

CREATIO EX NIHILO

=//=

Based on a short paper presented to the conference: "Einstein, God & Time", held at the Ian Ramsay Centre for science & religion in the University of Oxford, Sept. 2005.

(revised 2022.12)

=//=

ABSTRACT

Christian Faith assumes that the universe is created by God. But does the belief in a Divine Creator make any sense? If we have to accept Einsteinian cosmology as providing the final map of our universe, it certainly does not. The contingency of a created universe is totally incomprehensible without that absolute simultaneity which characterizes a cosmic time. But do we have to accept Einstein's cosmology? Not at all! In fact, there is a much ignored *British School of Relativistic Cosmology* that vindicates the *Newtonian Idea of a Cosmic Time*. Granted such time, the idea of *Creatio ex Nihilo* can even be analysed formally in terms of the logic of tenses.

=//=

CONTENTS

Deus Creator Mundi
The Causality Principle
Some Atheist Grumblings
The Logic of Tensed Truths
The "Spatialization" of Time
Some Cosmological Riddles
Time as Creatio Continua
A Christian View

=//=

Man Time World

1. DEUS CREATOR MUNDI

The Christian Tradition, at least since St. Augustine, is unanimous with respect to its understanding of God as the Creator of Heaven and Earth and of the creation as an act of God whereby the becoming of something, viz., the world, emerges from nothing.

In the *Bible*, probably the only hint of *creatio ex nihilo* is found in the prologue to the *Gospel according to John*: "*In the beginning was the Word, and the Word was with God, and the Word was God. This was in the beginning with God. All things through that became; and without that became not one thing which has become.*"

The last passage can also be read: "*All things were made by him, and without him became nothing of that which is.*" When translated thus, it is a statement of the contingency of created beings, and indeed of the entire universe. Thus, if it pleased God to withdraw his Spirit from the creation, it would fall apart into dust and ashes, returning to that state of "nothingness" from which it originated *in principio*.

Now a state of "nothingness" is not easily defined or explained, and therefore the idea of creation poses a serious logical problem; in fact so serious that not only logicians, but even theologians, have held it to be insoluble and, accordingly, considered the belief in a divine creation to be an instance of *credo quia absurdum*.

But is it true that the first article in the Christian confession of faith is impenetrable to reason or common sense, being accessible only to *sancta simplicitas*? No, clearly not! Christian believers do not need to make the ultimate intellectual sacrifice and to bow in humility to the pretended wisdom of very famous scientists.

After all, it is still possible to defend the faith in creation by rational means without accepting the doctrine of a double truth, and without recurring to some outdated form of creationism with divine design and blueprint!

2. THE CAUSALITY PRINCIPLE

The founder of German "Geisteswissenschaft", W. Dilthey, described the antique principle *ex nihilo nihil fit*, from nothing comes nothing, as *the principle of metaphysics*. He might have illustrated his point by referring to Plato who let his spokesman Timaios make the statement: "*Everything that becomes must have a cause, since it is impossible that something can emerge without any cause*", the silent condition being that, if it could, then something would have emerged from pure nothing.

It is worth noticing that the causal principle in this, its classical form, is immune to the famous criticism stated by Hume. 1) His billiard example problematized the inference forwards in time, *from cause to effect*, not that backwards in time, *from effect to cause*. Whereas the *inference forwards in time* is the foundation for *the predictions of science*, the *inference backwards in time* forms *the basis of metaphysics*. 2) Hume is boomeranged by his own argument that it is impossible to reproduce any impression upon our senses that may prove the assumption of a necessary connection between cause and effect.

Mogens True Wegener

What reason did he state that the idea of necessary causal connection, in order to be legitimate, must be reproducible as a sense impression? Solely the hypothesis that only ideas which originate from sense impressions can be recognized as representing reality. In order to depict reality, our ideas must be produced to our experience by reality itself. But how, and in what way produced, if not causally? The answer appears to show that *Hume, in order to refute the principle of causality, exploited what he intended to refute!* Maybe the causal principle has a stronger foundation than Hume was prepared to admit? Kant claimed that. But Hume saw a way out: he dropped the *ex nihilo nihil fit*.

