

Some Aspects of Religiosity in Science

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Abstract: *If religion and science are discussed, they are mostly presented either in opposition or in dialogue. People usually tend to think that 'religiosity in science' usually refers either to scientists who are followers of some religion, novel forms of religions, or the anarchistic view of science. In the current paper, this term is not used in any of these meanings. In comparison with the concept of science, the concept of religion is even more unclear and context-sensitive, including sometimes also the so-called civil religion.*

This paper is based on the stance that the notion of religion can be defined without relying on belief into gods or a supernatural force. Different religions may be alike in their religiosity. If we define religiosity as certain kinds of beliefs and believing, we might find it outside religions, even in science. The concept of religiosity, as used in social philosophy, can also be applied in the study of science, albeit in a slightly different way, as we can find unperceived religious attitude in trusting beliefs and feelings of sanctity among scientists. Religiosity in science can be analysed via multidimensional scales of religiosity as presented by Glock and Stark. Our use of the concept of religiosity in this wider sense may be substantiated by brain studies, and the existence such phenomenon may be confirmed by sociometric analysis, employing the abovementioned multidimensional scale.

In science, religiosity is present mostly in its unperceived form, sometimes allowing us to talk about the civil religion in science. The recognition of religiosity in science enables us to gain better understanding and control of the scientific process, and opens some possibilities to defend science from pseudo-sciences.

Keywords: *beliefs, civil religion, dimensions of religiosity, philosophy of science, religiosity in science, sociology of science*

When I was clever, that is to say, young and a physicist, we, the scientists, were called to arms. No, not against religion, for that war seemed to be over, but against pseudo-sciences. Yet despite our struggle, pseudo-sciences seem to be flourishing. For me, it correlates with my own decline. When I used to lecture on the glory and achievements of science, I was a very popular lecturer. But now that I often talk about human stupidity, my popularity has decreased enormously. Most likely it is due to the fact that some propositions are perceived as unpleasant in spite of their truth value. Unfortunately, the same effect can be observed amongst scientists, unscientific elements in the minds of scientists are not restricted to certain emotional stances. They can refer to strong convictions that basically can be unperceived, yet are quite influential contextually. As part of the scientists' worldview, these can influence not only their daily life, but also their scientific activities. Such convictions can create uneasy paradoxes that are hard to notice within the confines of a scientific discipline because most of the professionals share the same beliefs, yet these remain also well-hidden from the outsiders because a non-specialist cannot say to which extent the asseverations of a scientist are based on so-to-say 'pure science', and to which extent they are founded on the scientist's general worldview. For example, if you ask from a natural scientist if s/he knows anything perfect in nature, s/he answers 'no'. Yet a scientist is ready to believe in the existence of perfect laws of nature that cannot be confirmed by any experience, for it is unclear if an experimental error was due to a mistake by the scientist or a fluctuation in the law of nature. I think this exemplifies the scientist's unperceived religious mentality. Maybe the law of nature happened to be a little bit more tired on Friday evening than it used to be on Monday morning. That problem has been dwelt on in length by Prigogine (for a short roundup, see Prigogine, 1989).

The structure of the current paper will be the following. In the first chapter, the question about possible religiosity in science will be presented and various definitions of religion will be dwelt upon. The concept of 'civil religion' used mostly in social philosophy and the concept of 'religiosity' deserve our interest. On the basis of pragmatist epistemology we will attempt to show that religion and science are overlapping concepts.

In the second chapter, we will try to analyse 'religiosity in science' using the ideas of Glock and Stark (1965) – religiosity on a five-dimensional scale. We will attempt to use the general term 'civil religion in science' to name religious phenomena occurring in science, that are often present in an unperceived form.

In the third chapter, we will aim to demonstrate the necessity of perceiving the presence of civil religion in science. The recognition of religiosity in science

enables us to (i) gain better understanding and control of the scientific process, and (ii) distinguish disciplines in which religiosity is a rather misleading phenomenon that has to be transcended from the others that are genuinely built on religious convictions and claims to truth; also, this opens for us some possibilities of defending science from pseudo-sciences. Finally, we shall demonstrate the possibilities of handling religiosity in science as a scientific problem: brain studies can analyse the justification of the term, while sociometrics will help us analyse this phenomenon on the basis of a multidimensional scale.

