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PRATARMĖ

Šiandienos visuomenė pasiruošusi tikėti šviesesne ateitimi ir tikėtis geresnių gyvenimo sąlygų, aukštesnio išsilavinimo, mokslo laimėjimų, puikiai besiklostančių politinių santykių, stabilesnės ekonominės situacijos, efektyvesnės medicinos, kitų teigiamų pokyčių. Tačiau taip nutinka, kad kuo ilgiau žmonija gyvena istorijoje, tuo rečiau tie lūkesčiai pasiteisina arba iš viso nepasiteisina. Vis labiau nusiviliama politiniu gyvenimu, mokslu; iškrypsta visuomenės moralė, dorovė; medicina nepadeda išvengti mirties; ekonominė padėtis nepastovi (auga arba svyruoja bedarbystės lygis); žmonės vis labiau teršia gamtą, kol galų gale turbūt pradės nykti ir patys.

Pergyvenome du pasaulinius karus, nacizmą, socializmą ir komunizmą, tada – postmodernizmo ideologiją, dabar vadinamą „ketvirtąją pramonės“ revoliucija, iki 2030 metų turėtų įvykti dar vienas lūžis – visuomenė turėtų tapti „išmaniąja“. Įvairių sričių specialistai prognozuoja, kad dirbtinis intelektas, išmaniosios technologijos gali pakeisti viską, išskyrus žmogaus savęs paties ar kito asmens slaugą. Mašinos niekada nepakeis žmogiškos meilės, jautrumo, šilumos, pažinimo ir vilties. Apskritai – ir gyvenimo. Benedikto XVI teigimu, gyvenimas tikrąja šio žodžio prasme atrandamas ne savyje ir ne savo išgalėmis: tai – santykis, o gyvenimas, kaip visuma, yra santykis su Tuo, kuris yra gyvenimo versmė. Jei mus sieja santykis su Tuo, kuris nemiršta, kuris pats yra gyvenimas ir meilė, tada esame gyvi. Dievas – gyvenimo autorius. Kai įvairios gyvenimo „dėlionės ir detalės“ susijungs, mūsų esybė bus užpildyta dangiško tobulumo ir, vaizdžiai kalbant, sielos dykumos pražys dieviško šventumo žiedais. Vis dėlto krikščioniška viltis neperkelia šventėjimo vien į tolimą anapusinę ateitį, atvirksčiai – ji įkvepia geriems dalykams, skaitina gyvenimą jau dabar. Eschatologinė viltis ne atitraukia žmogų nuo šio pasaulio rūpesčių, kaip manė K. Marksas, bet priešingai – skatina kurti tą karalystę jau čia, žemėje.

Šis mokslinių straipsnių rinkinys iš esmės ir yra apie krikščionybę bei gyvenimą, apie santykį su Dievu, Jėzumi Kristumi, besiskleidžiantį per Bažnyčią, mokslą, kultūrą, šeimą ir kitus reiškinius, kurie analizuojami pateiktuose moksliniuose tekstuose.

Mons. prof. dr. Arvydas Ramonas

WHY IS IT NOT SO EASY FOR A PRESENT-DAY PHYSICIST TO BE GENUINELY A CHRISTIAN?

Rudolf Larenz

Helsinki universitetas

Anotacija

Straipsnyje analizuojamas empirinių mokslų, ypač fizikos, sąlytis su krikščioniškąja teologija, filosofija ir apskritai humanitariniais mokslais. Šiandienos mokslo pasaulyje dažnai atrodo, kad gamtos ir tikslieji mokslai nepripažįsta krikščionybės teiginių, sunkiai priima Apreiškimo tiesas. Teisingas abiejų sričių ir krypčių mokslų dialogas turėtų remtis abipuse pagarba, pagrindžiant savus mokslo tyrinėjimo metodus, teiginius ir aksiomas. Ginti teologiją reikėtų pradėti, nurodant tam tikrus fizikos trūkumus ir suformulavus filosofinę šių trūkumų kontrolę. Tai reiškia, kad fizika, o ne teologija tampa „iš naujo peržiūrima realybe“. Tik „kontroliuojama“ fizika gerąją prasme ir teologija yra tinkami diskusijų partneriai, kurie ieško autentiškos tiesos. Šio straipsnio autorius yra katalikas, bet jo išsakytos idėjos priimtinos ir stačiatikiams, ir liuteronams, galimi skirtumai tik dėl natūraliosios teologijos požiūrių įvairovės.

PAGRINDINIAI ŽODŽIAI: fizika, krikščionybė, teologija.

Abstract

A short description of the relationship between Physics, Philosophy and Theology is: Physics neglects or passes by Natural Realism, which is the origin of Philosophy. In turn, Natural Realism is backed up by Judeo-Christian revelation. Therefore, Physics neglects or passes by Theology. That relationship between Physics and Theology is widely used as a background for exercising an intense pressure on Theology. The defence of Theology should begin by pointing out certain shortcomings of Physics and formulating a philosophical control of these shortcomings. This is tantamount to turning Physics instead of Theology into a “site under construction”. Only a “controlled” Physics and Theology are adequate discussion partners. The author of this article is a Catholic. However, the ideas expressed are, by and large, acceptable for Orthodox and Lutheran Christians as well, with possible differences only regarding natural theology.

KEY WORDS: Physics, Christianity, theology.

Introduction

Most probably, the first reaction to the title ‘Why is it not so easy for a present-day physicist to be genuinely a Christian?’ is bewilderment or discontent. One might rather think that the beautiful laws of nature discovered by physicists, together with their success in describing natural processes, should help their discoverers to notice the creative mind that shines up in them. In fact, the observed order and intelligibility of nature give rise to a classical and, so to speak very popular, argument for the Creator. In St. Thomas Aquinas’s account of cosmological arguments for the existence of the Creator, it is called the *quinta via*. But, as a *sociological fact*, physicists are not inclined to notice the creative mind in the laws of nature, and less so by means of their professional education and work. Rather, many physicists are atheists or agnostics. And many people, who have been raised in a Christian family, no matter whether Catholic, Orthodox or Lutheran, have become estranged, *precisely because* of exercising their profession as physicists, from the faith of their youth without becoming declared atheists or agnostics.

Here is an incomplete list with the names of some widely known physicists and their religious affiliation. Only very few first-line physicists are declared Christians, including Pascual Jordan (Jordan, 1968), Max Planck and Carl Friedrich von Weizsäcker; all of them Lutherans. Some others relate friendly towards Christianity, such as Max Born and Werner Heisenberg. There is a certain number of second-line physicists who declare themselves Christians, mainly evangelical or lutheran, above all in the US. Second-line physicists who declare themselves Catholics, are not so frequent, such as Stephen Barr, University of Delaware, co-founder of the US-based Society of Catholic Scientists (SCS) (Barr, 2016). Similarly Michael B. Dennin, University of California – Irvine (Dennin, 2015). Quite a few first-line physicists are declared atheists including, but not limited to, Niels Bohr, Max Delbrück, Paul Dirac, Albert Einstein, Richard Feynman, Peter Higgs, Stephen Hawking, Carlo Rovelli, Erwin Schrödinger and Steven Weinberg.

It seems that the *quinta via* “does not work” any longer. Physics and other natural sciences seem to have replaced Religion. In other words, the cathedrals of our time are not any more the real cathedrals of *St. Peter*, or *St. John in Late-*

ran, or *St. Mary*, or *St. James*, or *Christ the Saviour*. The names of the contemporanean cathedrals are CERN in Geneva, DESY in Hamburg, DUBNA in Moscow, almost all university hospitals, Enrico Fermi-Laboratory in Chicago, Jacques Monod-Institute of Fundamental Biology in Paris, Albert Einstein-Institute for Gravitational Physics in Hannover/Potsdam, and so on. As to Biology, suffice it to say that the dominant spirit in almost all university departments of Biology is materialistic, and as such opposed to any religious belief.

