



Plenary Session 26-29 October 1998 – At the turn of the millennium the dialogue between science and theology is developing rapidly. However, it is in no way an easy affair. If we admit that there is a methodological gap between empirical science and theology, we could even wonder whether such a dialogue could exist at all. Moreover, naturalism time and again uses empirical science to present metaphysics and religion as meaningless or useless.

I intend to show that our present scientific worldview opens out a perspective which is coherent with the existence of purpose and religious values. We find ourselves now at a vantage point that enables us to explore these issues on solid grounds. It can be argued that, for the first time in history, we have a scientific worldview that is, at the same time, complete and rigorous, and is closely related to ideas of self-organization, rationality, and information. Also, the development of epistemology permits us to combine the logical, historical, and sociological perspectives, reaching a balanced view on the nature of empirical science. Finally, the development of science-based technology has made us more aware of the ethical implications of scientific progress. I am going to use this threefold vantage point as the framework of my argument, the purpose of which is to build a bridge connecting science and theology. Due to the space available, I must confine to a brief sketch; a full explanation can be found in a forthcoming book (Artigas, 1999).

My reflection is divided into four parts. The first is devoted to considering which method should be used to study the philosophical and theological implications of science. These implications are analyzed in the three following parts, which deal respectively with the ontological implications and the corresponding image of God (second part), the epistemological implications and the corresponding image of man (third part), and the ethical implications (fourth part).

1. Science transcends itself

Empirical science should not be used as the basis of reductionist or naturalist approaches, because it includes not only factual knowledge, but also its necessary conditions, which can be taken as presuppositions whose analysis constitutes a philosophical and theological task.

There are three kinds of such presuppositions. The first is an ontological presupposition; it concerns the intelligibility or rationality of nature, and is closely related to natural order. The second is an epistemological presupposition; it concerns the human ability to know natural order, and includes the different forms of scientific argument. The third is an ethical presupposition; it refers to the values implied by the scientific activity itself, and includes the search for truth, rigor, objectivity, intellectual modesty, service to other people, cooperation, and other related values.

In addition, there is feedback from scientific progress to these presuppositions, because the progress of science retro-justifies, enriches and refines them. Actually, as these presuppositions are necessary conditions for the existence of science, scientific progress is a sufficient condition for their existence, and enables us to determine their scope. Seen in the light of that feedback, the analysis of each one of those presuppositions can provide a clue to the philosophical meaning of scientific progress and, therefore, to its theological relevance.

2. Self-organization and divine action

The ontological presuppositions of science refer to the existence of nature and natural order, because empirical science studies natural patterns.

For the first time in history, we have a scientific worldview which provides a unified picture, because it includes all natural levels (micro- and macro-physical, as well as biological) and their mutual relations.

This worldview is centered around a dynamic process of self-organization. Our world is the result of the deployment of a dynamism that produces different natural levels with new emergent characteristics, and therefore with new kinds of dynamisms, in such a way that nature is creative in a real sense.

The development of physics and chemistry has provided the basis for a new biology which uses some basic concepts which apply also in the physico-chemical level, especially the concept of "information". Information is materialized rationality. It includes plans that are stored in spatio-temporal structures and guide the successive deployment of natural dynamism and the corresponding formation of increasingly complex patterns.

Natural order is contingent, as it is the result of singular circumstances. However, nature is full of organization, directionality, synergy (cooperativeness), and very sophisticated activities.

All this is most coherent with the "continuous" activity of God, the Creator who has conceived the natural dynamism and uses it to produce, according to the natural laws, a world of successive levels of emerging innovations. Our world does not exhaust the possibilities of the creation. God usually acts respecting and protecting the natural capacities of his creatures, and He has given them great and marvelous potentialities which are never exhausted, so that new results can always be produced or expected. However, in the production of new systems and processes we can only develop potentialities which are already contained in the created natural world.

In this context it is worth considering a kind of definition of nature provided seven centuries ago by Thomas Aquinas which runs this way: "Nature is nothing but the plan of some art, namely a divine one, put into things themselves, by which those things move towards a concrete end: as if the man who builds up a ship could give to the pieces of wood that they could move by themselves to produce the form of the ship" (Aquinas, 1965). This idea has now more empirical support than in Aquinas' time and fits very well with the present worldview. Now we can say that God acts this way and can provide many striking examples. Therefore, scientific progress retro-justifies, enriches and refines the ontological presupposition of science, turning order into self-organization, and shows the central part that natural and divine creativity play here.