This seems to open up for transforming the principle to: *ex nihilo fit ens creatus*, from nothing comes the created being - but that, however, was hardly Hume's intention! Neither is it mine, for there is no point in being dogmatic.

So I give up the inference that the contingency of our universe, if it is contingent, necessarily entails the existence of a *prima causa*, or a *causa sui*. But that one *can* argue from contingent to necessary being, if one is feeling it to be mandatory, is evident!

Kant, after having demolished any metaphysics illegitimately pretending to possess *der sicheren Gang einer Wissenschaft*, said something similar in his "*Prolegomena*".

"Wir halten uns aber auf (die erlaubte) Grenze, wenn wir unser Urteil bloss auf das Verhältnis einschränken, welches die Welt zu einem Wesen haben mag, dessen Begriff selbst ausser aller Erkenntnis liegt, deren wir innerhalb der Welt fähig sind ... Wir .. vermeiden dadurch den dogmatischen Anthropomorphismus .. aber erlauben uns einen symbolischen Anthropomorphismus .. der in der Tat nur die Sprache .. angeht ... Und so kann uns nichts hindern, von diesem Wesen eine Kausalität durch Vernunft in Ansehung der Welt zu präzisieren und so zum Theismus überzuschreiten."

It is pertinent here to consider the concept of causality and its relevance to science. I must frankly admit that I find its significance to be highly over-estimated. It is so hard, in fact, to present a general definition of causality which in a reasonable way covers all presumed instances hereof, that I will choose instead to recur to the notion of natural law. So I reject all alternatives, whether founded on counterfactuals (as proposed by D. Lewis) or founded upon a procedure of marking (as proposed by H. Reichenbach).

Instead, I prefer to suggest that causality in the strict sense is better understood as the law-like connection between successive states within a well-defined energetic system. Whether it is acceptable to treat the universe *in toto* as a closed energetic system still remains to be shown. If it is, the structure of any earlier world-state may determine the structure of any later one, and "the past may be pregnant with the future" (Leibniz). That is: if time does not end now - if there is going to be any future at all!

But it is obvious that the notion of succession brings the concept of time into play. So I claim that *Time is prior to Causality*. If I am right, the *Logic of Time* is indispensable to an adequate understanding of the notion of *Contingency*.

3. SOME ATHEIST GRUMBLINGS

It is a favourite pastime of modern atheism to expose the impossibility of theology. This sport is facilitated by the musings of "atheist theologians", such as J. Sløk [1979]:

Theology does not speak *to* God, he claims. By contrast, it feigns to speak *of* God. But, in doing so, it does not make use of the proper language which is a religious one. Instead it uses the language of reason which is incommensurable to such lofty theme.

As a consequence, when the language of theology is attempting to speak of God, it invariably ends up in a mess; and if it does not do that, the explanation appears to be that it does not speak of God at all! Thus its project seems doomed to failure in advance. In fact, the idea of God puts a limit to human knowledge and understanding (Kant), and the word 'God' is on a par with the letter *X* representing an *incognito* (Kierkegaard).

The theological axiom "God created the world", or "The world is created by God", refers to human reason. But God, understood as "The Almighty", or "The Infinite Power", is impossible to define. The predicate 'infinite' is clearly negative and abstract. Moreover, if we attempt to make it positive, or concrete, it turns out that the only examples which can be offered have to be taken from that world which, according to the axiom itself, must be assumed to be entirely different from its Creator, God.

Because all predicates of our language receive their connotation from the world we all know, we are unable to predicate anything of God without predicating something wholly different, i.e., something which is not God. In this way the word 'God' turns out to have no connotation, the atheists claim. Neither can one point to any real denotation. Pretending to refer, it has no real referent. Hence it represents nothing, it is all feigned. The proposition: "God has created the world", can thus be translated into the proposition: "Nobody has created the world" or, simply: "The world was not created"!

