

Between postmodernism, positivism and (new) atheism

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Opsomming

Sedert die Renaissance het die rede-vergoding wat reeds in die Griekse kultuur na vore getree het 'n gesekulariseerde revitalisering beleef. Van die Grieks-Middeleeuse metafisiese synshierargie is afskeid geneem deurdat die mens voortaan slegs via sigself – d.m.v. duidelik en onderskeie denke by Descartes – sekerheid oor die bestaan van God kan verkry. Von Weizsäcker wys daarop dat dit nie meer die wêreld was wat my bestaan borg nie, aangesien die wêreld nou slegs as voorwerp van my *selfversekerde denke* verskyn. Hierdie selfversekerde denke is subtiel tot die rang van die goddelike verhef en daarom is dit nie verbasend dat Immanuel Kant spoedig die menslike verstand tot (formele) wetgewer van die natuur sou verhef nie. Om van *bo-natuurlike* gode ontslae te raak sou die “nuwe ateïste” (eintlik is hulle “anti-teïste”) God gelykstel aan die wette van die natuur, vergetende dat Nietzsche reeds besef het dat die wette onderskeie is van 'n Wetgewer en daarom nie van natuurwette nie maar bloot van “noodsaaklikhede” gepraat het. Onlangs het Stephen Hawking selfs beweer dat die swaartekragwet die heelal uit niks sal kan skep. Die logiese konsekwensie van Kant se oortuiging dat die verstand die wetgewer van die natuur is, het op die positivistiese siening dat die wetenskap *objektief* en *neutraal* is, uitgeloop. (Ten spyte van die wetenskapsfilosofie van die vorige eeu is die meeste vakwetenskaplikes vandag nog “naïewe” positivistes.) As die menslike verstand beskikking oor die bestaan van God verkry dan oefen die nuwe ateïsme van ons dag bloot hierdie self-opgelegde mandaat van die humanisme uit deur te kies vir die nie-bestaan van God (by talle in reaksie op eksesse en misdade wat in die naam van godsdiens gepleeg is – onder meer 9/11). Veral die historisme van die 19de en vroeg 20ste eeu sou egter hierdie sekerheid *relativeer*, gerugsteun deur die sogenaamde *wending na die taal* wat die realiteit van *alternatiewe interpretasies* op die voorgrond geplaas het. Die wetenskapsfilosofie van die 20ste eeu sou hierby aansluit deur te wys op die onvermydelikheid van 'n teoretiese verwysingsraamwerk in die beoefening van watter wetenskap ookal (*paradigma*) en op die effek van *diepste oortuigings (ultimate commitments)*. Gould is een van die weinige neo-Darwinistiese bioloë wat kennis geneem het van hierdie wetenskapsteoretiese ontwikkelinge. Hy merk teweens op: “Facts have no independent existence in science, or in any human endeavor; theories grant differing weights, values, and descriptions, even to the most empirical and undeniable of observations”. Die gekombineerde effek van *historiese relatiwiteit* en *alternatiewe interpretasies* het tot die postmoderne posisie gelei waarvolgens elke sogenaamde meta-verhaal bevraagteken word omdat elkeen van ons slegs sy *eie* beskeie *partikuliere verhaal* besit. In die nadere artikulering van die argument is

aandag geskenk aan onderliggende sistematiese probleme terwyl die idee van ‘n “eksakte” natuurwetenskap bevestig is met verwysing na die wiskunde, die fisika en die biologie. Stoker was van meet af sensitief vir die probleme wat later in die intellektuele ontwikkeling van die twintigste eeu sou ontvou. Hy het tevens self vasgehou aan die idee van ‘n goddelike wetsorde, die pleit gevoer vir die ver-Christeliking van die hele lewe en hy het ook ‘n nie-reduksionistiese ontologie nagestreef.

Key elements of modernity

Since the Renaissance the deification of reason, already found in Greek culture, experienced a new secularized revitalization. What it left behind is the Greek-Medieval realistic metaphysics which used the concept of *being* to generate a hierarchical view of reality. The human being is no longer understood as part of an objective order of being. For Descartes even certainty about the existence of God is now obtained only on the basis of clear and distinct *thinking*. Von Weizsäcker points out that the world no longer guarantees my existence since the world now solely appears as the object of my self-assured thinking. In a subtle way this self-assured thinking is elevated to the rank of what is divine. Therefore it should not be surprising that the new motive of *logical creation* soon inspired Immanuel Kant to elevate human understanding to become the formal law-giver of nature. More recently the desire to be liberated from “supra-natural” Gods led atheists (or rather: anti-theists) to the identification of God with the laws of nature, forgetting that Nietzsche already realized that laws are distinct from a Law-giver. In support of the cause of atheism, Nietzsche therefore prefers not to speak of laws but rather of *necessities*. The fusion of human rationality and natural law culminates in Hawking’s recent idea that the law of gravity on its own will create the universe.

Beyond positivism: the ideal of an objective and neutral science challenged

Kant’s view of understanding as formal law-giver of nature consolidated the preceding natural science ideal of modern humanism and provided the platform for the ideal of an objective and neutral science advanced by positivism – from Auguste Comte up to the Vienna Circle. However, as one of the key figures in the mid-twentieth century philosophy of science, Karl Popper, claimed the fame to have “killed” positivism. Kuhn challenged the positivist appeal to “facts” (identified with *sense data*) for it turned out that the interpretation of facts is embedded in theoretical frameworks (designated as paradigms), captured in the slogan the facts are “theory laden.” In addition, prominent figures within the domain of the philosophy of science of the twentieth century acknowledged that scholarly activities are embedded in intellectual communities and in the final analysis directed by more-than-theoretical (i.e. supra-theoretical) commitments (Popper and Stegmüller). But in spite of all these developments, most special scientists working within the natural sciences and the humanities are still victims of a kind of “naïve positivism,” still adhering to the modernist idea of the objectivity and neutrality of science. The remarkable exception in this regard is

the well-known neo-Darwinian biologist (initial field: *palaeontology*) who updated himself with what happened in the philosophy of science of the previous century. He remarks: “Facts have no independent existence in science, or in any human endeavor; theories grant differing weights, values, and descriptions, even to the most empirical and undeniable of observations” (Gould 2002:762).

