
Science and religion: an alternative paradigm

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Abstract

The possible influence of religious beliefs on science has attracted the interest of historians of science, theologians, scientists and philosophers. Yet, in my opinion, the approaches traditionally used to connect religion and science remain unsatisfactory. The main problem is that religious influence is most of the time depicted as optional, occasional and not really significant. In this article, an alternative approach is proposed, that would make this field of research much more “mandatory” for all scholars interested in science. This approach is based on a certain understanding of religion and of its unavoidable repercussions on theory formation. An example of religious influences in the field of philosophy of science is sketched. Finally, the question is considered whether the alternative paradigm proposed here may lead towards a relativist view of science and reality.

Opsomming

Wetenskap en religie: 'n alternatiewe paradigma

Die moontlike invloed van religieuse oortuigings op wetenskap het die aandag van wetenskapshistorici, teoloë, wetenskaplikes en filosowe ontlok. Die benaderings wat tradisioneel gebruik is om religie en wetenskap te koppel bly egter myns insiens onbevredigend. Die hoofprobleem is dat religieuse invloed meestal voorgestel word as opsioneel, dat dit slegs af en toe plaasvind en nie werklik beduidend is nie. In hierdie artikel word 'n alternatief voorgestel wat hierdie veld van studie baie meer 'verplichtend' sal maak vir alle navorsers wat in wetenskap belangstel. Hierdie benadering is gebaseer op 'n bepaalde siening van religie en van die onvermygbare reperkussies wat dit inhou vir teorievorming. 'n Voorbeeld van religieuse invloede in die veld van wetenskapsfilosofie word geskets. Laastens word die vraag oorweeg of die alternatiewe benadering wat hier voorgestel word kan lei tot 'n relativistiese siening van wetenskap en die werklikheid.

Keywords:

Science and religion; the influence of religion in science; philosophy of science; the nature of religion; religious beliefs; religion and philosophy of science.

1. Introduction

During the 20th century, several attempts were made in philosophy of science to identify the crucial factors or perspectives shaping science and our understanding of it. In reflecting on this topic, Elaine Botha (1994) identified a few "turns". For example, up to the 1940s, logic was regarded by many as the fundamental factor in science (Botha called it a "logicist turn"). Quite soon, however, a historical turn took place, followed by a linguistic turn, a social turn and so forth. Botha noticed that, notwithstanding the multiplication of the turns, religious belief is often neglected by philosophers of science as a possible key to understanding scientific theorizing better. She was certainly aware that many efforts were made and different strategies used by Christian authors in various disciplinary fields to point out the role of religion in science. Yet she was not convinced that religious factors were given their due.

Surely the science-and-religion topic has always attracted considerable academic interest. Among the “top” philosophers of science one can mention the contributions of Polanyi¹ and other Roman Catholic philosophers such as Stanley Jaki, Ernan McMullin, Frederick Suppe and so forth. In the Netherlands, Herman Dooyeweerd developed a neo-Calvinist perspective on the topic. Beyond Christian circles, one could mention the work of Fritjof Capra (1975), pointing out the parallels between modern physics and Eastern mysticism.² In addition to the philosophers, one could also mention Christian theologians, historians of science and scientists from different epochs and confessional traditions.

As a historian of science, John Headley Brooke (1996:3-16) distinguishes several ways in which the Christian faith (religion or theology) has been regarded and “utilized” by some scientists and scholars as an important factor for scientific theorizing. Yet the main problem with most of these (Christian) approaches is that they portray the influence of religion on science as rather optional and occasional. In other words, religious influence is not deemed to be always present, but rather to depend on the personal attitude of the scientists and perhaps on the field of research. By contrast, social or psychological factors, for example, are nowadays often regarded as normally and constantly present in scientific research.

Another problem is that it is not clear which “vehicle” religious factors should use to play a role in scientific theorizing: exegesis, theology, tradition or something else? The strategies and the goals are very different and sometimes conflicting. Furthermore, in many cases religious influence does not seem to be particularly important or to make a relevant difference. Finally, some of these Christian approaches focus especially on the past or seem to interest especially “religious” circles, for apologetic or dogmatic purposes.

In this article, I would like to propose an alternative approach to this field of study, from a Christian point of view, concerning especially the influence of

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- 1 Concerning Polanyi, I have in mind, for example, his *Science, Faith and Society* (1946). One could even say that what he calls “commitment” is the key factor in his understanding of science. Occasionally, Christian terms and metaphors were appropriated by non-Christian authors; for example, Kuhn described paradigm changes in terms of “conversion” and “faith” (cf. Kuhn, 1996:144, 150, 152, 158, 159) while also making room for the “function of dogma” in scientific research (Kuhn, 1963).
 - 2 Of course, the relationship between religion and science is discussed far beyond Christian circles, in Islam, Buddhism and so forth, but my present exploration is limited to the Christian approaches and aims at offering a Christian alternative.

religious beliefs on scholarly theorizing.³ My main thesis is that the research field of religion and science could enjoy wider attention, including in “secular” circles, if it could be argued that ultimate commitments of a religious nature exert a constant influence on scholarly theorizing and make a difference. This argumentation will be developed in the following pages.