On the concepts of ‘science’, ‘religion’ and ‘religiosity in science’

In the dialogue of science and religion, a strong asymmetry reveals itself: Religion has to be “modernised” and synchronised with science, yet science may accept the existence of religion and recognise some of its value, but religion has nothing useful to add to science. Still, it might not be quite so true.

When we talk about religiosity in science, I would like to mention that scientists accept the use of such notions while criticising pseudo-sciences, yet do not take it kindly in the context of “true” science. According to a widespread opinion, the notions ‘science’ and ‘religion’ have no common references.

The concept of science is widely used nowadays and understanding it seems to pose far less problems than defining the same notion.¹ Yet here it would be nice to provide at least some kind of definition. Presuming that the notion ‘science’ is actually familiar to the reader, I would provide here its institutional definition: science consists of the number of activities the financing of which is called financing science in the developed countries (see, e.g., *Frascati Manual*, 2002). This definition does not exclude the similar or same types of activities from science, which take place also elsewhere and which may be subsidised also from different sources, but an attempt to put it into words might make our definition too extended.

The usual idea of religion was based on widespread notions like this: *a religion is a system of beliefs, norms, customs and institutions that centre on divine, holy or supernatural forces and basic values that arrange the relations between a human being and Universe*. Such a definition can be easily combined from everyday sources, e.g. online encyclopaedias. It seems that such definitions

¹ From the long list of possible names I would point out, e.g., Chalmers, 1999; Niiniluoto, 1999; Maxwell, 2010; van Fraassen, 1980; etc.

of religion cannot usually bypass gods or other supernatural forces that by scientists' account have no place in science, or at least should not have.

However, religiosity can be considered to be wider than a mere belief into one or several gods. According to Atran, religion is "(1) a community's costly and hard-to-fake commitment (2) to a counterfactual and counterintuitive world of supernatural agents (3) who master people's existential anxieties, such as death and deception" (Atran, 2002, p. 4). Other authors, too, have stressed the need for a wider concept of religion, including Barbour (1990).

Indeed, we can get by without anything supernatural at all. According to Geertz,

a religion is: (1) a system of symbols which acts to (2) establish powerful, pervasive, and long-lasting moods and motivations in men by (3) formulating conceptions of a general order of existence and (4) clothing these conceptions with such an aura of factuality that (5) the moods and motivations seem uniquely realistic (Geertz, 1993, p. 90).

Geertz's definition is general enough to include those phenomena that are similar to religious yet are connected neither to religious institutions nor the supernatural.

The concept of civil religion as religion outside the religious institutions was first used by Rousseau in 1762. Phenomena of civil religion may include, for example, monuments of national importance connected to the mythology-like stories about important statesmen or the special state of a nation, so-called romantic nationalism (Jewett & Lawrence, 2004, p. 328).

In the case of civil religion we can ask if we are dealing with the 'real' religion or is it just something religion-like, properly called a para- or quasi-religion. In the same way, certain pseudo-scientific or esoteric belief systems have been labelled (see, e.g., Greil & Robbins, 1994). As such, para-religious phenomena involve expressions of ultimate concern but no supernatural beliefs. That is why practices like psychotherapy and ritualistic consumerism do not claim to be religions. On the other hand, quasi-religions like occultism, New Age, and scientology make supernatural claims yet are anomalous in the context of the folk category of 'religion'. The first author to use the term 'the invisible religion' was Luckmann (1963). This particular concept denotes that although religion remains an important feature of modern society, it is not restricted to mere church-going. Its main function is the creation of meaning that is adopted as objective by culture, thus transcending people's immediate experience.

Such disputes can be discarded, because the necessity to differentiate between

religion and quasi-religion is more important for theologians or social scientists. For a scientist who aims at atheism, there should be no difference whether a person believes in Christ or spiritual beings. It seems to me that the necessity for such a differentiation is somehow religious by its nature and when analysing science there is no need for it because of the relative similarity of the attitudes. Different religions love to describe the others as wrong religions. We can say that religions may be very different but religiosity is far less varied, as they all share common religious stance. Therefore, it would be better to speak about religiosity outside the religious institutions.