To the spirit dominant in natural sciences, one has to add their influence in the life of society. The technological results of the natural sciences, their influence on economy, finances and politics make them a focus of public interest. No wonder that in almost every country exist journals for the popularization of science such as “Scientific American”, “Science” and their translations in other languages plus the home-production of such journals. There are also TV-series such as “BBC-CrowdScience”, and on many products one can find a remark like “scientifically tested”. In comparison to that, initiatives for the “popularization of Religion” have great difficulties. It is not at all exaggerated to say that our western civilization is more and more a scientific-technological one and lesser and lesser a philosophical-religious one.

After this first overview, let us define our way to answer the question ‘Why is it not so easy for a present-day physicist to be genuinely a Christian?’ The first element is that we confine ourselves to *Physics*. The second step of defining our way to answer the question is to *not* focus on *persons* and their beliefs, but on *doctrines* and their harmony or lack of harmony. That means for the answer to our main question “Why is it not so easy for a present-day physicist to be genuinely a Christian?” that we disregard personal attitudes, which might have grown out of personal life circumstances. We are looking for a non-individual, theoretical reason, why it is not so easy... In fact, the focussing on doctrines makes it easier to single out precisely one aspect in which both branches of knowledge – Physics and Catholic Theology – *should be* in harmony with each other. The fact is that they *are not*. Accordingly, an individual physicist would have to host in his mind two doctrines that are somehow opposed. So, we will focus on the question, why Physics and Catholic theology are not in harmony in the area, where they should be.

Focusing on doctrines and their relationship means also that the particular physical problems are only important insofar they substantiate the methodology of Physics in a particular case. Therefore, the theory of Big-Bang, the question of the age of the Universe, the age of the Earth, the formation of galaxies and our planetary system, and others are secondary. Likewise, comparisons with particular statements of the Bible, such as the details of the Flood, are of no interest in our context. Also historical questions like the Galilei-affair are irrelevant. Our task is really centred on the present day state of doctrines and their methodological properties.

The third and last step of defining the way of answering our question is to determine *where* precisely Physics and Catholic Theology should be in harmony. (Please remember: what will be said here in the name of Catholic Theology, is acceptable, with the possible exception of *natural theology*, for Orthodox and Lutheran Theology as well.) Now, the point of harmony cannot be God, for Physics does not speak about God. The point of harmony cannot be either the particular laws of nature, for Theology does not deal with them. Yet, Theology speaks about the things of our world in a way that can be labelled as ‘common sense’ *plus* the concept of creating. ‘Creating’ lies outside our experience, but is linked to Common Sense by precisely the way of reasoning that is called ‘natural theology’.

A more philosophical name for ‘common sense’ is ‘Natural Realism’. It refers to the way of thinking that can be found everywhere throughout antiquity until the high Middle Ages. Thereafter it is confined to the philosophical traditions which have maintained that way of thinking such as Aristotelians, Thomists, also a certain group of Phenomenologists, to mention the main currents. On the other hand, Rationalists and Empiricists, Kantians and most Analytic philosophers would group themselves more or less apart from Natural Realism.

In the following we explain the relevant details of speaking about the material things of our world, as is done in Physics. Taking into account that Physics has grown out from the old philosophy of nature, which in turn “moves” within Natural Realism, we outline also the basic features of Natural Realism. Then we examine briefly also the Catholic view of how Christian revelation speaks about material things (II). In a nutshell, the result will be

that the mindset of Physics is not in harmony with that of Natural Realism, but the mindset of Natural Realism is in harmony with the mindset in Catholic Theology, when the latter speaks about our material world. This means that we have already answered somehow the initial question of “Why is it not so easy for a present-day physicist to be genuinely a Christian?”

But we have to take into account another fact not yet mentioned: there is a pressure on Theology, understood as a discipline that expounds Christian revelation. That pressure is exercised by people who seem to be convinced that Science has the stronger arguments (III.). Such a pressure is unjustifiable and we have to consider, therefore, also what can be done in order to diminish that pressure. It turns out that this task must be, and can be, carried out in the mindset of Natural Realism. The result would be a philosophical control of the methodical losses of Physics performed in order to match material things with mathematical models. This would be a substantial contribution to bringing Physics back into harmony with Catholic Theology (IV.), so that only a Physics equipped with that control is an adequate discussion partner for Theology.

1. State of affairs: Physics, Philosophy, Theology

1.1. Physics

In our context, the key words are *success*, *model* and *reductionism*. The *success* of Physics is known to everybody: from the simplest machines like balances and carriages to computers, telephones, nanotechnology and heavy industries, cars, ships, aeroplanes and spaceships. It is quite understandable that many people are fascinated by such achievements. Accordingly, it is understandable that a whole civilization is built on technology which, in turn, is based on science. Therefore, industry, economy, even military defence have deeply shaped our mindset.

On a more directly scientific level, should be mentioned the two great theories of the 20th century: the theories of Special and General Relativity, on the one hand, and the Quantum theory, on the other. Here are some key words that accompany these theories: the equivalence of mass and energy, which is at the root of atomic bombs (by both fission and fusion), the equivalence

of heavy and inert mass, gravitational waves, for the theories of Relativity. And for Quantum theory, atomic spectra, superconductivity and suprafluidity, elementary particles and their the so called electromagnetic, weak and strong interactions. The chain of successes can be expected to continue.

Now, what is the key to such successes? The answer consists in one concept expressed in two words: mathematical models. Here we have united in one concept both the greatness and the limitation of Physics. The greatness has just been sketched by some successes. Let me illustrate, by means of the definition of model, the limitation. The definition of model stems from the physicist Heinrich Hertz (1857–1894), who could even be called the father of the concept ‘model’. He relates external objects and certain mental (internal) images and imposes furthermore a certain condition on those images. He wrote his definition about 120 years ago, but the central idea continues also nowadays being the same: “The most direct, and in a sense the most important, problem which our conscious knowledge of nature should enable us to solve is the anticipation of future events, so that we may arrange our present affairs in accordance with such anticipation. In endeavouring thus to draw inferences as to the future from the past, we always adopt the following process. We form for ourselves images [*innere Scheinbilder*] or symbols of external objects; and the form which we give them is such that” – now comes the first key passage – “the necessary consequents of the images in thought are always the images of the necessary consequents in nature of the things pictured” (Hertz, 1899, p. 1).

Here we have clearly expressed the motivation for making models: to predict events or processes. And to predict not just in order to know, but in order to be able to act now in prevision of what is going to happen later. It is this what makes possible machines, because if future events can be controlled by making suitable arrangements in the present moment, you can let the process doing its work “alone”, because you already know the result. In other words, the most interesting property of Physics is, in Hertz’s eyes, that it can produce practical results, not just knowledge. After having introduced the notion of model, he goes on mentioning some of these properties, among others the following: “The images which we here speak of are our conceptions of things. With the things themselves they are in conformity in *one* important respect, namely, in

satisfying the above-mentioned, requirement. For our purpose it is not necessary that they should be in conformity with the things in any other respect whatever. As a matter of fact, we do not know, nor have we any means of knowing, whether our conceptions of things are in conformity with them in any other than this one fundamental respect” – and here comes the second key passage – “The images which we may form of things are not determined without ambiguity by the requirement that the consequents of the images must be the images of the consequents” (Hertz, 1899, p. 2).

Altogether, physical models are considered to be not uniquely determined by the material reality they are supposed to picture. Therefore, they also reflect the genius of the model maker and not only the reality of the material things involved. The model of a process is successful in the sense that it predicts the development of that process.