The "createdness" of the world is not an observable fact. For the atheist theologian, it is just a theory, like the opposite theory, that the world was not created but emerged by itself and now is there as a brute fact. As claimed by the opposite theory, we are left over to ourselves in a world without a trace of God. This theory, which currently enjoys great popularity, probably appears so natural to most people that it would hardly seem to be in need of any proof. The onus of proof appears to rest entirely upon the shoulders of anyone who dares to defend the sense of an outdated theory of creation. -

Instead of defending the theory of creation directly I shall do it indirectly, attacking the other theory. meant to be its opposite by denying all traces of "createdness".

My point is that if the theory of creation is meaningless, then the other theory, being its opposite, must be equally meaningless! Conversely, it holds that if the opposite theory makes any sense, then the theory of creation must be equally meaningful!

Even a poor logician must concede that, if a statement is true, its contrary is false. Likewise he must admit that, if a statement is meaningless, it is nonsense to deny it! -

Mogens True Wegener

4. THE LOGIC OF TENSED TRUTHS

A logic of time is needed to analyse the problems of contingency and creation. What is logic? It is the *organon*, or instrument, for all reasoning and rational discourse. Its aim as an intellectual discipline is to investigate the conditions for the transferring of truth-value from given premisses to a valid conclusion. Tense logic, like modal logic, cannot be reduced to ordinary truth-functional semantics.

Leibniz made an early attempt to explain modality by reference to *possible worlds*. In line with this, what is *necessary* is what is true in all possible worlds, what is *possible* is what is true in some possible world, and what is *actual* is what is true in a privileged possible world, viz., that unique world which we ostensibly point out as being 'our own'. But, against Leibniz, I do not admit that possible worlds really exist.

The starting point of tense logic, which was founded by A.N. Prior, is the classical opposition, cf. McTaggart, between an *A-term analysis* and a *B-term analysis* of time. McTaggart distinguished between the absolute *A-concepts* of *past*, *present* and *future* and the relational *B-concepts* of *before*, *during* and *after*. According to Prior all real existence is present, and only present existence is real. The past is no longer real, and the future is not yet real. Further, facts are true statements, and statements, if true, are true *now*.

The aim of tense logic is to systematize our reasoning with tensed propositions. The subject matter of standard tense logic consists of temporally indefinite statements, the definite statements being those that are omnitemporal, those that signify an absolute beginning or ceasing, and those that are unique in the sense that they are true just *now*, but neither true in the past nor true in the future. With tense logic, the verb can no longer be understood as atemporal, but must be interpreted as referring to the present.

Now, given some present fact, what can we infer concerning its past and future? You are now, at this very instant, reading a paper treating the idea of *creatio ex nihilo*. From this fact you can infer not only that, from now on, it will always have been the case that you were reading this paper, but that it is inevitable that it will have been the case. But you cannot infer that you were always already destined to read this paper; what you can infer is only that it was always possible that you would some day read some paper, and even that you can infer only if this possibility was always statable.

We conclude that the sum of statable truths is steadily increasing, due to the fact that assertions which were not hitherto statable become statable in the course of time. Being now statable, we may surmise that such statements remain statable forever after. On the contrary, propositions feigning departed individuals to be present are false.

With tense logic, we can always define a Leibnizian monad as a maximal set of consistent assertions, just as we can construct a Leibnizian world as a maximal set of compossible monads. What is important by this construction is that the structure of such monads, or possible worlds, remains the same, irrespective of whether we assume their actual existence, or not: their structure is relevant, but their existence is not.

As noticed by Prior in his *Worlds, Times & Selves*, their logical structure is similar. Even God, if personal, must be an individual, or a monad. However, a difference persists: God is *necessary* - but everything else, his entire creation, is *contingent*.

Defining the possible as that which is not inevitably not the case, possibility is always future, thereby implying that possibilities are lost forever as time is passing by; but this loss of possibility is more than compensated by a gain of storable truth.

i. It should be noticed that this new logic, *by making sense of the idea of time's flux*, thereby also *lends a unique direction to the arrow of time!*

ii. Further, by allowing the assumption that it may be possible tomorrow to speak of what we cannot speak of today, it *makes sense of creatio ex nihilo!*

iii. Finally, by discerning what was predestined of eternity from what is now inevitable it *solves the conflict between divine omniscience and human freedom!*

God knows all that is knowable now - but we assist his creation of future facts!