If the deified human understanding assumed the role of judge, even regarding the existence of God, then the authority assigned to it not only gives it the power to decide what will count as divine, but also the power to deny any divinity whatsoever – the ultimate position of contemporary atheism. Many of them justified their stance with reference to atrocities committed in the name of “religion” (such as 9/11). Already during the Enlightenment Kant advocated an elevated position for human reason:

Our age is, in every sense of the word, the age of criticism and everything must submit to it. Religion, on the strength of its sanctity, and law on the strength of its majesty, try to withdraw themselves from it; but by doing so they arouse just suspicions, and cannot claim that sincere respect which reason pays to those only who have been able to stand its free and open examination (Kant, 1781:A-12 – translation F.M. Müller – see Müller, 1961:21).

Relativizing human reason: historicism and 20th century philosophy of science

Of course closer scrutiny soon unveils that neither the (persistent) positivism nor the new atheism represent a sound position. In particular the pervasive influence of historicism during the nineteenth and early twentieth century relativized the certainties of modernity. In the “linguistic turn” historicism found a strong ally, for with language as horizon alternative interpretations surfaced prominently.

As noted briefly above, these lines of thought served as points of departure for developments within the philosophy of science of the twentieth century. It appeared to be inevitable to use theoretical frameworks (*paradigms*) which themselves are in the grip of ultimate commitments. Gould is one of the few neo-Darwinian biologists who took notice of these developments within the field of philosophy of science. He remarks: “Facts have no independent existence in science, or in any human endeavor; theories grant differing weights, values, and descriptions, even to the most empirical and undeniable of observations”.

Interestingly these developments within twentieth century philosophy of science were anticipated by Dooyeweerd. It prompted Van Peursen to say that Dooyeweerd's philosophy is today more relevant than ever and he added the remark that many books written within the domain of philosophy of science should not have been written, had the authors first read what Dooyeweerd wrote (see Van Peursen 1995).

Postmodernism: the relativity of interpretation

The combined effect of historical relativity and alternative interpretations in turn gave rise to postmodernism according to which every so-called meta-narrative is questioned, owing to the fact that everyone of us only disposes over our own particular stories. The new kind of knowledge emerging within the postmodern mode of thought apparently challenged long-standing conceptions. Amidst the introduction of themes and entities, such as *fractals* (somewhere in between one and two dimensions) and *chaos theory*, it is claimed that modernist thinking is *linear* and postmodern thinking is *non-linear*. Lyotard mentions “incommensurabilities” and the fact that “the continuous differentiable function is losing its pre-eminence as a paradigm of knowledge and prediction” and then continues: “Postmodern science – by concerning itself with such things as undecidables, the limits of precise control, conflicts characterized by incomplete information, ‘fracta,’ catastrophes, and pragmatic paradoxes – is theorizing its own evolution as discontinuous, catastrophic, nonrectifiable, and paradoxical” (Lyotard, 1987:60).

Is postmodernism characterized by *non-linear thinking*?

Mathematicians speak of linear equations when, for example, there are two variables that are related in a specific way. Co-ordinate geometry says that points whose co-ordinates satisfy an equation of the first degree, such as $y = ax + b$ (with a and b as constants), are lying on a *straight line*. An equation such as $y = x^2$ is therefore *non-linear*. Intuitively one may also think of a proportionality between cause and effect, although such a representation actually confuses numerical and physical states of affairs. Of course our awareness of succession originally has a quantitative meaning. Yet, as Immanuel Kant already realized, *causality* differs from *succession*, because although there is a succession of day and night, the day is neither the cause of the night nor is the night the cause of the day. That succession belongs to the primitive meaning of number (discreteness) is implicitly acknowledged by Russell when he states that “greater and less are undefinable” (see Russell 1956:194; see also page 167), in line with his remark that “progressions are the very essence of discreteness” (Russell 1956:299).

Postmodern authors want to distance themselves from the rationalistic trait of “modern science” with its reductionism and faith in numbers. In opposition to this “out-dated” mode of thinking such postmodern thinkers advocate a *non-linear* mode of thinking, apparently built upon a methodology of intuition and of subjective observation, exceeding human rationality. Sokal and Bricmont mention the words of a postmodern thinker, Robert Markley, who claims that “quantum physics, the bootstrap theory, the theory of complex numbers, and chaos theory share the basic assumption that reality cannot be described in linear concepts, that non-linear – and non-solvable – equations provide the only possible means to describe a complex, chaotic and non-deterministic reality” (Sokal and Bricmont 1999:166, note 26).

On the same page they highlight the fact that many postmodern authors interpret chaos theory as a revolution directed against Newton's mechanics, with quantum theory as an example of

non-linear thinking. Unfortunately Newton's "linear thinking" contains equations which are fully *non-linear*. In reality many examples of chaos theory derive from Newton's mechanics, which means that chaos research is in fact nothing but a *Renaissance* of Newton's mechanics. Even more embarrassing is the fact that while quantum physics is currently represented as a prime example of "postmodern science," it is not realized that the basic equation of quantum physics, the well-known Schrödinger equation, is absolutely *linear* (Sokal and Bricmont 1999:166-167). Moreover, there are very difficult linear problems and quite simple non-linear problems. Contrary to a widespread misunderstanding a non-linear system is not necessarily chaotic.

Is Derrida a postmodern thinker?

Postmodern thinkers tend to shy away from *universality* by emphasizing what is particular or singular. Caputo mentioned to Derrida that in connection with justice and care in Derrida's writings he discerns a resonance of the biblical concern for singularity. This is opposed to the "philosophical notion where justice is defined in terms of universality" (Derrida 1997:20). Remarkably Derrida's reason was immediately to emphasize the unbreakable co-existence of universality and singularity: "I would not oppose, as you did, universality and singularity. I would try to keep the two together" (Derrida 1997:22). According to Derrida *faith* is universal, it displays a universal structure and for this reason it should be distinguished from "religion." Actually, for him there is "no such thing as 'religion'." There are only singular religions, such as Judaism, Christianity, Islam and so on. This distinction between (universal) faith and (particular) religions runs parallel with his distinction between *messianicity* and *messianism* (Derrida 1997:21) and it explains his mode of speech where he declares: "So this faith is not religious, strictly speaking; at least it cannot be totally determined by a given religion. That is why this faith is absolutely universal. This attention to what is the singularity is not opposed to universality" (Derrida 1997:22).