In order to show that science and scholarship⁴ are influenced by religious orientations, it will be necessary to clarify the nature of religion. It is often believed that religion has to do with beliefs related to gods, moral codes, worship, holy books or a transcendent world. However, none of these constitutes a common ground for all religious beliefs. The latter, Clouser (2005:23) argues, are beliefs about something/someone that is regarded as independent from the rest of reality and on which the rest of reality depends. When acknowledged in this sense, religion is a universal phenomenon, not restricted to certain circles or persons; and it can be expected to affect whatever cultural activity is entertained. From this vantage point, the claim emerges that philosophers and other scholars interested in science need to pay more attention to the religious factors influencing scientific and scholarly theorizing.

2. Philosophy of science and its ‘turns’

Philosophers of science aim, among other things, at identifying the factors that play a relevant role in science and the perspectives that help in understanding science and scholarship (Loubser, 2013). They also aim at determining which factors exert a legitimate influence on science and which other factors should even be prevented from playing a role. For example, Popper was convinced that although psychological factors do occasionally infiltrate scientific processes, they should be kept in check. Logical factors, however, should in his opinion always play the role of the main character. According to Kuhn, by contrast, logical factors are not always decisive; however, exploring the “psychology of research” (Kuhn, 1970), for example, would open new and crucially important avenues to understand the concrete functioning of a scientific community.

3 I will therefore leave aside the impact of scientific theories on religious commitments and beliefs. The latter is a topic that surely deserves more attention than what it receives at present (cf. Wolterstorff, 2004:80-85); but that is for another occasion.

4 The discourse of this article is especially related to the natural sciences. However, I regard as sciences also mathematics, the humanities, the social sciences, philosophy and so forth. For this reason I will often use phrases such as “science and scholarship”, or “scientific theories” or “(scientific) theorizing” as referring to all sciences.

There is a similar debate around the disciplinary *perspectives* that we adopt to understand science. Coming back to Popper's (1970:57-58) point of view, resorting to the help of sociology, psychology or theology would mean adopting a delusional strategy. These disciplines constitute a sort of "lunatic fringe" (Popper, 1970:58). For Kuhn and others, however, one cannot understand science properly without making room at least for the historical perspective (Kuhn 1977; Pearce Williams, 1970). And does not Popper himself, asks Kuhn (1970:22), utilize ethical arguments when, with the help of maxims and values, he tells us what science *should* be? What about the social mechanisms that Kuhn showed to be operative in the scientific community? What about the communal acceptance of a paradigm? Is it dictated only by logical reasons? What about the psychological effects of propaganda and persuasion, or the role played by "reputation" (Kuhn, 1996:153, fn. 10)? In the long run, there was a multiplication of the factors and perspectives to be considered. To use Botha's metaphor, there was a multiplication of the turns.

Let us therefore consider some of the main "turns" in philosophy of science, in chronological order. Botha identifies the representatives of a "logicistic turn" in logical positivism and in authors such as Russell and Whitehead. Here, there is a strong emphasis on "the use of logical methods in the process of justification of theories and in the characterization of rationality and truth" (Botha, 1994:20). Although there is also considerable interest in language, it is especially formalized and axiomatic languages, bearing the stamp of symbolic logic, that are considered important. Yet, possibly, this interest in language paved the way for the next turn. The linguistic turn was represented by authors such as Rorty (e.g. 1962, 1967). Wittgenstein's dictum "the limits of my language mean the limits of my world" (1961, 5.6) can summarize quite well the "spirit" of this approach, defined by Hesse (1966:249) as a "metaphorical redescription of the domain of the explanandum".