5. THE "SPATIALIZATION" OF TIME

It is elevated beyond any reasonable doubt that natural science has a triple task, or purpose, namely: 1) to *describe* the facts, 2) to *predict* what is going to happen, and 3) to *explain* what was once the case. All science presupposes the tripartitioning of time into *past, present, and future*, making sense of time's *passage*, thus of its *direction*.

Hence, if a great physicist claims that time is an illusion, and that talk about time's passage or direction lacks a scientific foundation, he should be ousted with the message that his claims go against the basic premisses of science! Furthermore, it is unacceptable if his followers obstinately persevere in claiming the legitimacy of results that anyone can see are at variance not only with common sense, but with their scientific presuppositions! This criticism is particularly relevant against the relativity theories of Einstein.

Four branches of physics are very important regarding our comprehension of time: 1) *thermodynamics*, 2) *quantum mechanics*, 3) *relativity*, 4) *cosmology*.

Thermodynamics tells us: *a)* the energy of an isolated system is constant (1st Law); *b)* the sum of disposable energy, the part of it that can be made useful for work, steadily decreases when judged statistically (2nd Law). The second assertion, the law of entropy, is often assumed to provide time with a direction ("time's arrow").

As stressed by I. Prigogine, in his *From Being to Becoming* [1983], this is not true. Albeit thermodynamical statistics allow us to distinguish between two directions of time, thermodynamics alone do not tell us which one of these is pointing towards the future and which one towards the past: thermodynamics just lacks the relevant principle of selection. It is remarkable that tense logic provides physics with such a principle!

Quantum mechanics is a strange theory, exceedingly effective from the point of view of experimental practice, but theoretically incomplete, as it seems; however, not for the reasons adduced by Einstein, Podolsky & Rosen, which were refuted by Aspect & al., but because it does not have any means for parametrizing the "wave function collapse".

I do not wish here to be involved in the intricacies concerning the interpretation of quantum theory. But what the theory is unable to solve for one universe is hardly solved by invoking an infinity of parallel worlds, separated by successive instants of bifurcation. The notorious "many-worlds" interpretation of Everett & Wheeler may be interpreted as a naïve distortion of the possible worlds semantics of modal logic!

So it is a source of abiding surprise to me that the scientific establishment prefers hazardous extravagancies to modest generalizations guided by the *classical principle of correspondence*, such as, e.g., the ingenious *covering theory* of classical and quantum mechanics suggested by T.E. Phipps, jun., in his monumental book *Heretical Verities* [1986]. What is particularly interesting about this theory is that it provides a *mechanical explanation* of the concept of temporal irreversibility ("time's arrow"). In the same book Phipps directs a devastating criticism against Einstein's theories of relativity.

His book is well worth studying for its profundity and originality!

Einstein devised two theories of relativity: the special (SR) and the general (GR). SR, that may be viewed as the closure of classical mechanics (CM), entails a correction of CM with respect to time. Whereas Newton considered simultaneity to be absolute, Einstein claimed that it is relative to the observer or, rather, to his "reference frame". Later, Minkowski announced the welding of time and space into spacetime, and Einstein declared it to be his ambition to reduce everything in physics to "space-like concepts". The philosopher Bergson scorned this as a program for "the spatialization of time".

It should be noticed, however, that the French mathematician and philosopher of science H. Poincaré, in 1905, shortly before Einstein, published a paper wherein he, making a minor correction of what he called "Lorentz's transformations", validated their group properties and introduced $i = \sqrt{-1}$ in order to ensure time-space symmetry.

This did not restrain him from applauding Lorentz's "ingenious idea of local time" as a means of avoiding the relativization of the Newtonian concept of an universal time. For this he was reproached by A. Grünbaum who saw his mature prudence as a sign of hesitation that refrained him from taking the decisive step towards revolution in science, in contrast to Einstein who saw what was needed: a clean break with tradition.