Derrida here undoubtedly explores the *ontic universality* of "faith," of "messianicity" and so on – which disqualifies him, strictly speaking, to be a *postmodernist* thinker, for postmodernism generally attempts to shy away from *universality*. Since the era of *Enlightenment* the trust in universal (conceptual) knowledge guided the idea of *rational progress*. One way to define rationalism is actually to see it as a reification of *conceptual knowledge*. Likewise *irrationalism* can then be defined as a deification of concept-transcending knowledge (idea-knowledge), focused on what is unique, individual or singular.

The nominalistic restriction of universality: law and regularities

The decisive role played by nominalism in modern philosophy since the Renaissance is seen in its displacement of universality: universality is only and solely acknowledged within the human "mind," for outside the human mind nothing universal is found. That we actually have to account for two kinds of universality is often concealed behind interchangeably employing expressions such as *law*, *law for*, *lawfulness of*, *law-conformity*, *regularities* and so on. Whatever meets the *order for* its existence behaves in an *orderly* fashion, manifested in its

own *orderliness* or *law-conformity*. An *order for* and the *orderliness of* is equivalent to the conditions for the existence of something and meeting those conditions. In general there is a strict correlation between *law* and what is *factually subjected* to it. But when *reality* (the *ontic*) is stripped of its universality, then it is at once deprived of its *order for* side as well as the *orderliness of* reality conforming to this order. What is lost sight of is the fact that denying universality “outside the human mind” did not succeed in getting rid of universality because the feature of *being individual* universally holds for whatever is individual.

In spite of his sharp critical analysis of the ideas of Hawking, John Lennox still does not properly distinguish between law and regularity: “Newton's laws describe the regularities, the pattern, to which motion in the universe conforms under certain initial conditions. It was God, however, and not Newton who created the universe with those regularities and patterns” (Lennox 2011a:35). Law-conformity is a feature of what is subjected to laws and the only way to understand physical laws is to study the regularities evinced in their behaviour. It would therefore be better to say that Newton's laws are human formulations of the God-given laws for nature, making possible all the regularities we can observe. God did not create the regularities, for what has been created function in an orderly way, providing scholars with those regularities pointing at the God-given creational laws.

Type-laws and modal laws versus nominalistic classification

This entails that we have to acknowledge the universality of different *types* of entities, because our experience is not populated by just one kind of entity, whatever it may be. No one would defend the view that everything is an *x* – where *x* could be filled in by: “a quark.” “an atom,” “a cell,” or whatever. The diversity of entities within the horizon of human experience straightforwardly necessitates the acknowledgement of a *multiplicity* of *types* or *kinds*. The ontic reality is that the correlation between law and factuality cannot avoid the idea of *type-laws*. Yet since the dominant nominalistic assumption of modern philosophy denies universality outside the human mind, our entire system of biological classification is reduced to a functionalistic (physicalistic) perspective. Simpson categorically states that organisms are not types and do not have types (Simpson 1969:8-9). This view continues the conviction of Darwin that “no line of demarcation can be drawn between species” (Darwin 1859:443) which entails that according to Darwin “we shall have to treat species in the same manner as those naturalists treat genera, who admit that genera are merely artificial combinations made for convenience” (Darwin 1859:456).

The discreteness (discontinuities) marking the currently existing diversity of plants and animals as well as the dominant theme of palaeontology (stasis/constancy: a type abruptly appears, remains constant over millions of years and then suddenly disappears) squarely contradicts Darwin's core scientific belief that there must have been an infinitesimal, incremental and continuous development stretched over millions of years. A contemporary neo-Darwinist, Jerry Coyne, openly struggles with the tension between discreteness and

continuity. He advances the view that species are discrete clusters of living entities: “And at first sight, their existence looks like a problem for evolutionary theory. Evolution is, after all, a continuous process, so how can it produce groups of animals and plants that are discrete and discontinuous, separated from others by gaps in appearance and behavior?” (Coyne 2009:184). He also designates a species as “a discrete cluster of sexually reproducing organisms” and then on the same page he continues in a *realistic* fashion by holding that the discontinuities of nature are “not arbitrary, but an objective fact” (Coyne 2009:184). Whereas Darwin therefore advocated a *nominalistic* position regarding living entities, Coyne reverts to a *realistic* idea of living entities.

The levelling tendency in the postulate that nature does not make jumps

Within modern philosophy the emphasis soon shifted to functional relations which, particularly in the thought of Leibniz, resulted in his famous *lex continui* (law of continuity) according to which nature does not make any jumps (*natura non facit saltus*). Dooyeweerd characterized this view as the *continuity postulate* of humanistic philosophy and Gould argues that this postulate assumed in Darwin's thought even a more central position than natural selection. He calls upon the physicist and historian of science, Silvan S. Scheber when he claims: “In fact, I would advance the even stronger claim that the theory of natural selection is, in essence, Adam Smith's economics transferred to nature” (Gould 2002:122). And gradualism precedes in importance natural selection. Gould relates Darwin's position here to a confusion of the different senses of gradualism, for example the validity of natural selection and the acceptance of slow and continuous flux: “This conflation came easily (and probably unconsciously) to Darwin, in large part because gradualism stood prior to natural selection in the core of his beliefs about the nature of things. Natural selection exemplified gradualism, not vice versa – and the various forms of gradualism converged to a single, coordinated view of life that extended its compass far beyond natural selection and even evolution itself” (Gould 2002:154-155).