Botha (1994:21) places the historicistic turn as "concomitant" to the linguistic turn and characterizes the former as a "preoccupation" with the (historical) succession of language games. Yet she notes that, very soon, the scope was broadened to a history of forms of life and scientific paradigms. The main representatives of the historical turn are, of course, Hanson, Kuhn and Feyerabend. The historical turn also leads to recognition of "the role of the scientific community as initiator and sanctor of the legitimacy of scientific knowledge" (Botha, 1994:21). This favoured the emergence of the following sociological turn, represented by authors such as Brown, Bloor and Barnes (cf. Brown, 1984). Laudan (1977:196 ff.) welcomed the sociological perspective in science in the limited sense that it could step in when necessary

to integrate the work of the historian of science. But a more radical version of this turn is present, for example, in the “Strong Programme of Sociology of Science”, promoted by the Edinburgh School (cf. Bloor, 1984). In this case, it is believed that social factors are always present in the development of science and are crucial in the production of scientific knowledge. From this point of view, scientific beliefs, unlike other types of belief, have little relation to reason, truth or reality. On the contrary, epistemic factors are equivalent to social factors. A radical version of this position is reflected by Collins’ motto “the locus of order is society” (Collins, 1992:148).

Finally, one could mention a “cognitive turn”, aiming at understanding science by focusing on the cognitive processes by which scientific knowledge is formed. In this case, psychology was quite important, but other disciplines contributed to this trend, such as linguistics, the study of artificial intelligence, philosophy and neuroscience. In this approach, several “turns” and several disciplines seemed to converge. This was especially the case, for example, with the cognitive-historical approach that combined resources from the history of science with an interest in the nature of cognition (cf. Nersessian, 1987).

This is a school that Botha (1994:24) regarded as particularly interesting because, in her opinion, it implied that “scientific concept formation should not only be understood in linguistic or logical terms”. Botha was convinced that the cognitive-historical approach could provide “new perspectives” eventually “amenable to a more holistic theory” in which “the role of religious factors is not excluded” (Botha, 1994:27).

As far as this particular school is concerned, it seems to me that Botha’s expectations were a little too optimistic. Nevertheless, her analysis shows at least that there was a multiplication of the factors and perspectives to be considered relevant in understanding science. (Her analysis entails other important points, but I will comment on them later.) Was she hoping that a “religious turn” would emerge? I do not think so, as she regarded most of these turns as unbalanced and unjustified emphases on the role of a certain factor or perspective. She was hoping rather for “a more holistic approach”, in which the different factors, including religious factors, could be given their rightful place. Did she not realize, then, that many, not only philosophers, were already exploring precisely the role of “faith” in scientific theorizing? She was certainly aware of this, but she thought that their strategies were not satisfactory.

In the following section, we will look at the most common strategies that have been used, in Christian circles, to show the relevance of religious commitments in science.

3. Mapping the historical landscape

In a concise but very insightful document, Brooke (1996:3-16) presents the most common ways in which religion (faith, or theology) has played a role in science over the last few centuries. His “map” takes into account the work not only of philosophers but also of historians of science, theologians and scientists. In this section, I will follow his classification; I will only clarify it here and there when I find it potentially confusing and I will add a few examples that might help in grasping Brooke’s explanations better. My aim, however, will also be to argue that in most of the approaches listed by Brooke the influence of religion on science is presupposed as optional, occasional and not really significant.

3.1 *Belief as presupposition*

Firstly, Christian belief has been regarded as a *presupposition* for science. Modern science needs presuppositions such as the continuity, unity and uniformity of nature. These “metaphysical concepts” are regarded by some as direct products of the Christian belief in creation. According to Brooke (1996:4), there is also a “strong sense” or version of this idea: “Without a Christian doctrine of creation there would have been no modern science.” Among the supporters of this idea are authors such as Thomas Torrance (e.g. 2001) and Stanley Jaki (1978). Hooykaas (1963, 1972) argues that modern science was made possible especially by the Reformation. More recently, Harrison (2007) avers that modern science is indebted especially to the Christian doctrine of the fall into sin and its noetic consequences.

It should be noticed, however, that even those who believe that Christianity gave birth to modern science, in most cases suppose that the latter should march on its own legs, once it comes of age. Religious influence is therefore conceived as limited to the initial stages of science and is not necessarily supposed to play a role in the daily choices of scientists. In this case religion stands “before” – not “within” – science.

3.2 *Belief as sanction*

Secondly, says Brooke (1996:6-8), faith has often worked as a sanction for scientific research. I think Brooke has in mind here especially the maintenance of a broad scope for scientific inquiry. The Christian belief sanctioned certain forms of scientific enquiry that could have been otherwise suppressed or neglected. An example is the “two books” analogy promoted by Francis Bacon. As one was supposed to humble oneself before the book of God’s words, it was equally necessary to be humble before the book of his works. As it was imperative to consult the first book in all its details, it became also imperative to consult the second book in all its corners.

But nothing, admittedly, excludes the fact that secular scientists could have been interested in the same research “corners” for purposes of their own. In addition, the reasons why specific interests were “sanctioned” are quite puzzling. For example, “Luther liked alchemy because of its allegorical meanings: images of purification by fire brought the Day of Judgement to mind” (Brooke, 1996:7).