Grünbaum is clearly right that the relativization of simultaneity, and the following repudiation of the Newtonian concept of universal time, is the characteristic hallmark of the Einsteinian revolution. Apart from this, however, Poincaré's 1905-theory is practically indistinguishable from the 1905-theory of Einstein, except that the former is more elegant whereas the latter suffers from several flaws, cf. G. Keswani [1964/65].

It is precisely the revolutionary goal that makes Einstein's ideas so fatal to science. In politics, it has since long been realized that revolutions can be disastrous to society. More often than not they have just instigated a serious debasement, and the same may all too easily have happened to science. In fact, *the relativization of simultaneity is the most fatal blow ever given to realism in science!*

Fortunately, it can be countered with a whole series of weighty objections:

- a) It is a tacit premiss of all physics that atomic clocks of the same construction under the same circumstances keep the *same rate*, and that without being causally connected. This is but a physical analogue to the pre-established harmony of monads, cf Leibniz!
- b) Given two particles in collinear motion, it is always possible to construct their *midway particle* and, relative to this, the motion of the two first is perfectly symmetric. Thus LT (Lorentz-trf.s) are transmutable to GT (Galileo trf.s) for pairs of observers!
- c) The relative retardation of clocks by collinear inertial motion follows from the fact that, whereas the slave-clocks fixed in the frame of an observer are synchronized to his master-clock by taking *the arithmetic mean* of the epochs of emission and absorption of a reflected radar-signal, the synchronization of the master-clock of one observer to that of another one is effected by taking *the geometric mean* of the epochs of the same signal; cf. the "*k*-calculus" of H. Bondi. But that the master-clock of an observer in passing some slave-clocks fixed to the frame of another master-clock *appears* to be delayed relative to these does *not* demonstrate the master-clocks themselves to be mutually delayed!
- d) That clocks are retarded when exposed to the work of gravitational potentials, cf. the Cern meson experiments, is *not* a counterinstance to the idea of a true time!
- e) There are semi-classical equations of motion passing the same tests as does GR, cf. ch.17 §4, showing the heavy tensor apparatus of GR to be entirely redundant!
- f) Granted that the structure of the universe is fixed by a system of observers subject to *cosmic isotropy* (no preferred directions), a *Cosmic Time* is always definable!
- g) If the *cosmological principle*, which implies cosmic isotropy relative to the *CMBR*, is invalid, we can renounce all hope for a scientific theory of the universe!

6. SOME COSMOLOGICAL RIDDLES

It has been pointed out that cosmology provides physics with an indication of "time's arrow" which, with regard to importance, is on a par with that furnished by thermodynamics. If, as suggested by current evidence, the universe is evolving from an origin of infinite density, the successive stages in this evolution may be interpreted as an objective measure of its age. But other beginnings still remain possible.

So do other means of estimating the age. That the universe seems to exhibit the traces of a temporal evolution is not very surprising. If we take into account the many concordant results of sciences like astrophysics, geology, biology, and history, it would be more surprising if it did not. Nevertheless, there is a peculiar science - physics - which, dominated by the charisma of one person, would mock these results.

The outcome of Einstein's revolution is precisely to erase all temporal vestiges from science. Few have faced the result, viz., that Einstein makes nonsense of Darwin. But that Einstein is wrong does not by itself turn Darwin right. Let us instead consider the evidence adducible from cosmology in support of the definability of a cosmic time. In fact, two of the most important discoveries of the 20.th C. relate to cosmology.

Mogens True Wegener

They are: I) the discovery by E. Hubble of the so-called "redshift" of light received from distant galaxies, which is traditionally interpreted as showing that such galaxies are receding from us with speeds increasing in proportion to distance; II) the discovery by Penzias & Wilson of the 3K "cosmic microwave background radiation" (CMBR) which, due to its "black body" spectrum, is broadly considered as lending support to the famous "big bang" (BB) hypothesis proposed by Lemaître & Gamow. This conclusion, however, presupposes that a "black body" spectrum can only be explained by a BB.

What the observations *prove* is that universal 3-space seems to be almost isotropic. Consequently we have to face two possibilities: α) the first is that we (our own galaxy) are placed near the center of the entire universe; ω) the second is that our position is not that privileged, but that the same might be the case also for observers on other galaxies. According to the latter hypothesis, space is not just locally but even globally isotropic, so that any observer at rest relative to CMBR will see himself in the center of the universe. Cosmological humility then induces us to opt for the second possibility.