Even though Hertz does not mention it, the experimental practice shows without exception that prediction is possible only up to a relative precision. This relative precision can be good, high or even excellent. ‘Relatively precise’ can mean ‘exact with a margin of 2% deviation’, or of 0.2% deviation, or of 0.02% deviation – but of a deviation anyway. Relative precision can vary over a range and, thus, is not identical with truth. A model’s success might be true, but that does not mean that the model is true. The reason is that it does not make sense to say that a model is ‘more or less true’ or ‘true within certain margins’.

The bifurcation between truth and success (allowing for little deviations) makes that understanding a model is not the same as understanding the corresponding natural things. It is not possible to substitute success for truth or vice versa. Instead of one criterion for judging a discourse in Physics, one has now two criteria which never coincide. Because of that gap, the epistemological climate of Physics becomes “foggy” or even dark. It can only be brightened up when one achieves an understanding of the link between natural things and the pertinent model that goes beyond the category of success.

To the “darkening of the epistemological climate” of physics exists another contribution stemming from abstractions, idealizations and simplifications. They are very often carried out in order to make the models manageable in a practical way. It is the stated intention to leave the “main effect” untouched, the

latter being judged according to the rules of art, from the perspective of existing models. Of course, this does not change the reality experienced, but only the model from the physicist's side. In other words, the reality is *independent* of the model. Nevertheless, the abstractions, idealizations and simplifications make that the full reality must be described with fewer elements. The incompleteness emerging here may then be bridged by hypotheses. Precisely this is the additional darkening of the epistemological climate.

The idea of making models is not only supported by the desire of being able to arrange our present affairs in accordance with a model that anticipates the consequences of present actions. The philosophical tradition shaped by Immanuel Kant (1724–1804), in particular its epistemological aspects, is very likely to have supported the making of models, because it claims that knowledge of natural things stems, by and large, from man himself. In order to substantiate that, we need only recall some key quotations from Kant's *Critique of Pure Reason*: "Although all our knowledge begins with experience, that doesn't mean that it all comes from experience" (Kant, 1787, B1). For "[t]he order and regularity in appearances, which we call Nature, are put there by ourselves. We could never find them in appearances if it weren't that we, or the nature of our mind, had first put them there" (Kant, 1781, A125).

And a little bit later, another reference to the *copernican turn*: "Even though it might seem counterintuitive, the understanding isn't a mere power of formulating rules through comparison of appearances; it is itself the lawgiver of Nature. It's only through the understanding that Nature exists at all!.. Nature is the synthetic unity of the manifold of appearances according to rules. And appearances can't exist outside us – they exist only in our sensibility. Thus, Nature (...) is possible only in the unity of self-awareness" (Kant, 1781, A127).

In fact, it is known from Hertz's diaries that he was an avid reader of Kant's writings. The same is true with respect to Einstein. Therefore, it is likely that their views in Physics were influenced by Kant's thinking. It is not surprising, then, that the epistemological climate in Physics in general has become increasingly Kantian. This leads to a sort of exchange of roles: it is not any more the real world only that determines the properties of the model, but it is the model that increasingly determines what the real material

world should be like. The genius of the model maker becomes more and more important.

This change is reflected in the concept of ‘theory-ladenness of experience’ which, in our context, can be characterized by saying that the experiences or observations are affected by the theories held by the observer or experimenter. This idea – although not the word – is contained in the following text, written by Karl Popper (1902–1994) in 1935: “Even the careful and sober testing of our ideas by experience is in its turn inspired by ideas: experiment is planned action in which every step is guided by theory. We do not stumble upon our experiences, nor do we let them flow over us like a stream. Rather, we have to be active: we have to ‘make’ our experiences. It is we who always formulate the questions to be put to nature; it is we who try again and again to put these questions so as to elicit a clear-cut ‘yes’ or ‘no’ (for nature does not give an answer unless pressed for it). And in the end, it is again we who give the answer, it is we ourselves who, after severe scrutiny, decide upon the answer to the question we put to nature” (Popper, 2002, p. 280).

A contemporary voice confirms that the idea of theory-ladenness of experiences continues being influential. The following passages stem from Stephen Hawking (1942–2018) and represent, by and large, the mindset of the overwhelming majority of physicists. The two first paragraphs show, how models might carry the model maker from the observed “real reality” away to a theory-shaped reality, i.e. to theory-laden observations. The last sentence shows that it is only a small step from the theory-ladenness of observations to the theory-createdness of observations.

A contemporary voice confirms that the idea of theory-ladenness of experiences continues being influential. The following passages stem from the late Stephen Hawking (1942–2018) and represent, by and large, the mindset of the overwhelming majority of physicists. The two first paragraphs show, how models might carry the model maker from the observed “real reality” away to a theory-shaped reality, i.e. to theory-laden observations. The last sentence shows that it is only a small step from the theory-ladenness of observations to the theory-createdness of observations: “There is no picture- or theory-independent concept of reality. Instead we adopt a view that we call

model-dependent realism: the idea that a physical theory or world picture is a model (generally of a mathematical nature) and a set of rules that connect the elements of the model to observations” (Hawking, 2010, p. 42) The author continues: “According to the idea of model-dependent realism... our brains interpret the input from our sensory organs by making a model of the outside world. We form mental concepts of our home, trees, other people, the electricity that flows from wall sockets, atoms, molecules, and other universes. These mental concepts are the only reality we can know. There is no model-independent test of reality. It follows that a well-constructed model creates a reality of its own” (Hawking, 2010, p. 172). “Your reality depends on the model you employ” (Hawking, 2010, p. 175).

Now, if models were only meant to construct machines or bring about other products of engineering, the ranking of success before mere knowledge would be perfectly legitimate. It is really astonishing how successful this method work, even after all the severe interventions of the physicist, which we have pinpointed so far with the concepts of ‘success’ and ‘model’. Some explanations about reductionisms will follow in due course. Engineering and Creation are not at all at odds; on the contrary, the manifest reality of engineering convincingly show, how well the Creator has formed material things and the genius of the human mind. That situation would not only be compatible with, but part of Common Sense or Natural Realism. In fact, the first passage of Hertz quoted seems to point precisely to that direction (of practical possibilities). However, the second passage of Hertz quoted reflect clearly the skepticism inherited by Kant and, therefore, seems to claim that natural things are just precisely that what the model says they are.

In other words, if the models are claimed to tell how things really are, then it is obvious that the question is not about engineering, but about man’s relationship to reality at all. And this is a philosophical stance. Therefore, it is necessary to sharply distinguish between the point of view of engineering, on the one hand, and of philosophy, on the other. As a matter of fact, the dominating mindset among physicists and in society in general is inclining to conflate or mix the engineering stance with the philosophical one and say: Because a model is successful, it must be true. This opinion is not limited to

professional physicists, but spreads through school education and the many programmes for the popularization of science to all members of society. However, such a mindset has little to do with Common Sense.

Now, what about *reductionisms*. the third key word in the context of the intellectual climate of Physics? Here, the practical character of Physics plays a dominant role, because reductionisms determine, above all, the performing of experiments. Physics relies on experiments in order to substantiate the success of a model. At the same time, the design of experiments needs more and more sophisticated models. Here we have a sort of self-consistent circle, where theoretical and practical elements form an inseparable amalgam. The history of Physics shows that such a self-consistent circle is rather stable, while compatible with development and even major “paradigm shifts”. But not even such “paradigm shifts” have substantially altered that being interwoven of theory and experiment, so that it seems almost impossible to crack that circle and to attempt a sort of internal reform of Physics.