Chance versus progress: inconsistencies on opposing sides of the debate

Yet in spite of his achievements as a radical intellectual, advocating a theory without any claims to *progress*, Gould notes that Darwin considered it as his greatest failure that he did not succeed in reconciling his intellectual rejection of progress with his acceptance of a cultural context in which progress was one of the characteristics of the Victorian culture to which he belonged (see Gould 2002:467). Darwin holds that his greatest improvement compared to other evolutionary theories is given in banishing inherent progress. Gould writes: “Moreover, Darwin regarded the banishment of inherent progress as perhaps his greatest conceptual advance over previous evolutionary theories.” And to this he adds the words of Darwin, formulated in reaction to the progressionist paleontologist Alpheus Hyatt (on December 4, 1872): “After long reflection I cannot avoid the conviction that no innate tendency to progressive development exists” (Gould 2002:468). Ironically, close to the end of *The Origin of Species*, we read: “And as natural selection works solely by and for the good of

each being, all corporeal and mental endowments will tend to progress towards perfection” (Darwin 1859:459). Since Aristotle vitalistic theories in biology assumed that *goal-directedness* (finality/purpose) is inherent to living entities, something rejected by Darwin in the words just quoted. Theistic evolutionists of our day deem it possible to accept Darwin's views (on random variation and natural selection) and at the same time advance the (contradictory) view that God guided the process of evolution all the way.

Sometimes emergent-evolutionism, which wants to have it both ways – *continuity* in descent and *discontinuity* in existence – also surfaces in the thought of theistic evolutionists. The theologian, Wentzel Van Huyssteen, on the one hand holds that our universe and “all it contains is in principle explicable by the natural sciences” (Van Huyssteen, 1998:75). But a bit further in this work he alleges the opposite when he warns that we should not overextend rationality “to explain everything in our world in the name of natural science” (Van Huyssteen 1998:115). Later on he believes that *cultural evolution* (including the evolution of ideas, scientific theories, and religious worldviews) cannot be reduced to biological evolution (Van Huyssteen 2006:86-87). On the basis of his emergent-evolutionistic view Klapwijk also attempts to combine neo-Darwinian chance and purpose (see Klapwijk 2008 and 2009).

Gould explains that within the fossil record there is no clear signal of progress:

I believe that the most knowledgeable students of life's history have always sensed the failure of the fossil record to supply the most desired ingredient of Western comfort: a clear signal of progress measured as some form of steadily increasing complexity for life as a whole through time. The basic evidence cannot support such a view, for simple forms still predominate in most environments, as they always have. Faced with this undeniable fact, supporters of progress (that is, nearly all of us throughout the history of evolutionary thought) have shifted criteria and ended up grasping at straws (Gould 1996:166-167).

The idea of type-laws, briefly alluded to above, contains an acknowledgement of different types of living entities constituted by a limited number of them falling within each “type-category,” is eliminated in the nominalistic classification of neo-Darwinism with its claim that “organisms” are not types and do not have types (Simpson). The popular contemporary reference to “bio-diversity” is actually stripped of a meaningful content, because if the classification of living entities is merely the result of arbitrary and artificial thought constructions, lacking an ontic foundation (in the reality “out there”), then the intended diversity (reflecting typical differences determined by distinct type-laws) collapses into a structureless continuum. The speculative continuity postulate still rules the day!

Bio-diversity and the ontic diversity of universal modal aspects

The denial of the *specified* universality entailed in type-laws finds its foundation in a more basic misunderstanding, which is given in denying the “ontic diversity” of functional (modal) aspects. It is the merit of reformational philosophy that it subjected the multiple functions or modal aspects of our experiential world to a transcendental-empirical analysis. The key idea is that of the ontic universality of each one of these aspects, from the numerical up to the certitudinal aspect, co-determine whatever there is. Every concrete (natural and societal) entity functions within all these aspects which not only serve as *modes of being* and *modes of experience* but also as *modes of explanation*. When particular modes of explanation are over-emphasized at the cost of other modes of explanation – just recall the words of Van Huyssteen that our universe and all it contains “is in principle explicable by the natural sciences” – a *reductionist* approach surfaces, denying the *ontic diversity of modal aspects*.

The impasse of contemporary physicalistic materialism

The physicalistic or materialistic orientation of neo-Darwinism and of the new atheists currently succeeded in establishing a firm hold on scholarly journals and the public media. Their ultimate reductionist claim is: “everything is material.” Such a materialistic view in the final analysis believes, as Roy Clouser phrases it, “that reality is ultimately physical, so that everything is either matter or dependent upon matter.” Roy also mentions Paul Ziff who once remarked that he is not certain why he is a materialist: “It's not because of the arguments. I guess I'd just have to say that reality looks irresistably physical to me” (Clouser 2005:38).

Apart from trying to give an answer to the difficult question: “What is matter?” the basic statement that *everything is material* is self-defeating. Merely contemplate the status of laws holding for material things. They are not themselves material, just as little as the conditions (laws) for being an atom is itself an atom. But if the conditions (laws) for being material are not themselves material, then the claim that everything is material does not hold, because the physical laws for matter are not material. In addition the statement that everything is material is presented as being *true*. But truth is a matter of epistemology and logic, not a *physical* one. Moreover, the statement is formulated in a sentence, showing that we have to distinguish between the logical-analytical aspect (the basic statement) and the lingual aspect of the utterance (the sentence formulated). That is to say, the basic conviction of physicalism (materialism) could be approximated from different modes of experience. However, as long as “laws of nature” are accepted, the atheist will constantly be haunted by the quest for the Creator of such laws, the search for the *Law-Giver*.

Assigning creational power to as creature: physical laws turn divine

Therefore the last step in the attempt to get rid of the Creator is, as Lennox phrases it, to confer “creatorial powers on something that is not in itself capable of doing any creating” (Lennox 2011:52). This *something* may be scientific theories or even the laws addressed in such theories. According to Lennox for these scientists and philosophers “the term ‘God’ has become a synonym for the laws of nature” (Lennox 2011a:22). In order to get rid of God

Stephen Hawking settled for the law of gravity as the substitute ultimate origin of the universe. In his book, *The Grand Design* (co-author is the physicist Leonard Mlodinow) we read:

Because there is a law such as gravity, the universe can and will create itself from nothing. Spontaneous creation is the reason there is something rather than nothing, why the universe exists, why we exist.