The notion 'religiosity' in ordinary English is mainly connected with terms describing the strength of faith, e.g. faith, belief, piety, devotion, and holiness. Experts use the term 'religiosity' depending on their specialty. A theologian would define 'religiosity' by faith (Ratzinger, 2000), a psychologist might use such vocabulary as devotion and piety, while a sociologist would mention church membership, church attendance, and doctrinal knowledge. According to Glock and Stark, religiosity is multidimensional, whilst different dimensions can have little interdependence. For example, one might believe in the core doctrines of a certain religion, yet not attend church (Glock & Stark, 1965, pp. 20–21). Glock and Stark (1965, p. 4) give a new definition of religion, "religion, or what societies hold to be sacred, comprises an institutionalized system of symbols, beliefs, values, and practices focused on questions of ultimate meaning". The number of dimensions of religiosity has been increased later and this question has been studied in depth (see, e.g., De Jong *et al.*, 1976, p. 867).

Defining 'religion' and 'religiosity' more closely will remain outside the bounds of this article. McClendon and Smith (1994) have said that one should be cautious of people who claim that the word 'religion' or the adjective 'religious' refers to a single quality or a single trait of character or a single essence. What should this quality be? An awkwardly strict sense of duty? But there are other fields of human activity associated with this, such as playing delicate musical instruments. Loyalty to God or gods? Some religions are atheist. Caring about the sacred? Not all phenomena dubbed 'religion' are interested in this. We only want to claim that for any single trait – ritual, myth, ethical care, sense of social unity, sacrifice, consciousness of the numinous – there is at least one 'religion' with no such trait. (McClendon & Smith, 1994, p. 15) Roy Clouser argues in a similar manner while describing the more common conceptions of the nature of religion: if one associates religion with ethics, then it is possible to point out religions with no teachings on ethics; not all religions are associated with religious services; the issue of ritual and myth takes us into a train of thought that compels us to recognise religious rituals in order to find religious beliefs

while we have to recognise religious beliefs in order to define which rituals are religious; belief in a Superior Being is not common to all religions; when it comes to respecting gods, then there are religions indifferent towards gods or even hate them. (Clouser, 2005, pp. 10–15) The aim of this article is to point out that it is possible to search for the religious in science and that this may prove necessary. This article does not aim to prove the religiosity of science. Proof should perhaps better be sought using scientific methods.

The possible intersection of science and religion can be substantiated on pragmatist grounds, as expressed by William James: “Grant an idea or belief to be true, what concrete difference will its being true make in anyone’s actual life? How will the truth be realized? What experiences will be different from those which would obtain if the belief were false?” (James, 1907, p. 142)

Indeed, it seems that perceiving some circumstances would offer ‘true’ sciences possibilities to notice contextual fallacies, and they reveal the inner anti-scientific nature of popular pseudo-sciences. The often exploited semantic triangle by Ogden and Richards (1923, p. 11) is too simple. Actually, we have to consider that both you and I have each our own personal triangle. Apparently, we need a more complicated system. Skipping long historical introduction, I would like to borrow a well-founded and visually informative scheme from semiotics: Johansen’s pyramid of anthroposemiosis, as it was modified by Deely (2009, pp. 106–107).

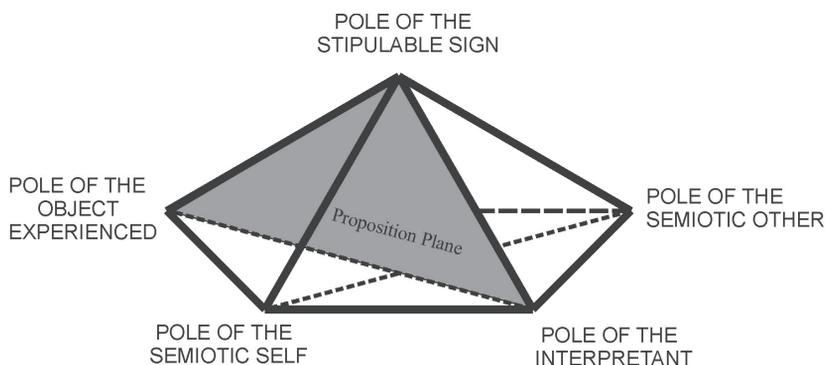


Figure 1. The pyramid of semiosis. The edges of the pyramid illustrate relationships between vertices. In our context a word or phrase can be taken as a conventional sign, the role of interpretant being signified by intersubjective meaning agreed by individuals. The proposition plane of the pyramid of semiosis illustrates the situation we are interested in (intersubjective semantic triangle).