Now, what about reductionisms, the third key word in the context of the intellectual climate of Physics? Here, the practical character of Physics plays a dominant role, because reductionisms determine, above all, the performing of experiments. Physics relies on experiments in order to substantiate the success of a model. At the same time, the design of experiments needs more and more sophisticated models. Here we have a sort of self-consistent circle, where theoretical and practical elements form an unseparable amalgam. The history of Physics shows that such a selfconsistent circle is rather stable, while compatible with development and even major “paradigm shifts”. But not even such “paradigm shifts” have substantially altered that being interwoven of theory and experiment, so that it seems almost impossible to crack that circle and to attempt a sort of internal reform of Physics.

In all branches of Physics, the experimenter shapes in six intertwined ways the performance of an experiment:

1. The experimenter chooses two material things. By doing so, he gives them a preferential position with respect to the rest of the world. At the same time, he assigns them the functions ‘object’ and ‘experimental apparatus’ in an experiment to be carried out by him. In doing

so, he chooses between two alternatives by determining which of the two sides should be considered the object and which the apparatus. The two possible attributions of ‘object/apparatus’ to the two sides exclude each other, in the same experimental process. Neither the categories ‘object’ and ‘apparatus’ nor the subsequent choice of one of the two alternatives have a foundation in nature. They have their exclusive roots in the interests of the experimenter-investigator.

2. The experimenter puts spatial limits to experiments, even though their real connection with the rest of the world continues unaltered. But that real connection gets lost in the theory.
3. The experimenter stops his intervention by his own initiative. Only this makes possible a result, though at the expenses of separating it from the “ongoing flow of nature”.
4. The experimenter mentally isolates part of the experiment from the whole, i.e. the result, by abstracting from the process the termination of which brings about that result. Exceptions are instantaneous processes (particle decays and -reactions), because there the process is identical with its result.
5. The experimenter almost entirely abstracts from the apparatus after having used it by attributing the result to the object only instead of equally to both sides. This has no foundation in nature, but exclusively in the experimenter-investigator’s interests.
6. The experimenter weakens the relevance of the observations concomitant to the experiment and often replaces experiences by results of experiments (e.g., the colours seen by wave lengths measured). Through the concomitant observations, it is known that the reductionisms (i) – (v) are precisely this: reductionisms.

None of the experimenter’s six interventions corresponds to anything in nature. The results of investigation obtained under such conditions do not refer to the true nature, but rather to its reductionist picture. The reductionist picture is successful, but not true, rather a lack of truth. In a nutshell: the major part of abstractions and rearrangements consists in (a) mentally cutting off

the two sides of an experiment from the “rest of the world” and (b) abstracting from the apparatus after having read off a result and attributed it to the object alone. This unequal treatment is an infraction of the equal situation of both object and apparatus in reality. At first sight, the six interventions seem to add something to the true picture of nature. But in reality, all these interventions cause losses in the knowledge of material reality. They give rise to section IV, which addresses the question of how these losses can be somehow controlled. More details can be found in (Larenz, 2013; 2017; 2019).

The influence of the key words ‘success’, ‘model’ and ‘reductionism’ on the intellectual physiognomy of Physics can be summarized as follows:

1. Physics is not aiming at truth, but at success. Nevertheless, the success is a true one.
2. In order to achieve that success, Physics does not focus on real material things, but fabricates abstract models of those material things. Such models are not uniquely determined and, thus, more or less hypothetical. Additionally, these models abstract from the major part of reality in order to investigate the remains. Furthermore, they use to make major simplifications. These abstractions and simplifications are losses for the pretended knowledge of material realities, i.e. they make impossible to achieve a full knowledge of what material things are and why and how they behave as they do. In other words, they are reductionisms.
3. The hypothetical character of those models as well as their lack of correspondence to the material reality prepares the way for an ever increasing skepticism.

The success of the reductionisms might easily make this assessment look too negative. But precisely the success is obtained at the expenses of truth, and it is not at all proven whether renouncing of the reductionisms would not yield the same, if not more, success. As has already been mentioned in the preview, Physics has grown out from the old philosophy of nature, which in turn “moves” within Natural Realism. This is why we are going to outline also the basic features of

1.2. Natural Realism

Representatives of Natural Realism are Aristotle, Thomas Aquinas, and their disciples through the centuries. One should leave aside, however, those who call themselves either transcendental or analytical Aristotelians and Thomists. The reason is, to my mind that, on the one hand, transcendental philosophers like Kant have made a “critical turn” *away* from natural Realism. On the other hand, analytical philosophers have made what they call a “linguistic turn” which, by and large, passes by sense experience without ruling it out by seeing thought and language in a tight parallel: “The basic tenet of analytical philosophy, common to such disparate philosophers as Schlick, early and late Wittgenstein, Carnap, Ryle, Ayer, Austin, Quine and Davidson, may be expressed as being that the philosophy of thought is to be equated with the philosophy of language; more exactly: (i) an account of language does not presuppose an account of thought, (ii) an account of language yields an account of thought, and (iii) there is no other adequate means by which an account of thought may be given” (Dummett, 1981, p. 39).

It is important to note that Natural Realism is more comprehensive than any particular consistently formulated building of metaphysical thought, like what we encounter in Aristotle’s thought of the metaphysical categories of *substance* and *accidents*, and the principles of *act* and *potency* that are encountered, for instance, in the hylomorphic structure of material things. Or what we encounter in the thought of Thomas Aquinas, who formulated a sort of synthesis of the Aristotelian metaphysical view with the notion of *participation* inspired by Plato. Conversely, Natural Realism cannot be defined by placing it into a more comprehensive category of human knowledge. The reason simply is, that Natural Realism itself does not exclude any sector of human knowledge. Accordingly, Natural Realism can be described somehow by saying that it does not put any preliminar condition to philosophical inquiry and is careful to not leave out anything that comes before the mind’s eyes.

There are many philosophers, who follow, to one degree or another, the spirit of Natural Realism. Perhaps the most important reason for this is that a person normally is brought up in the mindset of Natural Realism without his

parents need to make any decision to do so. That is to say that Natural Realism is not just one philosophical position besides others that can be chosen from a philosophical no mans land. It has a priority, not only in a temporal sense, but also in the sense of being present in any philosophical position. Even if somebody turns away from this connatural intellectual stance, her or she must decide to do so and, despite of that, can never completely leave Natural Realism. The philosopher Nicolai Hartmann (1882–1950) is an example, insofar he adhered during the first part of his philosophical career the Neo-Kantian school of Marburg, but then left it in order to embrace a position which is close to, though not identical with Natural Realism (Hartmann, 1965, p. 133–135).

The most characteristic feature of Natural Realism is that a person living within the spirit of Natural Realism is convinced, without a need of decision, that he or she perceives and understands something real, i.e. independent of him or her. In doing so, he or she becomes aware of the own perceiving and thinking. Therefore, a natural realist is also convinced, explicitly or implicitly, that he or she does not primarily perceive own perceptions of the senses and does not primarily think own thoughts. He does not need to fabricate representations of what he thinks might stand behind his perceptions and thoughts – the “outer world”. A natural realist is in intimate contact with what he comes to call reality, based precisely on that contact.

From what has been said about Physics and Natural Realism, it follows that the mindset of Physics and the mindset of Natural Realism are distant from each other like models of natural processes are distant from the same processes as perceived by an observer. However, the situation becomes complicated insofar models have their place in Natural Realism, if they serve a practical or technological goal, while they have no place at all in Natural Realism, if they are meant to mentally replace the perceived or experienced reality. Both aspects are not completely separable, which makes that the mindsets or intellectual climates of Physics and Natural Realism are at odds in principle, albeit to a variable degree, depending on whether a particular topic is more practical or more theoretical.

1.3. Theology

Except the short remarks in the introduction, no reference has been made to the question of whether and how the lack of harmony between the epistemological climate of Physics and that of Natural Realism has an effect on a professional of physics, if he happens to be a Christian. The core of the following considerations is that Christian revelation *backs up* Natural Realism. Therefore, if Physics is at odds with Natural Realism, it is also at odds with all that backs up Natural Realism, and with Christian revelation in particular. As a consequence, Physics is also at odds with Theology, understood as the discipline that expounds Christian revelation. The following considerations try to explain why and how Christian revelation backs up Natural Realism.