Granted that the universe, as indicated by the discovery of the *cosmic redshift*, is in a state of "expansion" - a misleading expression for the observed fact that the contents of the universe is subject to dispersion - what can be said about its fate? According to GR, gravitation functions as a brake hampering the dispersion of the universe. Most modern cosmologists therefore believed ("predicted") that its dispersion were decelerating.

To Einstein, however, the universe had to be static and finite, without boundaries. Assuming that the force of gravity is universal, he invented a new force, represented in his field equations by the constant Λ to balance it, thus ensuring that the universe is static. He might have taken a different stand, had he known Hubble's observations. Likewise, the interpretation of GR, suggested by Friedmann and Lemaître, might have made him realize somewhat earlier that his first, preferred, world-model was unstable.

Recent observations of supernovae, indicating that the dispersion of matter in the universe is accelerating and not decelerating, as most cosmologists had believed, the only way of explaining this acceleration on the basis of standard GR seemed to be to revive the old cosmological constant, Λ , which Einstein himself had abandoned a long time ago. This is what the cosmological "experts" chose, rather than questioning their premiss, GR, and without admitting, nor even realizing, that their procedure was *ad hoc*.

However, this is not the sole example of *ad hoc* reasoning exposed by the majority of ordinary relativists, characterized by possessing the right herd instinct!

For instance, supposing that the universe began with a Bang (a big one, indeed!), and assuming that causal influences cannot be propagated with velocities exceeding the limit c , as "predicted" by SR, it is difficult to explain how the universe appears to be so homogeneous and isotropic as, in fact, it does on the cosmic scale. To the purpose of solving this so-called "mix-master" problem, the orthodox cosmologists therefore invented an extraordinary solution, postulating that the space of the early universe, during a tiny fraction of a second, underwent a huge "inflation" exceeding the speed limit c .

This implied spacetime to have been partitioned in a strange way at an early stage.

For this "reason" the Universe, after the first BB, was inflated into a major "multiverse", comprising an infinity of minor "baby universes", separated from each other by horizons detectable in principle, albeit only if the observer is situated close to the border region. Such border region, fortunately, may be imagined to be so distant from the vast majority of observers that it is detectable by only a few of them, if they are that unfortunate.

But this drawback may easily be turned into a major advantage if one is prepared to admit, with L. Smolin, ignoring the discordance of Darwinian and Einsteinian science, that something like a Darwinian selection has been operating on these "baby-universes", favouring an evolution towards higher intelligence in an infinitesimal percentage of these "universes". This bright idea ensures compatibility with the notorious anthropic principle, stating that intelligence can only develop in a universe adapted to such purpose.

Thus there are lots of *examples of dysfunctional reasoning* in scientific cosmology. Having exploited inflation as an assurance that our tiny universe in a vast majority of its regions is subject to isotropy, it suddenly occurred to some cosmologists that they might have proven too much and therefore were in need of another explanation of the fact that our universe shows such a definite structure, in spite of all inhomogeneity and anisotropy. They therefore turned to astronomy for help, and *Heureka!* they found what they sought: some "ripples" in the CMBR, showing that the early universe was not *that* homogeneous, after all, thereby issuing a convenient opportunity of fusing GR with QM.

For those who are doubtful of the blessings promised by "the Einsteinian revolution", and are sick and tired of such wavering, there may still be hope. In fact, relativity theory did not begin with Einstein, it started with Poincaré; cf. E.T. Whittaker [1953, vol.II, ch.ii; and as remarked by J.D. North [1967, p.49]: "Had the general sympathy not been so emphatically in favour of a field theory of gravitation, Poincaré's memoirs might well have been a turning point in the history of the subject".

One cosmologist who did not buy GR, but preferred to construct his own theory, was the Christian mathematician and cosmologist E.A. Milne of Oxford, who proposed his *Kinematic Relativity* (KR) expressly as a viable alternative to SR & GR.