3.3 *Belief as a motive*

Thirdly, faith-belief did function as a motive for following a certain direction or “paradigm” in science. The aim to glorify God could be met by pursuing a certain result that was supposed to celebrate God’s handiwork in a clearer way. This is the case, for example, with Joseph Priestley who, as a dissenter, tried to show the consonance between science and Unitarianism. A chemistry purified of the presence of “spirits” could help to overcome the matter/spirit dualism and re-establish a sense of “unity”. In his case, science was also supposed to help to establish, in the long run, a form of Christianity that could stand rational criticism and abandon “superstition”. In some cases, therefore, supporting one certain type of “paradigm” instead of another was motivated by adopting one certain type of theology instead of another.

But, again, it could be argued that the same paradigms could have been adopted for different (i.e. secular) reasons. Actually, these paradigms were not the result of religious influence. Like many philosophical trends, they were forged on secular premises and later adopted by Christians because they seemed to underpin a certain theology (or scientific programme) better. One might even wonder, in this case, whether we are not dealing with the influence of science on religion.

3.4 Belief and the aesthetic dimension

Fourthly, one should consider the role of the aesthetic dimension in science. It is well known that in selecting between rival theories, the criterion of simplicity may play a strategic role. Simplicity is often associated with symmetry, elegance, harmony and beauty. Of course, these considerations do not automatically carry theological meanings. “In the past, however, ... aesthetic considerations [have been] a bridge from theology to science and vice versa” (Brooke, 1996:10). A classic example is Copernican theory: the alignment of the earth with other planets showed symmetry. The correlation of planetary periods with their distance from the sun showed harmony. Even in this case, however, I suppose that simplicity, beauty or elegance could have appealed even to someone who was not interested in the bridge between theology and science.

3.5 Belief as regulative principle

Fifthly, beliefs have sometimes played the role of regulative principles. For Newton, space was homogeneous because it was constituted by the one and only God. Faraday derived his view of the correlation and ultimate unity of all physical forces from his faith-understanding of God’s “power” (Rom. 1:21; cf. Botha, 2007:184-207). This belief guided his experimental work, notwithstanding his failure to demonstrate the connection between electrical effects and gravitational forces. James Clerk Maxwell seems to have derived some of his hypotheses from the doctrine of the Trinity. This category seems to link to the third one above, in the sense that, here, religion becomes internally operative for science and leads to the formation of hypotheses. The question remains, of course, as to whether it is legitimate to understand God’s “power” (in Romans 1), in a purely physical sense; or whether the nature of space should be deduced from the nature of God. Here we face problems concerning the legitimate use of the Bible, problems that re-present themselves in the last (sixth) category.

3.6 Belief as constituting science

Finally, according to Brooke (1996:14 ff.), in some cases faith has “constituted science” (one is tempted to say that faith has “substituted” science). An example is “creationist” theories. Doctrines derived from Scripture have sometimes fulfilled an explanatory and scientific role. Brooke recognizes that this model is often linked to an “oppositional stance” (the old Anabaptist

model and its modern versions), yet he (1996:14) also argues that this need not always be the case. After all, Galileo was opposed by Roman Catholics, not by Mennonites. Is literalism the main culprit? According to Clouser (2005:111 ff.), the idea that Scripture contains (at least some) scientific theories constitutes the distinctive hallmark of this trend, more than the literalist interpretation of Scripture. In any case, most Christians reject both the literalist reading of the Bible and the idea that the latter reveals scientific theories.

I trust this brief historical survey confirms my initial hypotheses (and legitimizes Botha's perplexities). Most of the time, Christian scholars have portrayed religion as an optional: some may appeal to their faith while others may proceed in a "neutral" manner. The influence of religious commitment has been also portrayed as rather occasional and not pervasive. In the above examples, it concerned the "birth" of science or the preservation of a few research topics, for example. It is probable that these goals could have been reached even without religious motivations. In some cases, biblical doctrines were taken to be substitutes for scientific theories, which damaged both faith and science. In this case one could also note that, as biblical verses are applicable only to some theories, religious belief is implicitly regarded as irrelevant in all the other theories. Only in two cases (the third and fifth in Brooke's list) were religious beliefs used to choose a certain "paradigm" or as "regulative principles" for science. This seems particularly promising and relevant; it means that in these cases they finally functioned *internally* to science. Yet the misuse of biblical texts rings a warning bell against these procedures.

Is there any hope left for considering religious belief as relevant for science? In the next section I would like to show why a restructuring of the discussion is needed.