Christian revelation and, thus, Christian Theology focuses on God and on man and the world insofar they are related to God. That means before anything else, that man and the world are created by God, and it belongs to Theology to make it explicit that Creation is an exclusive action of God. From this point of view, Theology also speaks about the same material things, which Natural Realism and Physics are dealing with. Natural Realism does it in a way open to philosophy of nature, and Physics by investigating what is called laws of nature. In other words, Theology, Natural Realism and Physics have a common object, which they deal with in qualitatively different ways.

From the perspective of Theology, Natural Realism and Physics are kinds of knowledge of certain created things. These two branches of knowledge are acquired by humans, i.e. other creatures, by their own cognitive capacities. Theology, in turn, is a knowledge, “hosted” by human creatures as the two others, but essentially, though not exclusively, based on the Creator’s revelation. It refers to both the Creator and His creatures, in particular, material things. Therefore, the *theological* knowledge about the common object (material things) is qualitatively different from the knowledge acquired by Natural Realism and acquired by Physics. Also the two latter are qualitatively different from each other.

A simple instance for these differences is the analysis of material things, from the point of view of philosophy of nature, as things that possess certain

qualitative and quantitative properties, from the point of view of Physics as things the properties of which obey certain laws of nature, where these laws involve certain quantities that can be subjected to experimental scrutiny, in particular to measurement. Theology, in turn, speaks of material things and their properties as created. Obviously, no contradiction arises so far. The situation seems to change if one takes into account that Christian revelation makes historical assertions that involve material things (age of the Earth, the Flood). These historical assertions might be, and are, considered as related to certain laws of nature. But even though here have arisen the well known perplexities, it is difficult to interpret them as sharp contradictions.

Nevertheless, scientific knowledge and theological knowledge have been considered to be at odds with each other, and that for a longer time. The reason is that scientific knowledge can claim to be verifiable, while the historical parts of theological knowledge rely, as all theological knowledge, on the authority of the revealing God. Obviously, here is a source of difficulties for a dialogue. But this situation also urges to investigate what is really going on. From the theological point of view, the source of theological knowledge, i.e. God himself, does neither err nor deceive nor change. Therefore, the conclusion seems to be unavoidable that any at odds – situation between theology and scientific knowledge is due to the latter.

However, things are not that simple. At this point, the distinction between Christian revelation and Theology that expounds it, is relevant. As the Galilei controversy shows, theology cannot be entirely equated with Christian revelation. On the one hand, God uses, during a certain period, human means in order to convey his revelation to humans, and this revelation remains fixed in history. On the other hand, Theology is made by humans, who are children of their time and culture. In other words, in trying to expound God's revelation, theology certainly relies on the perennial tradition of language, general historical knowledge and human wisdom. But besides these necessary elements, theology is always influenced by temporal elements that arise in a given epoch and might fade away centuries later. Therefore, the conclusion suggested in the previous paragraph about the cause of at odds – situations between theology and scientific knowledge does not seem to be so clear.

In order to explore the situation in more detail, we propose three things:

- (i) leave aside all sort questions about historical or otherwise individual material things or events;
- (ii) leave aside all Natural Sciences except Physics, and
- (iii) take into account what has been said above about ‘reductionisms’ in Physics.

In fact, every attempt to amend the relationship between Physics and Theology will have to address those reductionisms. This yields a sort of strategy, which is ultimately based on the difference that Physics has a picture of material things thanks to certain reductionisms, while Theology does not make such reductionisms at all. In other words, they have not any longer the same object, which severely limits the possibilities of dialogue.

After having sketched the relationship between Physics and Theology, we should do the same with Natural Realism and Theology. First of all, it calls attention that the biblical text contains notions such as *Creator, God, create, image* (Gen 1: 26.27), *Soul, Angel, Bread of life, living Bread, Holy Spirit, Father*, and many others. They are not isolated pieces like a foreign body in a living organism, but semantically and inseparably interwoven with the surrounding text made of every-day’s language. Even much more: on every page, the mystery of God shines through in an unspeakable way. Furthermore, there is an analogical meaning of material things for the Kingdom of Heaven (for instance the pearl, the treasure, etc., cf. Mt 13) as well as, for instance, the sacramental meaning of water in Baptism. Altogether, there exists a most intimate co-presence of natural language and reality and biblical-theological language and reality. One might say that the use of human means of communication is a sort of “natural” way God has chosen to *reveal* himself.

Another important point must be stressed: the God of Christian revelation is the God of truth and, thus, of intrinsic intelligibility. The Old Testament precedes God’s self-revelation through His Son (Hebr 1: 2), and the New Testament follows this self-revelation, which was already prepared in the Old Testament (cf. Lk 24: 27; Jo 5: 39). Furthermore, the Son indicates as reason for that He calls the apostles ‘friends’ that He has made them know *all* that He

has heard from His Father (cf. Jo 15: 15; Mt 11: 25). And the Son promises the assistance of the Holy Spirit, the Spirit of truth, who will bring to their remembrance all that He has said to them (cf. Jo 14: 17; 15: 26.27; Jo 16: 13). The triune God is the God of truth, communication and transparency.

On the other hand, ordinary language and the philosophical stance that belongs to it, namely Natural Realism, carry the insight that natural things possess an intrinsic intelligibility. Therefore, Natural Realism extends to any other sort of (purely human) knowledge and cannot be left behind in order to step over, for instance, to an artificial language and a purely immanent representation of what the subject conceives as real. Taking into account that God uses ordinary human language in order to convey His revelation, it follows that Christian Theology and Natural Realism are intimately related with each other. Both cannot be separated from each other.

Notice that the intelligibility first belongs to the objects of the domain of knowledge in question. However, as the term ‘intelligibility’ refers also to the mind that “hosts” the knowledge in question, the notion of intelligibility refers inseparably to both object and subject of knowledge. Here, the object has a logical priority: the mind can have an insight into the object, because the object is intelligible. All these are insights of Natural Realism.

Altogether, the considerations of the first part of this section II yield that Physics does not harmonize with Natural Realism, even though the latter remains somehow present in Physics. On the other hand, Natural Realism is in harmony with Christian Theology, even though natural language and Realism, on the one hand, and biblical-theological language and reality, on the other, are not identical, because the latter’s object is larger. All this provides an answer to the question formulated at the beginning of the subsection II.3 Theology, namely whether and how the lack of harmony between the epistemological climates of Physics and Natural Realism has an effect on a professional of physics, if he happens to be a Christian. It does have an effect, which is that Christian revelation corroborates the gap existing in the same person’s mind between the epistemological climates of Physics and Natural Realism. This is rather detrimental than anything else.

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Before dealing with the question of how to react to this finding, three pertinent statements of the Magisterium of the Catholic Church might be quoted for supporting the view of the relationship between Christian revelation and Natural Realism just proposed. The first statement stems from the Encyclical *Fides et ratio* (FR, 1998) by Pope John Paul II. In the final part of this document, the Pope encourages scientists, to do their science within a “*sapiential horizon*” (FR 106, 2). While it is not made explicit in that passage, what precisely this sapiential horizon is, it is clear that natural sciences are situated within such a horizon, which excludes the alternative that natural sciences themselves constitute such a sapiential horizon.