The law of gravity now replaces God – forgetting that it is merely a God-given creational law. Hawking also forgets that every physical law is always related to what is subjected to it and correlated with it. Lennox aptly remarks that laws create nothing in any world for they can only “act on something that is already there” (Lennox 2011:71). Ironically enough, no single physical law could be explained in a *purely physical* way because the physical aspect of reality does not exist in isolation from the other aspects of reality. Newton’s formulation of the law of gravitation contains the term *force* (F), the *gravitational constant* (G), two mass-points (m_1 en m_2), and the distance between m_1 and m_2 (r). The gravitational force between m_1 and m_2 is directly proportional to the product of their masses and indirectly proportional to the square of the distance between them. But mass is a physical *quantity* (highlighting the fundamental connection between the physical aspect and the numerical aspect). Distance, in turn, pre-supposes the meaning of (physical) space, whereas the idea of a *constant* reveals the coherence between the meaning of the physical aspect and a uniform [constant] motion. From this it appears that the formulation of the law of gravitation is made possible in the first place by the coherence of the physical aspect with three foundational *non-physical* aspects (namely number, space, and movement). These non-physical aspects serve as the foundation for the meaning of the physical aspect. Formulated in terms of the theory of modal aspects, the *law of energy-constancy*, for example, analogically reflects the kinematic meaning of constancy on the law-side of the physical aspect.

Given these conditions and interconnectedness one may ask: how could these non-physical aspects (and, for that matter, the universe itself) then merely emerge from the physical aspect of creation or originate purely from a physical law? Hawking attempts to pull himself up with the bag in which he positioned himself – something clearly seen by Lennox. Of course the law of gravity is something implying that if the universe is created by this law the starting-point is *something* (the law of gravity) and not “nothing.” The statement “the universe can and will create itself from nothing” is self-contradictory: “If I say ‘X creates Y’, this presupposes the existence of X” (Lennox 2011a:32). Materialism simply entangles itself in unsolvable antinomies – the “reward” for not respecting the God-given creational laws in their uniqueness and unbreakable coherence.

Law and law-conformity

The only way in which we can approximate the *laws for* physical entities is through an investigation of their *orderliness, law-conformity or regularities*. The above-mentioned

example used by Derrida concerning the universal structure of *faith* (*messianicity*) and particular (“singular”) religions, implicitly alludes to the *universality* of the certitudinal aspect of reality. Particularly in respect of the conviction (!) of the new atheists that they do not have faith at all, the *modal universality* of the faith aspect implies the opposite. But we have noticed that if one does not accept God as Creator, the only alternative is to find a substitute within creation – and in the case of contemporary atheism this substitute for God is most of the time found in *matter*. The ultimate commitment of the new Atheists is therefore justly characterized as *materialistic* or *physicalistic* – and it is inevitably caught up in the above-mentioned inconsistencies.

“Faith and reason”

Materialism over-emphasizes a single mode of explanation, namely the *physical*. However, such an orientation embodies a more-than-theoretical commitment – just recall the remark of Paul Ziff who said “that reality looks irresistably physical to” him. No *reason* is given, just an underlying *trust* in (physical) reason! It represents therefore a particular *faith in reason*, namely the trust in the rational reliability of physical reasoning. The *onto-diversity* of modal aspects is challenged from the outset.

From this state of affairs we can conclude that “faith” (“trust”) inherently belongs to the practice of the natural sciences. What is more is that “rationality” (or: “reason”) is connected to faith in the sense of *intellectual trust*. Yet in the course of the historical development of Western philosophy “reason and faith” eventually appeared in opposition to each other, as if each on its own is an entity in its own right. Quite recently this is still done by Pope John Paul II in his Encyclical Letter *Fides Et Ratio* (1998). In this letter he portrays both as entity-like, inter-dependent realities. He claims that *faith* does not fear reason but *trust* it: “Faith therefore has no fear of reason, but seeks it out and has trust in it” (John Paul 1998). Of course *thinking* (“reason”) and *believing* (“faith”) are concrete acts of human beings which, like every concrete (natural and social) structure or event, in principle function within all the aspects of reality. The latter, namely the dimension of aspects, provides a universal modal order co-determining concrete events and processes. In an ontic sense they lie at the foundation of our experience of entities and their functions. Therefore the first level of investigating the interconnections between “faith” and “reason” should commence with an analysis of the meaning of the logical-analytical aspect and the meaning of the certitudinal aspect, abstracting for the moment from the fact that every concrete act of faith at once functions in the logical-analytical aspect and that every concrete thought-act also functions within the faith aspect.

The terms *trust* or *certainty* may be used to capture the core meaning of the faith aspect. The inter-modal coherence between the various ontic aspects entails that the terms *trust* and *certainty* will also appear within other aspects in an *analogical* way, normally captured in compound phrases such as legal trust, social trust, moral trust and economic trust (*credit*). Given the order relation between the logical and certitudinal aspects an expression such as

intellectual trust highlights a forward-pointing connection between the logical and faith aspects, in technical philosophical parlance also designated as a certitudinal anticipatory analogy between these two aspects. Likewise configurations such as *legal trust*, *social trust*, *moral trust* and *economic trust* reveal anticipations from the legal, social, modal and economic aspects to the faith aspect.

In the same way the faith aspect reveals its unique meaning only in coherence with all the other aspects of reality, including the logical-analytical aspect. The core meaning of the logical aspect is found in *analysis* (identification and distinguishing). When we therefore lack faith distinctions in our trusting and do not identify the core elements of our faith we will end up with a “blind faith.” Therefore it should be acknowledged that there also exists an intrinsic connection between the faith aspect and the logical-analytical aspect, manifest in *faith distinctions* and *identifying* what is crucial to faith convictions.

“Reason” and “faith” surely are not “strangers” because human acts qualified either by the logical aspect or the certitudinal aspect structurally display an internal coherence with the non-qualifying aspects of acts like these.

Trust in reason

In respect of the nature of intellectual trust this insight is acknowledged in his own way by the philosopher of science, Wolfgang Stegmüller, where he explains that one first has to *believe* in something in order to justify something else (Stegmüller 1969:314). Nonetheless an uncritical adherence to what we have earlier designated as a “naïve positivism” is still widespread. Special scientists and laymen think that the ultimate judge of truth and is “science” – the assumed anonymous (rational) power supposedly capable of solving all our problems. The scope of “science” is restricted to mathematics, physics and (the physical or molecular foundations) of biology. This modernist over-estimation of “science” up to the present implicitly continues the modern natural science ideal of objectivity and neutrality.