4. Understanding religion

The types of approaches mentioned by Brooke rely on a certain understanding of both science and religion/faith/theology. As far as the religion pole is concerned, the situation seems particularly confused. As already pointed out, to identify this field of study, phrases such as "science and religion", "science and faith" or "science and theology" are often used interchangeably.⁵ In other

5 In the previous pages I had to adapt to this situation and to use "faith", "religion", "belief" or "theology" as synonyms. I found it virtually impossible to do otherwise, especially when I had to discuss the arguments of authors who do not distinguish these terms clearly.

words, it is not clear how terms such as religion, faith, Christianity or theology could or should be distinguished from each other. This means that it is often not clear whether science can be influenced either by faith, theology, religion, doctrine, tradition and so forth.

Without entering all the complex meanderings of this problem, I will just point out that in this article the relationship between *science and religion* is discussed. However, even after choosing this direction, the problems that we need to face are not simple. It is the term religion itself that is quite problematic. What is religion? Unfortunately, we cannot hope to get any consensus on the definition of this phenomenon. Nonetheless, some common ground might be found in the agreement that a good definition of “religion” should identify the characteristics that all religions have in common. In this sense, the contribution by Roy Clouser in his book *The Myth of Religious Neutrality* (2005) is quite helpful.

At a popular level, and intuitively, religion is associated with its “classical” expressions: Christianity, Islam, Hinduism and so forth. Religion, therefore, is related to worship of a Supreme Being/s, certain rituals, sacred books, temples, leaders or priests and perhaps ethical prescriptions. Clouser’s (2005:11-17) analysis, however, reveals that none of these characteristics is shared by all religions. For example, not all the communities that are usually regarded as religious believe in a Supreme Being. Theravada Buddhism is perhaps the clearest example of a “religion without god”, but in all Buddhist traditions the divine is traditionally associated with a “Void”, with “non-being” or “nothingness”. In Hinduism, Brahman-Atman is not considered a being, but rather “being-ness” or “being in itself” (Clouser, 2005:12).

Characterizing religion by relating it to specific actions, rituals or practices is also quite problematic. For example, not all religions include prayers or even worship among their practices. It could be suggested that we have religion whenever we have “rituals”. Yet in many cases, the same rituals can be regarded as “religious” in a certain context and as non-religious (or even as crimes) in others.⁶ Besides, are “rituals” also not present in courts, academies, parliaments and so forth?

Furthermore, not all religions adopt sacred books, or acknowledge sacred places or gather in temples. As far as ethical codes are concerned, we meet

6 In Clouser’s (2005:11) list, examples of practices that may (or may not) involve religious beliefs include: “burning a house, setting off fireworks, fasting, feasting, having a sexual intercourse, singing, chanting, cutting oneself, circumcising, covering oneself in manure, washing, killing an animal, killing a human, eating bread and wine, shaving one’s head” and so forth.

the strange situation that while membership of certain clubs does require ethical standards, not all religions prescribe such codes.

In other words, none of the characteristics mentioned above (others are examined by Clouser, 2005:12ff.) seem to constitute the common ground that we are looking for, with the result that attempts at defining “religion” are nowadays often given up. Yet, according to Clouser, it is possible to identify a common denominator of all religious beliefs, one that is present in all religious traditions without exception. He proposes the following definition:

A religious belief is a belief in something as divine per se, no matter how that is further described, where ‘divine per se’ means having unconditionally non-dependent reality (Clouser, 2005:23).

According to Clouser, there is also a secondary sense in which a belief is religious, namely when “it is about how the non-divine depends upon the divine per se” or if it is a belief “about how humans come to stand in proper relation to the divine per se” (2005:24). This second sense of the definition, however, does not concern our discussion about science.⁷ It should also be admitted that religion entails more than simply beliefs; but here I focus on beliefs because they are the vehicle through which religion reaches the area of scientific theorizing.

The common denominator of all religions lies in the identification of someone or something that is *independent* from anything else and on whom/which everything else depends.⁸ To the extent that this definition is correct, it implies that religious belief or commitment is not an option that some people take and others leave. From this point of view, religion is a universal human condition. Humankind is not divided into two groups of believers and unbelievers: all people breathe, eat, speak, socialize, care, trust and are religious. Religion is about identifying the ultimate “bedrock” of reality and this is something that, consciously or less consciously, we all do. We all do this because we cannot escape forming a view of reality in which the different entities, laws and properties that we experience daily are arranged in a certain way, given priority, absolutized, overlooked and so forth. It might

7 Clouser also specifies that the adjective “secondary” is not meant to diminish the importance of these beliefs. They are secondary only for the purpose of giving a proper definition of religious belief, “but not in actual religious life and practice” (Clouser, 2005: 24).

