable essence from which they could be logically deduced and, in such a way, seen as necessary and not chaotic. More than empirical evidence a rational theoretical construction was considered the condition for the understanding of reality.

Western civilization has inherited this way of conceiving “science” and this is why very often scholars put the origins of science in Greek science, considering as a kind of pre-scientific knowledge the “factual” knowledge acquired by other civilizations. This model of knowledge characterized philosophy (another thing that is usually considered a Greek invention), but this was not distinct from science, not only because, as we have said, science had a completely general meaning, but also because, if one wanted to characterize science as the study of certain special domains (such as nature or mathematical entities), one would find in the investigation of these domains the same philosophical patterns as in the other fields of investigation. The work of reason consisted in the determination of some essences or principles of increasing generality, starting from those that are specific of a given domain and passing to those of greater generality that are needed in order to complete the rational understanding of reality.

Coming to the relations of this science with religion, we must note that the proposal of simply *understanding* the world remained distinct from the possibility of considering it also as “sacred”, but some points of contact with the divine remained open, especially when the search for adequate rational explanations of reality led philosophers to affirm the existence of some entities endowed with properties that overstep those of the mundane world and are among those that religion attributes to the divine. (consider, e.g., the “immovable motor” of Aristotle). The interesting feature of this approach is that also the divine was included among the domains that can be investigated “scientifically”, that is, with no solution of continuity with regard to the investigation of the natural world. Aristotle, for instance, explicitly says that “the theoretical sciences are three, mathematics, physics and theology” (*Metaph.* VI, 1,3), where theology is not understood as the rational interpretation of some religious revelation, as it was going to be qualified much later in the West, but as the rational determination of the characteristics of “the divine”. Regarding other fundamental issues that lie at the core of all religions, such as the final destiny of human life and the possibility that some part of the human being (call it soul or otherwise) continues in existence after the death and corruption of the body, it is well known how many subtle arguments Plato has developed in order to advocate this thesis, of which we find traces also in the works of Aristotle. Certain scholars (e.g. Zeller) have affirmed that the flourishing of Greek philosophy was permitted by the full separation from religion of this new rational style of investigation, but this is only partially true. It is true only in the sense that philosophy was independent of the forms, rites and myths of the official or “public” religion (which by that time had retained essentially a role of social cohesion among the Greeks), but was not independent of religious issues in general and even of certain forms of “mysteric” religions in particular. Indeed several elements of such religious movements (especially of orphism) are integral parts of Plato’s conception of the human being (in which an immaterial soul similar in nature to the divine has been imprisoned in a corruptible material body to whose death she will survive and have a final destiny proportioned to her moral standard). But, more generally, we must recognize that Greek philosophers did not consider religion as a realm of emotional inclinations and fantasies of which people should get rid and that should be supplanted by the rational rigor of philosophy-science. On the contrary, they normally accepted certain fundamental truths contained in religion and tried to give them a form of rational understanding and foundation, being also aware, by the way, that such a rational analysis could not exhaust the richness of the issue. In Plato’s *Phaedo*, for example, Socrates does not pretend to

offer cogent “proofs” of the immortality of the soul, but only to rationally justify his *hope* to survive in another world after his death. Similarly, Aristotle never presents his doctrine of the unmovable mover as a “proof” of the existence of god, though his arguments were going to provide much of the ingredients for such proofs developed in the “rational theology” of the subsequent centuries. Yet such developments were fully consistent with the spirit of his philosophical approach in which “physical” arguments regarding the explanation of celestial motions smoothly expand to “metaphysical” claims regarding the first causes of such motions, and spontaneously recognize as divine the nature of such first movers, even with an explicit recognition of the “religious” significance of this conclusion. (To see this consider, e.g., the conclusion of chapter 8 of the 12th book of *Metaphysics*, that is highly technical from the astronomical point of view but at the same time presents arguments showing that every celestial motion is produced by a peculiar divine intelligence, and concludes with a respectful mention of the religious traditions: “Our forefathers in the most remote ages have handed down to their posterity a tradition in the form of a myth, that these bodies are gods, and that the divine encloses the whole of nature. The rest of the tradition has been added later...but if one were to separate the first point from these additions and take it alone – that they thought the first substances to be gods, one must regard this as an inspired utterance”).

Without entering into further details, one can easily recognize that within the whole of “classical” culture no opposition surfaced between religion and science, both if we take science in its more general and formal sense (i.e., as rational investigation, that concretely coincided with philosophy), or if we take it in the more restricted sense of the study of certain well delimited domains (such as mathematics, astronomy, medicine). Indeed, on the one hand, Greek philosophy, especially in its late period when it was much concerned with existential issues, abundantly developed reflections that were significantly cognate with religious views (in particular in the case of Neo-platonic and Stoic doctrines) while, on the other hand, great scientists such as Ptolemy for astronomy and Galen for medicine have elaborated such comprehensive, systematic and harmonious syntheses for the understanding of the cosmic and human universe that they could last essentially untouched for many centuries as cornerstones of the Western worldview, and this because they were also impregnated with a sense of moral and spiritual inspiration that made them open to a fruitful interchange with religion. Of course, by the above considerations we do not intend to ignore that among the voices of Greek philosophy there were also those of Leucippus, Democritus and Epicurus, that is, of the representatives of a materialist philosophy that was obviously at variance with any religious conception of the world and of man. This was a minority school but by no means a negligible one. Not, however, because it expressed a “scientific” point of view, having introduced only material atoms falling in empty space owing to their weight and meeting at random, in order to explain the constitution and dissolution of all existing entities. This would be a naïve anti-historic appreciation in which antiquity is apprehended through the spectacles of modernity, and indeed Greek atomism was not based on any empirical evidence but was a very general and highly abstract *metaphysical* doctrine that, by the way, was criticized by the most prominent Greek thinkers owing to several strictly philosophical shortcomings. The interest of atomism consists rather in the fact that it was the most consistent rational elaboration of an *irreligious* worldview, that is, of a worldview in which an option against religion, rather than in favor of religion, is adopted *a priori* and then advocated as reasonable through a

suitable materialistic metaphysics.