Now, the text of *Fides et ratio* as a whole presents a positive view of the human capacity of insight, which means above all other things a metaphysical knowledge, and a metaphysics of being. It is worth while noting that *Fides et ratio* uses the term ‘metaphysics of being’ and its equivalents 23 times (Knasas, 2000). This is why scholars have qualified this Encyclical as the first document of the Magisterium that does not only recommend that philosophers and theologians draw their leading ideas from a realist philosophy (and theology) in general and that of Thomas Aquinas in particular but, specifically, by a realist metaphysics. Therefore, it can be concluded that Natural Realism is the main piece of the sapiential horizon mentioned in FR 106, 2. In other words, it is Natural Realism that should be the philosophical frame for the natural sciences. As we have seen, at present it is not.

The second magisterial statement consists of three passages taken from the address of Pope John Paul II on 23.4.1993, shortly after the publication, by the Pontifical Biblical Commission, of the document *The Interpretation of the Bible in the Church*. One of the main ideas of the address is the “harmony between Catholic exegesis and the Mystery of Incarnation” (section 2). Among the passages relevant for the relationship between Theology and Natural Realism are, above all, the following three. In these passages, the expression ‘human language’ should be understood as parallel to ‘Natural Realism’: “The God of the Bible is not an absolute Being who, crushing everything

he touches, would suppress all differences and all nuances. On the contrary, he is God the Creator, who created the astonishing variety of beings “each according to its kind”, as the Genesis account says repeatedly (Gen 1). Far from destroying differences, God respects them and makes use of them (cf. 1 Cor 12: 18.24.28). Although he expresses himself in human language he does not give each expression a uniform value, but uses its possible nuances with extreme flexibility and likewise respects its limitations. (...) None of the human aspects of language can be neglected” (No. 8). And on the other hand: “The Sacred Books cannot be likened to ordinary writings, but, since they have been dictated by the Holy Spirit himself and have extremely serious contents, mysterious and difficult in many respects, we always need, in order to understand and explain them, the coming of the same Holy Spirit, that is, his light and grace, which must certainly be sought in humble prayer and preserved by a life of holiness” (no. 9).

These statements acquire their full weight by the parallelism between that the Son of God has become man, on the one hand, and that God’s revelation is expressed in human language, on the other. This is how John Paul II puts it in the same address: “The strict relationship uniting the inspired biblical texts with the mystery of the incarnation was expressed by the Encyclical *Divino afflante Spiritu* in the following terms: “Just as the substantial Word of God became like man in every respect except sin, so too the words of God, expressed in human languages, became like human language in every respect except error” (EB, 559). Repeated almost literally by the Conciliar Constitution *Dei Verbum* (13), this statement sheds light on a parallelism rich in meaning” (no. 6).

The third statement is more specifically Catholic, for it concerns the assertion that a natural theology is possible. The formulation of the First Vatican Council’s Dogmatic Constitution *Dei Filius* is short: “The (...) Church holds and teaches that God, the beginning and end of all things, can be known with certitude by the natural light of human reason from created things, “for the invisible things of him, from the creation of the world, are clearly seen, being understood by the things that are made” (Rom 1: 20)” (Denzinger-Hünemann, 1991, no. 3004). This sober assertion can be circumscribed in a somewhat narrative manner by saying that Christian Revelation gives to

understand that it is *possible* that a healthy person, who has got normally developed cognitive capacities, but lacks even the faintest idea about Christianity, is able to come, by his or her own intellectual resources, to the following insight: it is adequate to shape a proper *concept* for expressing the innermost state of the things of this world. If that person would encounter later the real Christianity, it would become clear to him or her that that *new concept* is equivalent to ‘creation’ or ‘create’, and that the inference to the existence of a Creator is true. It must be specified that the Church does *not* say that the possibility *has* or *will* become reality. It is rather a statement about the harmony between our world’s being created and its intrinsic intelligibility, on the one hand, and the human mind’s cognitive capacities, on the other.

Most probably, theologians like Karl Barth would deny the possibility of such a natural theology. We need not go into details here, because we are *not* concerned with natural theology. But the Catholic position somehow supports what has been said so far about the *should be*-relationship between Christian Theology, Natural Realism and Physics. Such a corroboration goes like this: the possibility of a natural theology allows the conclusion that the laws of nature are not necessarily a product of the model maker’s genius, but might well stem from just those material things the behaviour of which they describe. This does not exclude a *contribution* of the model maker’s genius, but it is not the essential part.

It is as if Christian revelation said: “it is almost “forbidden” to use the Bible as a source of scientific information. While the Christian revelation has very little to offer with respect to the particularities of the laws of nature, it has very much to offer with respect to the intelligibility of the things of this world and the human mind’s cognitive capacities. It is as if Christian revelation gave to understand: “scientists, trust your eyes and your mind! Through them you are in contact with reality!” It encourages somehow to not ultimately rely on reductionisms, but to trust that the full material reality will disclose itself to the human mind. This corroborates a mindset that tries to assimilate that reality, rather than to intervene by introducing reductionisms. Others than Christians do not know that, and they more easily assimilate less critically the intellectual climate which they are born into.

Taking both sections I and II together, one can say that: First, present day Physics essentially involves models for prediction, at the cost of making severe reductionisms. Models and reductionisms are bound together by the requirement of success, but they reduce the intelligibility of the processes investigated. This has led physicists to be rather sceptical about the intelligibility of material things. Second, Natural Realism tries to avoid all sort of reductionisms in order to do justice to the whole reality. Third, Christian theology supports Natural Realism by asserting the intelligibility of material things and the human mind's capacity of insight. Therefore, the "intellectual climates" of physics, on the one hand, and of Natural Realism and Catholic Theology, on the other, do not match. This situation is not at all satisfactory, and attempts to amend it are more than desirable.

Unfortunately, the pertinent public discussions persistantly ignore that knowledge depends of the intelligibility of the object of knowledge. Intelligibility is inherent to any reality whatsoever that can be known by a human mind. In the particular case of the common object of Physics and Theology, namely all material things, the intelligibility of these things "shows up" in both of Physics and Theology, modulated by the method and procedures of each of them. Admittedly, this is a difficult philosophical topic, and it might seem easier to focus on particular questions such as the age of the Universe, the beginning and development of the Universe, the age and development of the Earth and the historicity of the Flood.

But before these problems can be properly addressed, it is necessary to make sure that both Physics and Theology refer to the same object without reductionisms and with a common view of the object's intelligibility. Obviously, this would require a Physics without reductionisms. This would most probably put in quarantine the true successses of Physics as it is done to date, which is not really desirable. Instead, one could envisage a Physics enriched with a sort of metatheory where the reductionisms are absent from the very outset. This possibility offers a new assessment of the curious fact that Theology is urged to assimilate scientific ways of thinking. As this sort of pressure on Theology is not any longer a minor phenomenon, we will briefly address it in the following section III, before we return to some details of the idea of enriching Physics in section IV.

2. The pressure on Theology

In order to substantiate the claim insinuated in this section's title, we essentially present some titles and quotations from different authors. Although the phenomenon involves all natural sciences, we limit ourselves to quotations related to Physics. Titles and quotations are so eloquent that, for our purposes, a detailed evaluation seems to be unnecessary. Taken together, they give to understand that Christian Theology and Physics do not only relate to each other in an unharmonious way, but that there is a sort of pressure on theologians exercised by physicists in the name of Physics in order to get Theology adapted to the mindset of Physics.

In fact, one finds countless publications with titles that express in one or other way the wish to introduce the intellectual climate of natural science into Theology. Take, for instance, the title *The Hidden Face of God. Science Reveals the Ultimate Truth* (Schroeder, 2002). A major title in this context is *A Scientific Theology* in three volumes dedicated to, respectively, 'Nature', 'Reality' and 'Theory'. Its author is the Anglican theologian and former biophysicist Alister McGrath. It is not a text book of dogmatic or moral theology, but presents an attempt of bringing together both natural sciences and theology (McGrath, 2001–2003). As the cover text explains, "the first volume sets out a vision for a "scientific theology" in which the working assumptions of the natural sciences are critically appropriated as a theological resource". The cover text continues: "[A]s a whole, *A Scientific Theology* is the most extended and systematic exploration of the relation between Christian theology and the natural sciences ever undertaken". But to make working assumptions is an essential part of the mindset of scientists, much less of theologians.