8 I would like to avoid the impression that Clouser is the only author adopting the view of religion described here. Clouser (2005: 333-334 – fn. 23) provides a list of authors who basically adopted the same understanding. Among them are of course Dooyeweerd and other reformational authors, but also William James, Mircea Eliade, Paul Tillich and Hans Kung. In a forthcoming book (“Dark matter: Why naturalism is blind faith”, ch. 2) the list is enlarged and at least 25 major authors are mentioned.

be objected that this view of religion seems to ignore that there are atheists among us. Yet knowing what one does not believe does not exclude religious belief, just as knowing what a vegetarian does not eat *does not* exclude that s/he may still eat something else.

Different religious positions lead to different views of reality, and these lead to potentially different ways of theorizing or different ways of interpreting the facts and states of affairs of our experience. This issue is closely related to the problem of reductionism: one or a few aspects of reality are taken to either generate the others or to be the ones on which the others depend. According to both Dooyeweerd (1984, 1:12 ff.) and Clouser (2005:186 ff.) these types of reduction are virtually inevitable when the “divine per se” (Dooyeweerd’s “Arche”) is located within the horizon of temporal reality. In other words, reductionism is inevitable whenever theorizing is based on a non-biblical religious position.

5. Religion and philosophy of science

At this juncture, Botha’s analysis of the different “turns” in philosophy of science is again helpful. On that basis, it is now easier to see that the different turns aimed at identifying the solid ground, the *locus ordinis*⁹ on which certainty and universality could be anchored. By referring to the theory of modal aspects one can say that such foundation of order was “found” in one or the other modal aspects.¹⁰ By elevating one or a few aspects to the role of the only genuine aspects (in some cases to the role of Origin of the others), they were in fact absolutized. The reductionist strategies adopted by the different trends and schools in philosophy of science reveal the presence of supra-rational commitments that are proposed as rational choices but are in fact religious options. It is interesting to note that the selected modalities, in that period, were always those located in the “upper” section of the modal order (in the analytical or later aspects – see footnote 10). In fact, those are the modalities qualifying the activities of the knowing *subject* (not the characteristics of the knowable *object*). In addition to the influence of

9 Latin: the foundation of order.

10 In order of increasing complexity these modal aspects are traditionally indicated by the terms numerical, spatial, kinematic, physical, biotic, sensitive, analytical, cultural, linguistic, social, economic, aesthetic, juridical, ethical and pistic or certitudinal (e.g. Dooyeweerd, 1979:214). Together, these aspects constitute the “modal order”. They are arranged in a sequence in which each aspect functions as a basis for the possibility of the next aspect(s). For example, we would have no sensations (sensitive aspect) in the absence of specific organs (biotic aspect) allowing such experiences.

religious beliefs, this shows, in that historical period, an inclination towards subjectivism.

The consequences are clear: if religion is a universal human condition, if no individual or community can avoid relying on ultimate commitments for their theoretical achievements, it seems reasonable to conclude that philosophers and historians of science, scientists, theologians and other scholars should be interested in exploring the impact of religion on science and scholarship.

From the point of view presented here, it is clear that trying to “eliminate” religion from science (as Dawkins and others tried to do) is not only impossible but is also the result of a fundamental misunderstanding. It is possible to substitute one religion with another, but not to eliminate the influence of religious beliefs from scientific theorizing. One should rather try to explore the impact of religious convictions on academic theorizing.

The purpose, of course, would not be to prove that Christians (or any other group) are always right while the others are wrong. It is well known that valuable theories can sometimes even be based on “myths” (Popper, 1963:127). On the other hand, theories that may be developed within Christian parameters may well be wrong (Clouser, 2005:240). The purpose would rather be to understand the link between the commitment of the scientist, or scientific community, and the scientific hypotheses, theories, methods and results that are proposed. In some cases, this exercise might point out the reasons why certain problems are selected instead of others. It might shed light on the reasons why a certain theory is shaped in a certain way, with certain implications, with a certain scope. This type of inquiry might shed light on the different approaches that the “schools” within a certain discipline may adopt. It might also help in revealing why certain states of affairs are interpreted in different ways by different schools. Of course, these differences in interpretation can often be understood, to a certain extent, by referring to the philosophical differences among rival schools. Yet the type of inquiry that is promoted here could penetrate even deeper, to the roots of the different positions.