Milne's purpose was to invent a cosmology by deduction from a few assumptions. Generalizing SR to a full cosmology, his world model was based on uniform dispersion. His colleague A.G. Walker developed KR further to become a mathematical technique on a par with GR and, just like GR, applicable to a whole range of world models, viz., all those subject to the principle of cosmic isotropy, the cosmological principle.

Although the principle (like so much else) is often ascribed to Einstein, it was first formulated by Milne; cf. North (*ibid.*). As noticed before, an universal time is definable for any universe fulfilling that principle. The famous *Robertson-Walker metric* (RWM), which is a formalization of the principle of cosmic isotropy, has long been commonly acknowledged as being the standard metric of relativistic cosmology.

Milne's method for the construction of his relativity theory is based on signal-functions, and his solution to the paradoxes of time can be boiled down to just two points: 1) Two observers possess congruent clocks when their signal functions are symmetric. 2) All the clocks of an infinite set of observers are congruent when their signal functions are mutually commutative. The latter point implies that, even though the mutual distances between the observers may be changing in accordance with a universal scale function, the relative angles between the lines of sight will be preserved in flat 3-space.

Milne also held that the general structure of the universe is fixed by a privileged class of equivalent observers, called *the substratum*, which is subject to cosmic isotropy, thus constituting an universal reference frame for the description of rest and motion.

One of the most conspicuous differences between the cosmologies of Einstein and Milne is that Einstein held gravitation to be a brake counteracting universal dispersion, whereas Milne saw gravitation as a spontaneous consequence of that dispersion.

A. Mercier [1979] has stated his qualms concerning the program of "spatializing" time, proposing that "*spacetime*" be re-interpreted as "*timespace*", or "*supertime*".

As regards gravity, he even expressed the startling opinion: "**Gravitation is Time!**" Maybe time, at last, has come to reconsider "the Einsteinian revolution" ?

7. TIME IS CREATIO CONTINUA

According to Plato, there is one world only, "and it is and remains the only one". Leibniz agreed to this statement: we can conceive of an infinity of possible worlds, but only one of these is in fact real. Now, what is real is also conceivable in the sense that it does not lead us into inconsistency. However, a world wherein nothing ever happens is not a conceivable world. Whatever happens we call occurrences or events.

Events find their place in time or, rather, they constitute time. All possible worlds, including that which we call "our own", must be described as so many series of events in succession, so many world-times. The notions of time and world are indistinguishable and may be identified with the concept of process as a succession of observed events. Hence, for each possible world, there is one, and only one, world-time.

The decisive difference between God and world, Creator and creation, is reducible to that between two kinds of "existence": necessary and contingent. For the Christian, this in the last resort will be equivalent to the difference between divine perfection and human imperfection. However, we here consider contingency in contrast to necessity, because contingency is what must designate a world which is created.

Considered separately from the concept of time it is hard to see how the notion of contingency can be ascribed a precise meaning; but if a world is identified with its time, we can define contingency as the impossibility of explaining the occurrence of a future world-state by reference to the occurrence of a past one: causality is impotent to that: *Causality can never guarantee that we are going to experience any future at all!*

What causality *can* predict, given the structure of some past world-state, is the *probable* structure of a future one. All this, of course, would presuppose that it makes sense to speak of a world-wide simultaneity. If not, the idea of *creatio ex nihilo* will eventually have been refuted. Therefore the idea *can* be refuted. So it *does* make sense, contrary to the claims of atheist-theologians. But this shows it to be vulnerable too.

It can be true or false. Maybe it is false? How should the world be to make it false? Just as Einstein imagined! If Einstein's unfinished revolution could ever be completed, if it were true that talk of time's flow had no meaning, this would end all talk of creation. But Einstein's revolution is a theoretical disaster and will be recognized as such!

The warfare of science against religion will then turn out to be the most spectacular instance in all history of an unsuccessful attempt at falsification! Thus we may conclude that science is not the only source of truth. In particular, religion need not hamper reason! As A.N. Whitehead wrote in his *Science and the Modern World* [1925]:

"Faith in the possibility of science, generated antecedently to the development of modern scientific theory, is an unconscious derivative from medieval theology."