If we now accept to qualify as “scientific” the rationalistic approach to reality typical of Greek culture, we must conclude that this approach was in itself neither in keeping nor at variance with religion and religious attitudes, since it was simply instrumental in the treatment of conceptual and intellectual problems rising within the different worldviews. Concretely speaking, one must recognize, however, that religions have offered the most fertile fields of application to this “scientific” patrimony represented by the intellectual constructions of the Hellenistic philosophy (especially neo-Platonism and stoicism): the encounter between the Jewish and Christian religions and the Greek philosophy in ancient Alexandria is a well known cultural phenomenon that has produced the birth of the first genuine *theologies*, conceived as the effort of rational understanding of the content of a given revelation. For a few centuries, theological disputes regarding the basic tenets of Christian religion, its fundamental “mysteries”, and the establishment of an “orthodox” doctrine required the elaboration of subtle and sophisticated notions and distinctions that were fed by the inheritance of Greek thought and nourished the work of the “Church Fathers”.

At this point someone could find a little too paradoxical to consider theology as the first significant incarnation of the scientific spirit, and could prefer to understand science according to its more restricted sense, as being a rational investigation of nature, of the physical world. In this sense it seems rather uncontroversial that a religious conception of the world is rather far from the rationalistic approach that characterizes natural science. This is true, but only to a certain extent. Limiting our attention to the Christian tradition, it is certain that it contained a conception of nature as sacramental, symbolic of spiritual truths, but this conception could easily be complemented with the Greek rationalistic approach, that permitted to see in nature the expression of an order, of an intelligible and exact structure that was the expression of an intelligent creator (God is, for Christians, also reason, or *logos*). This is, for example, the kind of synthesis we find in Saint Augustine and that continues in the Middle Ages, a large historical epoch that covers about a millennium and was undoubtedly characterized, in the West, by a profound religious and Christian inspiration of all the forms of its culture. It was precisely within this European culture that, between the sixteenth and the seventeenth century, the new natural science rose. How could this so quickly happen? Was this a sudden inexplicable rupture with a very long tradition? By no means. Accurate historical studies have shown that the inheritance of Greek rationalism has been piecemeal recovered in the West and assimilated in the teaching of medieval universities, where in particular the works of Aristotle were at the same time largely used, discussed and also criticized, while an empiricist spirit, little known to the Greeks, was fostered by the spreading of technical inventions typical of medieval society. All this was preparing the field for the birth of an experimental science but, at the same time, it cannot really explain the rising of this science unless one takes into account how decisive it was to consider nature as the creation of an intelligent being that has put in it a rational order, a creator who has also made man “similar” to him and endowed with a reason capable of grasping the intellectual order of nature. These are precisely the most fundamental traits of the Christian conception of nature and man. Moreover, according to the Christian religion, nature depends on God for its existence, but is not divine; it has its own independent ontological status, its laws that can be investigated by “natural

reason” without resorting to revelation (this reliability of human reason in the domains not belonging to the “supernatural” is fundamental for Christian rationalist philosophy, such as that of Thomas Aquinas, for example). Taking all this into consideration, several historians of science (whose most significant representative is Stanley Jaki) have defended the thesis that, far from having been an obstacle to the birth of natural science, Christian religion has been the historical humus that has propitiated this birth.

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Biographical Sketch

Evandro Agazzi studied philosophy at the Catholic University of Milan and physics at the State University of the same city, and did postgraduate study and research stays at the Universities of Oxford, Marburg and Münster. He occupied then several teaching positions: at the Department of Mathematics of the University of Genoa, at the Higher Normal School of Pisa, at the Catholic University of Milan, before and after becoming full professor of Philosophy of Science at the University of Genoa (1970). He also had the chair of Philosophical Anthropology, Philosophy of Nature and Philosophy of Science at the University of Fribourg in Switzerland (1979-1998), and taught as a visiting professor at the Universities of Düsseldorf, Berne, Pittsburgh, Stanford , Geneva UNAM (Mexico), as well as at other universities for shorter times. At present he is Professor of Philosophy at the University of Genoa. He is Doctor *honoris causa* of the Universities of Cordoba and Santiago del Estero (Argentina), Ricardo Palma of Lima (Peru), Urbino (Italy).

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His publications include more than 60 books, of which he is the author or the editor, and more than 700 papers and articles. He is the editor of *Epistemologia*, an Italian journal for the Philosophy of Science, and of *Nuova Secondaria*, an Italian journal for high school teachers, and is a consulting editor of several international journals. He has been and is a member of the editorial board of learned dictionaries and encyclopedias.

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