Positivism and the history of the concept of matter

In the case of positivism the criterion of sense perception matches the (internally antinomic) reductionism found in materialism because it cannot account for the epistemic status of descriptive terms derived from what we have called the *onto-diversity* of modal aspects. Once something has been observed (sensed) it is in need of a scientific description and every description has to employ specific terms. However, the history of the concept of matter shows that alternative modes of explanation have been chosen. It commenced with the Pythagorean belief that everything essentially *is* number, then it continues with the switch within Greek mathematics to geometry (after the discovery of incommensurability – the fact that is not possible to describe all spatial relationships merely in terms of fractions), then, after the Renaissance, the choice for (reversible) motion as basic denominator, and finally reaching the current state of physics which had to acknowledge that (irreversible) energy-operation characterizes the uniqueness of this aspect.

Clearly, during the history of physics different modal points of entry were used in describing material entities, namely the numerical, the spatial, the kinematic and the physical. But since

these functional modes of reality are not concrete entities or events themselves, they are not open to the senses as such. One cannot weigh, smell, hear, feel or see anyone of these aspects, simply because they are not belonging to the entitary dimensions of reality.

The classical positivist neutrality postulate had to face other objections as well. Perhaps the most important of these objections are related to the *history* of every academic discipline, which *relativizes* any temporarily (assumed) “up-to-date” theoretical stance. Whatever is currently accepted as the “generally accepted” standpoint within the discipline differs from what the case fifty, hundred or more years ago was, apart from the fact that the majority is not a yardstick for truth (as correctly identified in text books on logic where one of the informal fallacies is designated as the *majority fallacy*; see *Bowell and Kemp, 2005:131 ff.*). And within the forthcoming decades and millennia the emphasis may shift again and again.

How “exact” is science

This explains why not even the “exact” discipline of mathematics succeeded in avoiding concurrent and successive alternative theoretical stances. The remarkable historical fact is that the three main subdivisions of Kant’s *Critique of Pure Reason* (1781) provided the starting-point for the three main schools of thought found in twentieth century mathematics: intuitionistic mathematics explored the transcendental aesthetics (Brouwer and Weyl), logicism the transcendental analytic (Russell and Gödel) and axiomatic formalism the transcendental dialectics (Hilbert and his followers).

Regarding the mathematical status of intuitionism Beth writes: “It is clear that intuitionistic mathematics is not merely that part of classical mathematics which would remain if one removed certain methods not acceptable to the intuitionists. On the contrary, intuitionistic mathematics replaces the methods by other ones that lead to results which find no counterpart in classical mathematics” (Beth 1965:89). But listen to what Brouwer himself has to say. He believes that “classical analysis ... has less mathematical truth than intuitionistic analysis” (Brouwer, 1964:78) – to which he adds in respect of the differences between intuitionism and formalism:

As a matter of course also the languages of the two mathematical schools diverge. And even in those mathematical theories which are covered by a neutral language, i.e. by a language understandable on both sides, either school operates with mathematical entities not recognized by the other one: there are intuitionist structures which cannot be fitted into any classical logical frame, and there are classical arguments not applying to any introspective image. Likewise, in the theories mentioned, mathematical entities recognized by both parties on each side are found satisfying theorems which for the other school are either false, or senseless, or even in a way contradictory. In particular, theorems holding in intuitionism, but not in classical mathematics, often originate from the circumstance that for mathematical entities belonging to a certain species, the possession of a certain property imposes a special character on their way of development from the basic intuition, and that from this special character of their way of development from the basic intuition, properties ensue which for classical mathematics are false. A striking example is the intuitionist theorem that a full function of the unity continuum, i.e. a function assigning a real number to every non-

negative real number not exceeding unity, is necessarily uniformly continuous (Brouwer, 1964:79).

Beth elaborates this divergence in a broader context by mentioning multiple other orientations informed by distinct philosophical positions and he even questions the appreciation of axiomatic set theory as the ultimate foundation of mathematics (Beth 1965:161-203).

Differences such as these prompted the mathematician Kline to come up with a pretty negative assessment of the situation within mathematics:

The developments in the foundations of mathematics since 1900 are bewildering, and the present state of mathematics is anomalous and deplorable. The light of truth no longer illuminates the road to follow. In place of the unique, universally admired and universally accepted body of mathematics whose proofs, though sometimes requiring emendation, were regarded as the acme of sound reasoning, we now have conflicting approaches to mathematics. Beyond the logicist, intuitionist, and formalist bases, the approach through set theory alone gives many options. Some divergent and even conflicting positions are possible even within the other schools. Thus the constructivist movement within the intuitionist philosophy has many splinter groups. Within formalism there are choices to be made about what principles of metamathematics may be employed. Non-standard analysis, though not a doctrine of any one school, permits an alternative approach to analysis which may also lead to conflicting views. At the very least what was considered to be illogical and to be banished is now accepted by some schools as logically sound (Kline 1980:275-276).

The actuality of these diverging orientations is currently still reflected in the encompassing Oxford hand book published by Oxford University Press in 2005 on philosophy, mathematics and logic – with Shapiro as Editor (833 pages). This work inter alia contains contributions on empiricism and logical positivism (1), on logicism (3), on Wittgenstein (1), on formalism (1), on intuitionism (3), on naturalism (2), on nominalism (2) and on structuralism (2).

An artikel on “non-denumerability” which appeared in the Journal *Koers* shows that alternative philosophical assumptions regarding the nature of the infinite lead to mutually opposing interpretations (see Strauss 2001:637-659). Interestingly, the Editor of an *Accredited Journal* refused to publish this article because one of the Reviewers objected that it may mislead the youth to think that mathematics is not “an exact science”!