Although there exists an individual term in each subject's mind as the object of thinking, the social practice, being named language-game by Wittgenstein, is possible only if the intersubjective signs (words) and conventional intersubjective interpretants exist. For instance, one who loves cats and one who is allergic to them agree that by saying 'cat' they mean a small furry feline predator. Now both can compose mutually comprehensible propositions.

Figure 1 has been presented to point out that one should be cautious in using the words 'religion' and 'religious' if the discussion is held between persons with different worldviews. "In fact, when an alternative perspective gives a more detailed explanation of more things, that only makes it seem false in greater detail to someone, who rejects it" (Clouser, 2005, p. 82).

An analogy can be drawn in the connection 'reality—statement—proposition', whereas proposition appears in a similar role with the intersubjective statement compared to interpretant. In order to make the right decisions and live in a right way it is not indispensable to connect the truthfulness of proposition with the reality.

A proposition can be considered to be true if it is in accordance with intersubjective experience and the text that expresses it (stipulable signs) keeps to the rules of actual language-game. For example, the proposition 'John is an ape' might be contextually true even if John is actually human. Now, we can try to define the types of beliefs we are interested in:

A belief can be considered to be knowledge, if it is in accordance with intersubjective experience and keeps to the rules and context of actual language-game.

A belief can be considered scientific if it is in accordance with intersubjective experience and keeps to the rules and context of the language-game of the actual discipline.

A belief can be considered religious if it corresponds to Geertz's definition (see above).

As the concepts of scientific belief and religious belief are described by different characteristics, there is no rational justification to believe these concepts should be exclusive. Still, if these concepts are overlapping, we might have a justified need to study their intersection, its extension and intension.

Dimensions of religiosity and religiosity in science

While discussing ‘religiosity in science’, people usually tend to think that this notion usually refers to: scientists who are followers of some religion (so-called believers); novel forms of religions, such as scientology or creationism; anarchistic view of science that may consider science to be a form of religion. I do not use this term in any of these meanings.

I am interested in beliefs that represent religiosity in science: traits that are immanent in the modern, fundamentally atheistic and materialist science, yet still resemble religious tenets. Studying religiosity in science, we attempt to apply the dimensions of religiosity as described by Glock and Stark (1965, pp. 20–21) to science, looking for appropriate examples for each and every dimension.

1) The experiential dimension. It includes personal religious experience: the feeling of sanctity, the feeling of belonging and the sense of truth. Revelation of solutions via knowing “how things really are” – revelation-like events similar to ‘religious experience’ are well-known in science. Scientific creativity is not much more scientific than in antiquity. In practice of science there appears to be present an odd and contradictory combination of materialistic worldview and half-mystical creative force, the source of the latter being, to put it mildly, unclear for a scientist and suspiciously similar with divine revelation of truth.

In science, ‘sanctity’ can occur in several ways. When somebody shows up doubt in a steadfast conviction, it elicits emotional stress and reaction far beyond the ordinary reactions on an everyday blunder or even a personal attack. This phenomenon reveals the scientist’s ‘sense of truth’: she has a feeling that she knows some things are truly real. This combines further with the ‘sense of belonging’: no scientist is an island; s/he is part of the everlasting scientific progress that brings us the truth. The existence of sanctity in science can also be seen in the creation of martyrs of science like Bruno, or saints of science like Newton.

2) The ritualistic dimension. This includes the worship in community, rituals or procedures. This aspect is perhaps the least represented in science. The rituals of defending a scientific degree or awarding one might be an example, but these are usually not taken too seriously. Maybe rituals followed in laboratories serve as a better example: no one grounds them rationally, but the elder teach the younger to observe these rules.