Another sort of attempt to seek harmony between Physics and Theology consists in the view that object and method of Theology are such that it could contribute to the solution of problems, which (to date) have not, or not completely, been solved by Physics. This stance leads immediately to problem settings like the following: "We investigate the problem whether physics – which is understood here as the most general and most abstract field in science can lead to questions which cannot be answered within the methodological framework of physics alone and which could perhaps be ans-

wered in the context of theology. Many prominent scientists of the 20th century, e.g. Einstein, Jordan, Weinberg, and Hawking have seriously discussed this conjecture. The question (...) will be investigated here first for classical mechanics, in particular with respect to the problem of a complete determinism in the sense of Laplace and its refutation in the 20th century. Second we discuss quantum mechanics with respect to the uncertainty relation, the problem of objectification and the complete loss of classical determinism and its replacement by statistical causality. Third we consider relativity, in particular relativistic quantum cosmology. Here we are confronted with the problem of the origin of the universe, the big bang and the problem of the *creatio ex nihilo*. It was argued very often by physicists and philosophers of science that for a complete explanation of this process a creator of the universe must be presupposed” (Mittelstaedt, 2004, Abstract).

There are certainly more ways of *conflating* both branches of knowledge. On the other hand, there has also been proposed a solution to *avoid* from the outset divergence and possible conflicts altogether. It is the idea of NOMA (= Non Overlapping MAgisteria) proposed by the evolutionary biologist and historian of science Stephen Jay Gould (1941–2002): “The net of science covers the empirical universe: what is it made of (fact) and why does it work this way (theory). The net of religion extends over questions of moral meaning and value. These two magisteria do not overlap, nor do they encompass all inquiry (consider, for starters, the magisterium of art and the meaning of beauty). To cite the arch clichés, we get the age of rocks, and religion retains the rock of ages; we study how the heavens go, and they determine how to go to heaven” (Gould, 2002).

But theology is not only, and not primarily, about moral meaning and value but, above all, about God and His providence for the entire creation. NOMA would deprive God from giving things the laws of nature He esteems convenient. That is to say, NOMA would empty the concept of creation reducing it to mere ‘existence’. That would be a heavy intervention of Science in Theology, which is precisely what NOMA claims it has set out to avoid.

Attempting to bring the mindset of the Natural Sciences to Theology and, conversely, expecting answers from Theology to problems posed by Science, in parti-

cular Physics, and confining Theology to morals and meaning (NOMA) are three ways of influencing Theology from outside towards a direction different from that chosen by Theology itself. They are subtle forms of pressure motivated by success of a Natural Science. In fact, that success is true, but it does not follow that the Science which yields that success is true. Here we find that the difference between success and truth referred to in section II, is the ultimate reason that a pressure upon Theology from Natural Sciences has no foundation.

Not enough with that. Some authors do not hesitate to proclaim a sort of leadership of natural sciences over theology. This claim is first advanced by scientists. Here should be mentioned the view of Ian G. Barbour (1923–2013), who is praised by some people as one of the pioneers of the Science-Theology debate. He was a physicist and became later a protestant theologian: “Science and Religion are considered to be relatively independent sources of ideas, but with some areas of overlap in their concerns. In particular, the doctrines of creation and human nature are affected by the findings of science. If religious beliefs are to be in harmony with scientific knowledge, more extensive adjustments or modifications are called for than those introduced by proponents of the Dialogue thesis. It is said that the theologian should draw from broad features of science that are widely accepted, rather than risk adapting to limited or speculative theories that are more likely to be abandoned in the future. Theological doctrines must be consistent with the scientific evidence even if they are not directly implied by current scientific theories (...) God is not the transcendent Sovereign of classical Christianity. God interacts reciprocally with the world, an influence on all events though never the sole cause of any event” (Barbour, 2000, p. 35).

Surprisingly, the idea of the role of natural science as a “light house” for theology is supported also by *theologians*. This might be substantiated by two quotations; one from the reformed protestant theologian Thomas F. Torrance (1913–2007), the other from the well known Lutheran theologian Wolfhart Pannenberg (1928–2014). First, Torrance with a passage from the General Introduction that appears in every volume of a series initiated by him: “We must now reckon with a revolutionary change in the generation of fundamental ideas. Today it is no longer philosophy but the physical and natural sciences which set the pace in human culture through their astonishing revelation

of the relational structures that pervade and underlie all created reality. At the same time, as our science presses its inquiries to the very boundaries of being, in macrophysical and microphysical dimensions alike, there is being brought to light a hidden traffic between theological and scientific ideas of the most far-reaching significance for both theology and science” (Torrance, 1989 ff., General Introduction).

This is neither a marginal nor an isolated phenomenon. Torrance is one of the 97 foundational members of the *International Society for Science and Religion* (2001; www.issr.org.uk), the founding president of which is the theoretical physicist and later Anglican pastor John Polkinghorne, Cambridge (UK). Other similar institutions are the *Center for Theology and Natural Sciences* (Berkeley, California, www.ctns.org), the *John Templeton Foundation* (West Conshohocken, PA, USA, www.templeton.org), the Michael Faraday Institute for Science and Religion (Cambridge (UK), www.faraday-institute.org), the Ian Ramsey Centre for Science and Religion (Oxford (UK), www.ianramseycentre.info), the European Society for the Study of Science and Theology (ESSSAT, www.esssat.net), the Zygon Center for Religion and Science (Chicago, www.zygoncenter.org). These and several others, of different background, are listed in the Interdisciplinary Encyclopedia of Religion and Science (Rome, www.inters.org/websites).

Torrance’s stance is motivated by theological considerations which we need not examine here. Pannenberg’s theological views may differ from Torrance’s but, for a certain period of his life, he seems to have supported Torrance’s idea of introducing into Theology the concept of ‘field’, which certainly occupies a central position in modern Physics: “To Th. F. Torrance belongs the merit to have called attention – perhaps as the first – to these connections and to have pleaded for introducing the concept of field into theology: “The field that we are concerned with is surely the interaction of God with history understood from the axis of Creation – Incarnation. (...) Our understanding of this field will be determined by the force or energy that constitutes it, the Holy and Creator Spirit of God” (Torrance, 1969, p. 71)” (Pannenberg, 1988, p. 102).

Pannenberg dedicates to the topic of the relationship between Theology and the Natural Sciences, in particular Physics, at least 26 of his 744 publications.

Except one or two previous publications, the first ones appear in the beginning of the 80's and reach their zenith in the 90's (Dienstbeck, without year). Thus, one may conclude that the relationship between Theology and the Natural Sciences is for him an "important secondary topic". A sample of Pannenberg's terminology in dealing with the concept of field is the following quotation (page numbers refer to volume I of his *Systematische Theologie*): "The assertion that the turning of modern Physics to field theories of ever more natural phenomena has an implicit theological relevance is suggested by the metaphysical origin of the concept of field. The idea of a field of forces can be traced through the Stoa back to the presocratics. Insofar as the concept of field corresponds to the old doctrines of pneuma [spirit], it is not at all nonsensical, but rather suggested by the history of concepts and mind, to put into relation the field theories of modern Physics with the Christian doctrine of the dynamical operations of the divine pneuma in the creation. As a matter of fact, such reasons for introducing the concept of field into theology have taken place in the framework of the doctrine about God, namely linked to the interpretation of the traditional way of speaking about God as about a Spirit" (Pannenberg, 1988, p. 101–104). A similar language is used in (Pannenberg, 1996, p. 257–260).