There is a “vicious circle” entailed in the set theoretical attempt (such as that of Grünbaum published in 1952) to explain the continuous extension of a straight line as being constituted by non-extended elements. This circularity is only apparent when it is realized that whereas our awareness of succession (and discreteness) originally belongs to the irreducible core meaning of number, the awareness of a totality (a whole with its parts) originally belongs to the core meaning of the spatial aspect. Once this is seen, it is clear that the idea of *infinite totalities* merely represents an anticipatory analogy pointing from the numerical aspect to the spatial aspect. However, the idea of an infinite totality presupposes the idea of the at once infinite (traditionally known as the actual infinite), which stands and falls with the deepening or disclosure of the meaning of number under the guidance of the meaning of space. For this

reason the at once infinite in principle differs from the primitive meaning of infinity in the literal sense of one, another one, yet another one, and so on (traditionally known as the potential infinite but preferably designated as the successive infinite – *endlessness*). The decisive point in the argument pursued by Grünbaum is given in the employment of the at once infinite which is needed in Cantor’s proof of the non-denumerability of the real numbers (see Appendix 1). If the real numbers cannot be enumerated, they cannot be added – apparently providing an opening for degenerate intervals to constitute a measure larger than zero (see Strauss 2011). Grünbaum writes explicitly: “The consistency of the metrical analysis which I have given depends crucially on the non-denumerability of the infinite point-sets constituting the intervals on the line” (Grünbaum 1952:302). Therefore the entire arithmeticistic argument begs the question. The attempted arithmetization crucially depends upon the use of the idea of infinite totalities, which needs the at once infinite, and which finally presupposes the irreducible meaning of the spatial order of at once and the (correlated) spatial whole-parts relation.

Recent challenges to neo-Darwinism

The perspective which we have advanced thus far challenged the idea of “an exact science.” But since biology is oftentimes incorporated in the restricted notion of “science” we now briefly highlight some of the increasing problems facing neo-Darwinism with its law-like mechanism of random mutation and natural selection (of course, accepting the *constancy* of this mechanism contradicts the neo-Darwinian claim that “everything changes”).

In the *Prologue* of his recent book, *Darwin's Doubt* (2013), Stephen Meyer states the following in connection with the assumed origination of the first living entities: “The type of information present in living cells – that is, ‘specified’ information in which the sequence of characters matters to the function of the sequence as a whole – has generated an acute mystery. No undirected physical or chemical process has demonstrated the capacity to produce specified information starting ‘from purely physical or chemical’ precursors. For this reason, chemical evolutionary theories have failed to solve the mystery of the origin of first life – a claim that few mainstream evolutionary theorists now dispute” [This book is dedicated to the mystery of the Cambrian explosion (initially estimated to have occurred within a time-span of 20 to 40 million years, but now reduced to 5–6 million years – (Meyer 2013: 72).]

Although neo-Darwinians therefore have to concede that the origination of the first living entity is a mystery, they still BELIEVE that it did happen “spontaneously,” through purely material processes. However, apart from the extreme improbability of such a process, there are no clues as to how the information found in living entities came into being – the “hardware” (material) does not explain the “software” (such as ordered DNS sequences, epigenetic information or complex proteins).

The equally mysterious appearance of new animal phyla during the Cambrian explosion is now attributed to information not stored in genes, namely *epigenetic information*. Add to this that similar information sequences do not affirm common ancestor genes. The reality that genes with information-rich sequences cannot be derived from common ancestral genes, is underscored by recent “genomic studies which reveal that hundreds of thousands of genes in many diverse organisms exhibit no significant similarity in sequence to any other known gene” (Meyer 2013:215). In addition Meyer mentions that these ORFan genes (derived from “open reading frames of unknown origin”) have “turned up in every major group of organisms, including plant and animals as well as both eukaryotic and prokaryotic one-celled living entities. In some organisms, as much as one-half of the entire genome comprises ORFan genes” (Meyer, 2013: 216). While having no homologs ORFans cannot be related to a common ancestral gene, a “fact tacitly acknowledged by the increasing number of evolutionary biologists who attempt to ‘explain’ the origin of such genes through *de novo* (‘out of nowhere’) origination” (Meyer, 2013:216). Clearly, questions concerning origins increasingly recede into the mystical realm of “coming from nowhere” (which is synonymous with: ultimately *we do not know* and closely approximating the possibility of *creation*)!

Likewise, the Cambrian expert, Douglas Erwin (trained at the University of California), in collaboration with Eric Davidson, “have now ruled out standard neo-Darwinian theory” because it “gives rise to lethal errors,” to which Erwin and Davidson add that no current theory of evolution explains the origin of the *de novo* body plans found in the Cambrian explosion (see Meyer 2013:356). On the same page Meyer mentions Erwin saying that establishing these novel body plans does not have “any parallel to currently observed biological processes” because he insists that the events of the past were fundamentally different. Meyer summarizes this succinctly: “the cause responsible for generating the new animal forms, whatever it was, must have been unlike any observed biological process operating in actual living populations today” (Meyer, 2013:356). When the principle of uniformity is challenged the door is opened for speculating about origination phenomena which are indeed unlike any biological processes observed in currently living populations.

How can anyone come to terms with the uncertainties and speculation increasingly surrounding (and even rejecting) the neo-Darwinian mechanism of random mutation and natural selection? Reverting to “out of nowhere” and a “fundamentally different past” underscore the mystery surrounding the unique origination of living entities, including the evidence of the Cambrian explosion which, according to Erwin and Davidson (2002), is not accounted for by any known (micro or macro) theory of evolution.

Concluding remark

In conclusion, it should be mentioned that implicit in our entire preceding analysis of the shortcomings in and problems of postmodernism, positivism and atheism one can discern key elements of a non-reductionist ontology motivated by the supra-theoretical ultimate

commitment to accepting God as Creator of the universe in Whom all things hang together. The idea of type-laws (with their specified universality) and the idea of universal (unspecified) modal laws occupy a key position in such a non-reductionist ontology. We are indebted to the founders of this philosophical legacy who developed their crucial insight during the first half of the previous century.

Among them also Stoker articulated his own assessment of what those who are involved in scholarship should acknowledge. He did this within the perspective of Christianizing all of life (Stoker 1967:65) which for him entailed the idea of God's law-order (Stoker 1967:52) on the basis of explicitly promoting the ideal of a non-reductionist ontology (Stoker 1967:61).

It is a privilege to be able to make a humble contribution to the further development of this philosophical legacy at an institution where professor Stoker has spent his fruitful academic career.