6. Is this a plea for relativism?

Some readers might interpret the suggestion that religious commitments should receive proper attention as a project that can only lead to some sort of relativist or subjectivist position. After all, religion belongs to the knowing subject, and suggesting that rationality is ultimately based on belief means that there are no ways to evaluate different approaches, based on different

religious “roots”. In other words, we would all be in a situation where we could only speak from inside our presuppositions, our paradigms, and there would be no third party to act as an arbiter to evaluate or to adjudicate anything. Would this not place scholars in the same situation as the one denounced by many when Kuhn and others (cf. Polanyi, 1958:266) started arguing that we can only speak from inside our paradigms? This seems to be a reasonable question. Perhaps the relativism generated by acknowledging the religious roots of theorizing would be even more problematic than the one generated by other types of *Weltanschauung* analyses. In fact, paradigms (at least for Kuhn) are still partly scientific and many would claim that they can be discussed, compared and criticized. But how can one discuss or criticize religious beliefs? Is it ever possible that such beliefs may undergo a phase of “crisis” (Kuhn’s term) caused by new scientific results? It seems as if relativism would be the only result, a situation in which we would all argue from inside our particular “cages”.

To this question I would reply in two ways. First of all, it must be recognized that it is difficult to debate about religious commitments in abstract. It is, however, possible to discuss and compare the different effects that they have on scientific theorizing. We have noticed, for example, that certain ground motives require a reductionist approach, in which a particular aspect of reality (or a few of them) is supposed to be more real or more important than others. In some cases, a particular modal aspect is supposed to generate the others and the multiplicity of aspects is regarded as reducible to a particular (absolutized) aspect. All this is not only unjustified and unjustifiable at a theoretical level, but also produces several types of problems. In many cases, reductionist theorizing involves itself in antinomies, the “clash” between different aspects and their laws, signalling that something went wrong in the theoretical process. For a classic example, when Zeno reduced movement to space, the well-known paradox of Achilles and the tortoise was created.

It is therefore not true that different ground motives cannot be discussed or compared, at least in relation to the results that they produce in theorizing. True, even that discussion cannot be completely objective; it will be influenced by the different religious starting points of the participants. But this leads me to a second point.

The religious starting points of groups or individuals do not have the power to make us blind to concrete reality. Let us take for example Ernst Mach’s view that atoms are not real entities but “useful fictions” that facilitate our theorizing. This position (see also Hume’s and Berkeley’s philosophies) was

generated by a view of reality that reduced all the aspects of our experience to the sensory aspect. Mach's point of view is captured very well in his statement: "The assertion, then, is correct that the world consists only of our sensations. In which case we have knowledge only of sensations ..." (Mach, 1897:10) Obviously, this position does not encourage setting up experiments to discover subatomic particles. Yet when such experiments were established, in 1956, and the results pointed towards the existence of neutrinos, Mach's position became problematic. Reality has the power to refute our paradigms (in Elaine Botha's words, "it kicks back").

Relativism is not the automatic result of the recognition of the role of the knowing subject in the process of scientific theorizing. Rather, relativism is indirectly proportional to the lack of recognition of a structural order for reality, which holds for both subjects and objects. In other words, although subjective points of view are real and inevitable, they all deal with a given order which is not constructed by the subject. This is the point of anchorage which is needed to escape relativism. Once the reality of the "creational order" (Dooyeweerd, 1979:68, 89, 146, etc.) is acknowledged, the recognition of a vast variety and diversity of points of view is not problematic and it does not plunge us into the deep sea of relativism. On the contrary, the recognition of the religious roots of theoretical thought could even open new avenues of dialogue, in which the deepest presuppositions are not hidden or ignored, but are honestly recognized and discussed. This, at least, was Dooyeweerd's opinion in matters of genuine dialogue (Dooyeweerd, 1979:5-6).

7. Conclusion

In this article, the influence of religion on science was discussed according to an alternative paradigm. This paradigm is not really new, but it is often ignored and therefore it remains "alternative". After noticing that philosophers of science became gradually more open to exploring a variety of factors influencing science, it was observed how Christian scholars have dealt with this topic through the ages. It was argued that their mainline approaches rely on an understanding of religion that is far from satisfactory. After sketching a new framework for understanding religion, it was suggested that, when properly understood, religious influences on science and scholarship are neither occasional nor optional nor insignificant. It was therefore recommended that philosophers and all scholars interested in science should pay more attention to the role of religious commitment in scientific theorizing.