3. Scientific creativity and human singularity

Likewise, there is feedback from scientific progress to the epistemological presupposition of science, which is connected with the human ability to know nature's order.

Indeed, nature does not speak, and natural science is possible because we are able to build specific languages which allow us to pose questions to nature and to interpret the answers provided by our mute partner. This shows that, although we are a part of nature, nevertheless we transcend it.

Creativity plays a central role in the progress of science. In contrast with earlier ideas, contemporary epistemology points out that creativity is an essential ingredient of the scientific enterprise: we need it every time that we formulate a new hypothesis, or propose a new experiment, or perform an experiment and interpret it, or establish new stipulations. Scientific creativity has to be adapted to the constraints imposed by coherence and experience, but it is indubitably a central feature of science.

Scientific creativity is one of the most astonishing capacities we possess. Empirical science steadily progresses in spite of the fact that, on purely logical grounds, we could never be sure of having obtained true knowledge. We are able to build on foundations that, even though they are not completely firm, are good enough to build impressive skyscrapers.

Scientific creativity is a proof of our singularity. It shows that we possess dimensions which transcend the natural ambit and can be labeled as spiritual. The very existence and progress of the natural sciences is one of the best arguments that show our spiritual character. But, at the same time, the success of scientific method shows that our spiritual dimensions related to creativity and argument are intertwined with our material dimensions, so that we are a single person constituted by both aspects.

All this is coherent with the view that man is a co-creator who participates in God's plans, and has the capacity of carrying the natural and the human ambits to more and more evolved states.

Also on this level we can appreciate that scientific progress retro-justifies, enriches and refines the epistemological presuppositions of science. Thanks to this progress, we know better our own capacities and we are able to develop them in a line of increasing creativity which corresponds to God's plans. Obviously, the scientific enterprise acquires a completely new and fascinating meaning when we see it as a task that God has

entrusted to us, so that we may increasingly participate in his knowledge and mastery over the natural world. Then, cultivating science becomes a human task which has a deep divine meaning, and it should be carried out with a deep gratefulness and respect towards the plans of the Creator.

4. Science and values

The meaning and relevance of science reach their highest peak when we consider its ethical presuppositions. Empirical science is, above all, a human enterprise directed towards a twofold goal: a knowledge of nature that can be submitted to empirical control and, therefore, can provide a dominion over nature. Therefore, the meaning of science is also twofold: the pursuit of truth and the service to humankind. In this case, it is obvious that scientific progress retro-justifies, enriches and refines these goals, and provides better means for their implementation.

Besides, scientific work requires an entire set of values, such as love for truth, rigor, objectivity, intellectual modesty, cooperation, interest in solving practical problems (medical, economic, and so on), so that scientific progress contributes to the spread of those values.

The progress of science and of science-based technology always creates new problems of a humanist character. Therefore, their progress is a source of new challenges which require basic moral values as well as social responsibility and ethical creativity.

The new worldview presents a creative universe which has made possible the existence of creative intelligent beings who are, at the same time, carriers of insignificance and of grandeur. This worldview is entirely consistent with the emphasis on God's respect towards creation. The resulting model of God and divine action underlines God's involvement with creation and God's respect for human freedom.

God can also be viewed as an artist. The universe and, in a personal way, intelligent beings such as ourselves, participate in his creativity. This is most consistent with the self-organization of nature and with human freedom. Our world does not exhaust God's creativity and perfection. Any representation of God will always be partial and imperfect. Nevertheless, we can know and experience those features of divine wisdom and love that we need to find the meaning of our lives.

Following an ancient image provided by Seneca (Seneca, 1961) and used fifteen centuries later by Luis de Granada (Granada, 1989), God can be referred to as "the mind of the universe" not in a pantheistic sense, but to express the idea that our universe exhibits rationality, information and creativity; that it makes possible the existence of human beings who are strictly rational and creative; and that all this requires a divine foundation and a participation in God's creativity.

If we compare this theistic perspective with other positions, we realize that it stands the criteria which we apply in the natural sciences. Its explanatory power is very high, while atheism and agnosticism leave everything unexplained. It has also a very good predictive power because it provides a rational basis for human responsible and creative activity, while atheists and agnostics, if they are coherent with their position, have no basis at all for a moral way of living: they can be honest in spite of the fact that they are atheists or agnostics. It has the support of independent proofs and can be integrated in a chain of mutual support with other generally accepted views: mainly with those of science, as they have been developed jointly with an analysis of the present scientific worldview, but also with the central core of most religious views and with the basic human aspirations. Here we can find a common ground which could be accepted by most religious people and could foster religious views.

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