It goes without saying that, for a Christian, such views as those formulated by Barbour, Torrance and Pannenberg are highly problematic. The most important reason for it is that Theology develops in a homogeneous way, because it is based on God-given revelations, and God does neither err nor change over time. Physics, in turn, as any human science, is based on human experience and reason, and these capacities are subject to the possibility of error. and change. As is well known, Physics has experienced several "paradigm shifts".

These quotations may be sufficient to show that *there does exist a pressure on theology*, stemming from the natural sciences. We have limited ourselves to Physics, but also Biology and Chemistry contribute to that pressure. It is hardly deniable that the omnipresent, though not always mentioned motive is the success of the natural sciences. More precisely, it is not these doctrines themselves which act upon each other, but human persons, theologians and scientists, which relate in a personal way to both doctrines and exercise their

influence, according to their personal views and motives, on other scientists and theologians. That interaction between theologians and scientists influences heavily the mindset of the general public. We face that pressure in everyday's life, even become aware of it in our own way of thinking, and witness it in the mindset of almost everybody else.

This pressure on Theology calls for a defence. Such a defence should take place in philosophical and, perhaps, in general physical terms, but not in theological terms. That does not make it impossible that such a defence is backed up by theological considerations, above all in the light of that both Christian revelation and Natural Realism assess the intelligibility of material things in similar terms. Therefore one might wonder whether the need of harmonization of the epistemological climates found in Physics, Natural Realism and Christian Theology would be beneficial for that defence, too. At the end of section II, a Physics has been envisaged that is enriched with a sort of metatheory where the reductionisms are absent from the very outset. In other words, instead of changes in Theology, Physics turns out to be in need of flanking structures that control the systematic losses. Thus it is Physics instead of Theology which should turn into a "site under construction".

3. On the defence of Theology by providing a control of the losses of Physics

In this final section we do not present an elaboration of a control of the cognitive losses of Physics, which arise from its methodical reductionisms. But we pretend to somehow prepare the ground for such an elaboration and add also some considerations about the persons who would do such a work. First of all, the control envisaged at the end of the previous section should take place neither in theological terms nor in terms of physico-mathematical theories, but in terms of philosophical Natural Realism. However, that does not make it impossible that the specific intelligibility of material things leads the philosophical reflection into areas closer to Mathematics and Theology.

One might wonder whether the harmonization of the present epistemological climates found in Physics and Christian Theology envisaged in section II would

also contribute to the control of the cognitive losses of Physics. The reason is simply that, according to section II, a low intelligibility of material things goes hand in hand with the reductionisms in Physics, while high intelligibility of material things goes hand in hand with the absence of such reductionisms. And ‘intelligibility’ is just another word for ‘epistemological climate’. Therefore, the starting point of elaborating the desired control definitely consists in not performing the known reductionisms in Physics from the very outset. Then, one is left with the common experience of our material world and with the task of reflecting on this experience in order to extract further insights.

The considerations of sections II and III make it quite clear that elaborating a control cannot limit itself to minor re-arrangements, so to speak, to *tactical* manoeuvres. It must reach the very foundations. In other words, they must be, so to speak, a *strategical* manoeuvre. Any specification of such a manoeuvre should take into account the two following basic facts:

- Physics depends on the severe reductionisms sketched in section II, while Theology has *no* voluntarily made reductionisms such as Physics.
- Theology can grow, but only in a way that posterior stages are fully consistent with all previous ones. The reason is that a theologians understanding of God’s revelation can grow, but God is always identical with Himself. In contrast, Physics has already undergone several major changes “of paradigm” [the last two: determinism/indeterminism (quantum theory), and the relativity of observer and observed (theories of relativity)]. Therefore, there is no problem at all if Physics would change once more.

In other words, Physics is envisaged to undergo another change of paradigm, namely the change from doing Physics after the reductionisms without any control or estimate of the losses due to the reductionisms to doing Physics after the reductionisms, but together with the light of a control or estimate of the losses due to the reductionisms. With all certainty, the control would represent a pressure on Physics motivated from inside Physics. It remains to be seen, whether a Physics with an estimate of the losses would continue exercising undue pressures upon Theology.

Further considerations about *how* a control or estimate of the losses caused by the reductionisms of Physics could be established, do not belong to our topic. Some ideas one comes across on the way of elaborating such a control have been published elsewhere (Larenz, 2013; 2017; 2019). It goes without saying that such a task does not belong to any Church's mission, but rather to competent professionals. However, given the typical uncertainties of an innovative approach to a difficult problem, the number of such professionals, who in fact would dedicate years and even decades to its solution, is quite reduced.

A final remark goes to the persons who unite in their mind the way of thinking of both Physics and Theology. Christians who happen to be physicists will feel both the difference of epistemological climates and the pressure upon Theology in a more intense way, because difference and pressure stem from their own professional environment. Still more: if a physicist wants to be competitive, he or she must work according to the present-day standards of Physics and, in so doing, somehow *interiorize* the disharmony of epistemological climates.

If he or she is a Christian, the pressure upon Theology inevitably accompanies the professional mindset. In particular, such a physicist is obliged to do the professional work *as if* he or she were convinced that nature is *unintelligible*, while he *is*, by Common Sense (backed up by Faith), convinced that nature *is* intelligible. In doing so, he is creating a certain internal contradiction in his mind and continues maintaining it. In this way, he contributes to perpetuate the spirit of the present standards of Physics, in himself and in his professional environment.

It is true that this situation does not affect in equal degree every single physicist, but the basic situation is nevertheless the same for everybody: for a present day physicist, it is not so easy to be genuinely a Christian, because he or she is, first, burdened by the lack of epistemological harmony between Physics and Natural Realism, which in turn is backed up by Christian revelation. Second, a present day physicist who happens to be a Christian, is exposed to an atmosphere of estrangement from and pressure upon Theology.

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Summary

Natural Realism and Physics are two ways of relating to our material world. This article provides some basic characteristics of both and derives two joined reasons why Physics is, partially, at odds with Natural Realism. The first reason consists in that present-day Physics is based on *models* of reality which involve several severe methodical *reductionisms*. From that derives the second reason, which is the difference of epistemological climates of Natural Realism and Physics. The difference is that *the intelligibility of material things* is esteemed *low* in Physics and *high* in Natural Realism.

Natural Realism suggests that it should be possible to overcome that unsatisfactory state of affairs. As a way to amend the relationship, it is suggested as a goal to elaborate a certain *control* or *estimate* of the methodical losses of Physics due to its reductionisms (as long as Physics does not change its method). This control is elaborated in the spirit of Natural Realism. It is also expected to be helpful for achieving deeper insights within Physics.

The results of a Physics *under reductionisms* do not seem to harmonize with many data offered by the Bible about certain material and historical facts. On the other hand, the Bible is *not a scientific protocol* or text book. Both the differences between epistemological climates and between the pre-

sentation of facts appear to bring about a sort of pressure upon theologians to assimilate the scientific way of understanding, *because it is considered "successful"*.

Though this pressure is partly exercised by scientists and partly even by theologians, i.e. by *persons*, one root of the pressure lies in the *doctrines* of Physics and Natural Realism as such, above all in the difference of their epistemological climates. Making disappear the difference of epistemological climates will, therefore, lower the pressure. A first step towards that goal is the investigation of the consequences that emerge from renouncing of the reductionisms of Physics. As the reductionisms are recognized as such in the spirit of Natural Realism, any investigating the consequences of renouncing of them will equally take place in the spirit of Natural Realism.

Christian revelation endorses Natural Realism, when speaking of our material world. Thus, it turns out that the philosophical solution of a problem of Physics in the spirit of Natural Realism has beneficial consequences also for the relationship of Physics to Christian Theology, and to Christianity in general. It is a flanking aid to the inculturation of Christianity into a scientific-technological civilization.