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Appendix 2

The wave-particle duality – the necessity of a transmodal understanding

1 Complementarity – limits to experimentation

There are also remarkable *limits* to physics in the sense of experimental exactitude and determination. By introducing his principle of uncertainty Heisenberg showed that it is impossible simultaneously to measure the *impulse* and *position* of an electron. The Copenhagen interpretation of quantum physics employs the notion of *complementarity* in order to account for the impossibility to establish both at once – thus allowing for two irreducible (and complementary) modes of description, in terms of “place” and “impulse” respectively. In following some ideas of Mario Bunge the physicist Henry Margenau defends a so-called “moderate reductionism.” He takes this to be “the strategy consisting in reducing whatever can be reduced without, however, ignoring emergence or persisting in reducing the irreducible.”

2 The typical totality structure of an entity (a unitary interpretation of wave and particle)

After Einstein reverted to a particle theory regarding the nature of light,² it turned out, on the basis of *interference phenomena*,³ that it is always possible to ascribe a wave-character to elementary particles. Conversely, the *Compton-effect* – regarding the interaction of a photon and an electron – supplied evidence to support the idea of *distinct* particles. De Broglie broadened the perspective by showing that with each and every moving particle (atoms, molecules and even macro-structures) one can associate a wave (cf. Eisberg, R.M. 1962. *Fundamentals of Modern Physics* (Second edition). New York: Wiley, 1961: 81, 151).

Although it turned out to be impossible to establish experimentally at *the same time* both the particle and the wave nature Bohr claims that these two perspectives are *complementary* (cf. Bohr, 1968:41 ff.).

In the light of the generalization provided by De Broglie one may ask: if it is possible to describe or explain entities qualified by energy in terms of two mutually exclusive experimental perspectives, namely as *particles* and as *waves*, is it then still meaningful to speak about their *unitary structure*? This question puts the finger exactly on that point where the special scientific description reaches its limits and needs to fall back upon a perspective transcending the confines of special scientific inquiry. What is here required is some or other (transmodal) philosophical account transcending the mere combination of one or more (modally delimited) special scientific points of view. The *idea* of the unity and identity of an entity could never be provided to us by theoretically explicating various modal functions, simply because this underlying unity is presupposed in all its function-

ing and all theoretical explanations. In a strict and technical sense this idea of an entity in its totality – preceding the analysis of its modal aspects – refers to an individual whole embedded in the intermodal and inter-structural coherence of reality, to an entity emerged in the depth-layer of an all-embracing *temporality* transcending genuine concept-formation and only to be approximated in a *concept-transcending idea*.

A deepening of this basic (transcendental) idea occurs when – through theoretical reflection and investigation – the dimension of micro-structures is unveiled (the micro-world with atoms and sub-atomic particles). It is important in this context, however, to realize that concepts such as *particle*, *field*, and *wave* are not *type concepts* but *modal functional concepts* (sometimes referred to as elementary basic concepts of physics). Consequently, the terms particle and wave analogically reflect retrocipatory moments within the structure of the kinematical aspect, namely *movement multiplicity* (numerical analogy) and *movement extension* (spatial analogy). These facets are deepened in physically qualified entities and could be approximated in physical theory from the perspective of mathematical anticipations to the physical aspect – compare Schrödinger's wave function formulated in terms of differential equations.

Since number, space and movement remain irreducible aspects regardless of the nature and type of entities functioning within them (their modal universality), it is also from this perspective understandable why the functionally distinct concepts *particle* and *wave* cannot be reduced to each other – a state of affairs supported by experimental data. Irreducible modal perspectives indeed also serve as *modes of scientific explanation*.

Born, Pymont and Biem reject the struggle with a *dualism* in this context. They hold that it increasingly becomes clear that “nature could neither be described by particles alone, nor solely through waves,” because a proper understanding cannot toggle between a “particle image [*Teilchenbild*]” and a “wave image [*Wellenbild*].” This leads to a unitary view of physical systems.⁴ What we have called *modes of explanation* these authors designate as *representations* “Darstellungen” – and they specifically mention three distinct (but simultaneously present) modes of explanation: an “Ortsdarstellung” (spatial representation: *position*), a “Wellendarstellung” (*impulses* or *velocities* – kinematic explanation) and an “Energiedarstellung” (the physical mode of explanation). (Born, M., Pymont, B. and Biem, W. 1967-1968. *Dualismus in der Quantentheorie*. In: *Philosophia Naturalis*, Volume 10:411-418 (pp. 416-417).

1 Margenau, H. 1982. *Physics and the Doctrine of Reductionism*. In: Agassi, & Cohen. pp.187, 196-197. [In: Agassi, J. & Cohen, R.S. (editors) 1982. *Scientific Philosophy Today, Essays in Honour of Mario Bunge*, Boston Studies in the Philosophy of Science, Volume 67, Dordrecht, Boston, London, 1982.]

2 Light quanta are called photons and similar to the neutrino they possess a zero mass. It is well-known that Einstein defended a deterministic view in physics. In a letter to Popper written in 1935, Einstein wrote to Popper “A [method of] description which, like the one now in use, is statistical in principle, can only be a passing phase, in my opinion” and then, with reference to classical statistical mechanics and the theory of Brownian movement, he adds an example: “a material point move with constant velocity in a closed circle. I can calculate the probability of finding it at a given time within a given part of the periphery. What is essential is merely this: that I do not know the initial state, or that I do not know it precisely” (Letter from Einstein, contained in Popper, Karl R. 1968. *The Logic of Scientific Discovery*, New York: Harper & Row Publishers, page 459-460; see page 464 for the text in the handwriting of Einstein).

3 Interference phenomena were established after Michelson – round 1880 – designed an interferometer capable of cutting light and afterwards recombining it. Thus one ends up with the same light beam – with slightly less energy. The remarkable result was that the sum did not produce light but darkness! However, when one of the two halves was blocked with a piece of black paper the other half did appear. Seemingly the only way to explain what happened here is to assume that the interference of the split light-waves cancel out each other when reunited.

4 “Mit der Quantentheorie erfaßt man so alle Systeme einheitlich, ...”