3) The ideological dimension. It includes adherence to the principal beliefs of the doctrines, steadfast believing. In science, steadfast conviction appears in

the validity of certain principles and trusting belief in the existence or lack of certain entities. Some theories were necessary in their contemporary science, staying influential for millennia, but started to seem quite strange later, such as the epicycles theory authored by Apollonius (Pannekoek, 1961, pp. 133–144). According to Plato and Aristotle, planets may move only along a circumference. But the theoretical movement of the planets was not in accordance with what was seen in the sky, so astrologers were in distress. In the 3rd century BCE, Apollonius made planets move around an empty point along a small circumference called an epicycle. The centre of the circumference in turn moved along another circumference centred on the Earth and was called a deferent. But why should a planet move around an empty point in space?

Sometimes, clinging to the principles has justified itself, for example, when Neptune was found through the disruptions in the movement of Uranus. Sometimes it has not, for instance, when the drift of Mercury's perihelion was explained via a complementary planet. Scientific revolutions are somewhat similar to religious reforms as certain propositions and interpretations are allowed only after the reform (Kuhn, 1962). Steadfast conviction in principles is revealed during scientific revolutions. Old paradigms usually die only with their proponents. Popper's idea of a functional falsification is disproved by the actual history of science.

4) The intellectual dimension. This includes religious knowledge about the basic tenets of person's faith and sacred texts: that is, history, sacraments, and morality. Belief in perfect laws of nature also seems to have its origin in theology. Historically, that connection was not easily noticed since the success of science seemed to depend on its departure from theology. The Copernican principle of simplicity, considered by its author to be a proof of the existence of God, seemed to lead science towards atheism (Jaki, 2005, p. 46). In the wake of Laplace, God was dismissed as an unnecessary and complicated hypothesis. It was not easy to see, however, that the godless natural science had lost its foundation. In the history of science we can see strong conviction that human beings are able to understand the Universe. Yet how could Newton claim that absolute space is infinite and eternal? How much of that infinite Universe did he traverse and for how long of that eternity did he live? Newton's claim is not scientific; it is the claim of a deeply religious man who believes firmly in the existence of absolute truth and the possibility of perceiving it. (Velbaum, 2006)

5) The consequential dimension. It describes the effect of religion on the life of individual. According to Glock and Stark (1965, pp. 20–21), the two final dimensions are closely connected. Being in science demands commitment

and leading the life of a scientist. To justify the ethics of science also religious argumentation is used, because in a purely materialistic way people just cannot see the harm due to, for instance, faking data, which enables one to earn a lot of money and fame and then, using these resources, make a great discovery. Discarding the truth causes problems in science, especially in the field of ethics in science. If science is not a search for truth, then nowadays it is perhaps a kind of business. In this case the best science is the one which ensures the biggest profit. At the same time science is often attributed the role of saviour and redeemer. Unfortunately one cannot be redeemed without being ready for redemption, pursuing goals that are incompatible with redemption. Even if everyone had a spaceship, many would be unhappy because their ship is a few meters shorter than someone else's.

Some doubt has been cast on the existence of dimensions of religiosity (e.g., Clayton & Gladden, 1974). In the current paper, I do not asseverate the dimensions of religiosity to exist as objects on their own accord; they are tools that help us to comprehend this complex phenomenon. Discussion about the true form of their existence could be considered prudent rather in a religious, not scientific context.

It seems that almost all forms of religiosity are to a greater or lesser extent evident in science. However, using the expression 'religion in science' might be misleading in this context, reminding us the forms of institutional religiosity. It is less misleading to speak about 'civil religion in science'.

Currently, civil religion dwells unperceived in science. In my opinion, scientists need to perceive such beliefs and religiosity in science.

Exploring religiosity in science: why and how?

On the basis of my personal experience, I can assure that amongst the scientific community, the notion 'religiosity in science' prompts a rather negative attitude. In the following discussion, we dissert that criticism in a certain logical order, taking each point under consideration after dissecting the previous one:

- 1) the problem of definition: by 'religion' and 'religiosity', people usually mean belief in gods or the supernatural. Wider definitions are unfamiliar or considered to be meaningless;
- 2) the problem of the field of meaning: the notion 'religiosity in science' is equated with one or several of the usual meanings described at the

- beginning of the previous chapter and decided to have no application in science;
- 3) the problem of existence: should the two previous problems be overcome, the question arises if the matter is not far-fetched, as such phenomena might actually not exist;
 - 4) the problem of importance: if 'religiosity in science' is indeed a meaningful expression, such phenomena might still be marginal or unimportant for science;
 - 5) the problem of purpose: why should we study such matters and in whose interests would it be? It might be that science could get by very well without such research;
 - 6) the problem of methodology: can 'religiosity in science' be only the subject of philosophical disputes or could it be actually studied by scientific methods?