Bibliography

- BLOOR, D. 1984. The strengths of the strong programme. In: Brown J.R. (Ed.), *Scientific rationality: the sociological turn*. Dordrecht: Reidel.
- BOTHA, M.E. 1994. Understanding our age: philosophy at the turning point of the "turns"? The endless search for the elusive universal. *Tydskrif vir Christelike Wetenskap*, 30(2):16-31.
- BOTHA, M.E. 2007. *Metaphor and its moorings: studies in the grounding of metaphorical meaning*. Bern: Peter Lang.
- BROOKE, J.H. 1996. Religious belief and the natural sciences: mapping the historical landscape. In: Van der Meer, J.M. (Ed.), *Facets of faith and science*. Volume 1. Lanham, Md.: University press of America, pp. 1-26.
- BROWN, J.R. 1984. Introduction: the sociological turn. In: Brown, J.R. (Ed.), *Scientific rationality: the sociological turn*. Dordrecht: Reidel.
- CAPRA, F. 1975. *The tao of physics*. Boston: Shambhala Publications.
- CLOUSER, R.A. 2005. *The myth of religious neutrality: an essay on the hidden role of religious belief in theories*. Revised edition. Notre Dame, In.: University of Notre Dame Press.
- COLLINS, H.M. 1992. *Changing order*. Chicago: The University of Chicago Press.
- DOOYEWEERD, H. 1979. *Roots of Western culture: pagan, secular and Christian options*. Toronto: Wedge Publ. Foundation.
- DOOYEWEERD, H. 1984. *A new critique of theoretical thought*. 4 volumes. Jordan Station, On.: Paideia Press.
- HARRISON, P. 2007. *The fall of man and the foundations of science*. Cambridge: Cambridge University Press.
- HESSE, M.B. 1966. The explanatory function of metaphor. In: Bar-Hillel, Y. (Ed.), *Logic, methodology and philosophy of science*. Proceedings of the Second International Congress for Logic, Methodology and Philosophy of Science: Amsterdam. p. 249-259.
- HOOYKAAS, R. 1963. Science and Reformation. In: Metraux, G.S. and Crouzet, F. (Eds.), *The evolution of science*. New York: New American Library of World Literature, pp. 258-290.
- HOOYKAAS, R. 1972. *Religion and the rise of modern science*. Grand Rapids: Eerdmans.
- JAKI, S.L. 1978. *The Origin of science and the science of its origins*. Edinburgh: Scottish Academic Press.

- KUHN, T.S. 1963. The function of dogma in scientific research. In: Crombie, A.C. (Ed.), *Scientific change: historical studies in the intellectual, social and technical conditions for scientific discovery and technical invention, from antiquity to the present*. London: Heinemann, p. 347-369.
- KUHN, T.S. 1970. Logic of discovery or psychology of research? In: Lakatos, I. and Musgrave, A. (Eds.), *Criticism and the growth of knowledge*. Cambridge: Cambridge University Press, pp. 1-23.
- KUHN, T.S. 1977. *The essential tension: selected studies in the scientific tradition and change*. Chicago: University of Chicago Press.
- KUHN, T.S. 1996. *The structure of scientific revolutions*. Chicago: The University of Chicago Press.
- LAUDAN, L. 1977. *Progress and its problems*. London: Routledge and Kegan Paul.
- LOUBSER, R.A. 2013. Factors shaping scientific framework change. Proceedings of *Transformation in a changing climate*, June 2013. Oslo: University of Oslo. p. 19-21
- MACH, E. 1897. *Contributions to the analysis of sensations*. Chicago: Open Court.
- NERSESSIAN, N.J. 1987. A cognitive-historical approach to meaning in scientific theories. In: Nersessian, N.J. (Ed.), *The process of science: contemporary philosophical approaches to understanding scientific practice*. Dordrecht: Marthinus Nijhoff. p. 161-177.
- PEARCE WILLIAMS, I. 1970. Normal science, scientific revolutions and the history of science. In: Lakatos, I. and Musgrave, A. (Eds.), *Criticism and the growth of knowledge*. Cambridge: Cambridge University Press, pp. 49-50.
- POLANYI, M. 1946. *Science, faith and society*. Chicago: University of Chicago Press.
- POLANYI, M. 1958. *Personal knowledge: towards a post-critical philosophy*. London: Rutledge & Kegan Paul.
- POPPER, K.R. 1963. *Conjectures and refutations: the growth of scientific knowledge*. London: Rutledge & Kegan Paul.
- POPPER, K.R. 1970. Normal science and its dangers. In: Lakatos, I. and Musgrave, A. (Eds.), *Criticism and the growth of knowledge*. Cambridge: Cambridge University Press, pp. 51-58.
- RORTY, J.R. 1962. Realism, categories and the linguistic turn. *International Philosophical Quarterly* 2(2):307-322.

RORTY, J.R. 1967. *The linguistic turn: recent essays in philosophical method*. Chicago: University of Chicago Press.

TORRANCE, T.F. 2001. *The ground and grammar of theology*. Edinburgh: T&T Clark.

WITTGENSTEIN, L. 1961. *Tractatus logico-philosophicus*. London: Routledge and Kegan Paul.

WOLTERSTORFF, N.P. 2004. *Educating for shalom: essays on Christian higher education*. Grand Rapids: Eerdmans.