The first kind of criticism was already answered in the first chapter, the second kind at the beginning of the second chapter. We can add, brushing also the sixth point, that the wider fields of meaning of the notions 'religion' and 'religiosity' might be substantiated scientifically, for example, by brain studies using methods of functional tomography. One possible approach could be the comparison of the altered states of consciousness respective to belief and the sense of sacredness amongst scientists and the so-called believers. Both similarities and differences would give interesting material for analysis.

The third and fourth criticism may be addressed by studying to what extent do scientists themselves perceive and accept such phenomena. Listening to the (often unofficial) remarks and opinions of my colleagues, I have formed the impression that there is a lot of problems in science that are caused by human error, funding, government, etc. – but science itself is basically all right and all these problems will eventually be solved. In such cases, I am reminded of the worldview of a loyal Soviet citizen. Such a person would admit that one can meet problems everywhere in the U.S.S.R., yet all these problems were quite particular and fundamentally solvable, because the system as a whole was still quite right and good. Sociological research could help to address the third criticism but even the analysis of the writings and speeches of scientists could be fruitful. Worry about science seems to be an arising trend but it should be studied how important are the phenomena denoted by the notions 'religiosity in science' and 'civil religion in science'. The limits of this article will not allow us to demonstrate more evidence or give further explanations. However, appropriate examples are available in treatises already published. For example, the book by Roy A. Clouser (2005) concentrates on the hidden role of religious belief in theories.

Against the fifth criticism, at least two kinds of arguments can be used. The first one is concerned with the question to what extent should scientists perceive their beliefs to make the process of scientific discovery even more scientific than it currently is. A scientist should try to notice and verbalise his/her axioms of trusting belief, and to check if those axioms are indeed axioms for him/her or have they, perchance, changed into dogmas. The objects of science become all the more complex, hence we might have to control the scientific process more accurately as it is still not much more scientific in its execution than it was in Plato's time (Kasak, 2008, p. 71).

The second kind of arguments is concerned with the obligation of scientists to take metaphysical stances in front of the general public. Most of the questions the public poses to scientists force the respondent to leave the framework of the specialty-related facts. It looks as if scientists are under social pressure to accept the image of metaphysicists. Quite often a scientist presents to the audience her views on metaphysics, which are based on the scientist's personal worldview but are not philosophically deeper than those of the audience. Sometimes, the expectations of the general public might even be better satisfied by a professional propagandist. For various reasons the same methods are used in school education, where it is, for pedagogical reasons, very important to convey convictions. Such activities are often based on the religious feeling of truth. Such unperceived religiosity supports the demagoguery in scientific propaganda that a malicious opponent could call lying in the name of truth.

Fight against pseudo-science would be much more successful if we perceived the hidden religiosity in science, and if the apologists of science kept science apart from the ideology that paradoxically claims there is no ideology in science, but only "maximally objective reflection of reality", as Wolpert (et al., 2006) likes to say.

The sixth criticism might be answered by using the multidimensional models of religiosity in sociometric studies. For the sake of reliability and verifiability, the original questionnaires of the authors should be used (see Hill & Hood, 1999). As a pilot project, the scientific religiosity of students of different fields could be measured. In the long run, such quantitative studies could be conducted on the scientific community, yet such studies should be international to gain reliable results. In order to demonstrate that a religiosity similar to that of other domains exists in science, it is possible to carry out textological studies that concentrate on texts authored by scientists that strive to be popular and persuasive. In order to compare the religious states of mind, using methods of functional tomography may be considered.

The study of ‘religiosity in science’ may come to be an object of study in a discipline tentatively called ‘the unscientific features in science’.

In sum

The purpose of the current paper was to propose that:

- (1) There are beliefs in science that resemble religious tenets. We may refer to those by the notions ‘religiosity in science’ or ‘civil religion in science’.
- (2) Religiosity may be analysed using the five-dimensional scale of religiosity by Glock and Stark (1965).
- (3) Studying the religiosity of science is possible and necessary.

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