In §8, I shall give a dazzling example showing the foresight of such theology! -

Christianity teaches us that the *power* of God manifests itself in the act of creation whereby something, namely, the universe, is called forth out of nothing and kept alive; further, that his *wisdom* is manifested in the creation of man as an imperfect *imago dei* with freedom of will, foreseeing the fall of man and our ensuing evil deeds; and finally, that his *grace* is demonstrated in his decision to save us by sending his son and spirit.

So far, there is no contradiction in this tall story. But a contradiction lurks if God's providence be construed as an eternal foreknowledge of the truth of all future contingents. In that case providence is falsely explained by the speaking of what is unspeakable!

But why should God's work of creation be predestined to repeat an eternal truth? Should God be unable to create spontaneously without using a preconceived blueprint? If he is a supreme artist, he surely works "bottom-up" as easily as "top-down"!

But God must be a perfect mathematician. Can we not imagine him as an infinite and infallible intelligence who calculates everything in advance, as suggested by Leibniz?

God has no need of a "brain", of course; but if he decided to make use of one, how big would it have to be? One less than the infinite universe will hardly do. If that is true, even God would have to wait and see, performing his calculations in real time'!

The reason why God does not know the truth of future contingents may be that he has chosen not to know. Maybe God created a world whose future is only predictable in general terms because he wished to convey freedom of will to man as *imago dei*.

Instead of continuing my speculations I prefer to follow Kierkegaard by accepting the relationship of Eternity to time, Creator to creation, as the Sovereign Paradox.

=//=

Mogens True Wegener

8. A CHRISTIAN VIEW

I shall conclude by recalling the ideas of cardinal Nicholas Cusanus (1401-64), theologian, philosopher, cosmologist, who inspired Giordano Bruno, prophet of infinity. Major works are: *De Docta Ignorantia*, *De Conjecturis*, *De Non Aliud*, *De Visione Dei*.

In his *De Docta Ignorantia* Nicholas followed Plato, describing Time as a moving image of Eternity, which he interpreted as Undivided Oneness. In itself, time is nothing but an ordering of the present: the present infolds past and future, just as past and future unfolds the present. Nicholas' point is that the now, being of variable duration, includes both the past as a having-been-present and the future as a going-to-be-present.

Oneness, itself beyond time, must perceive changing things in an unchanging way. Divine Providence encompasses everything which has happened, is happening, and will eventually happen, viewing that which is possible in time as being actualized of eternity. The universe, like everything created, had a beginning, though not within time, and may be called eternal in the sense that there was no time before the creation. World and time emerged together, and are still emerging, from their only possible source: Eternity.

*This is the traditional Christian view, which I can only accept with a proviso.*¹

Many other ideas of the Cusan are remarkably modern, pointing ahead of history. His *opus magnum*, "*De Docta Ignorantia*" (: on learned ignorance), is tripartite:

Pars I describes **God** as that **Oneness** which is *coincidentia oppositorum*, being at once *maximum absolutum & minimum absolutum*. This idea is then elaborated by means of geometric analogies which, in important respects, anticipate insights peculiar to non-Euclidean geometry! We can recall Nicholas' idea by describing God as **actual infinity**.

Pars II describes the **World** as the **Wholeness** that unites all as **potential infinity**, *maximum contractum & minimum contractum*. In order to explain this other idea Nicholas uses another geometric analogy, namely, that of a sphere which has its center everywhere and its periphery nowhere: "*Unde erit machina mundi quasi habens undique centrum et nullibi circumferentia, quoniam eius circumferentia et centrum est Deus qui est undique et nullibi*" (ch.xii).² This idea stems from the Hermetian writings where it is applied to God as Creator. Nicholas, who probably knew it from the *Itinerarium Mentis in Deum* of St. Bonaventure, brought it to bear on the created universe instead.

With this, he anticipated *the modern cosmological principle* of Milne & Walker! Rejecting both the geocentric and the heliocentric world, his intuition of an astrocentric universe led him to intimate that *all stars are heavenly bodies* similar to our own Sun, that *no star in heaven forms a perfect sphere*, perfection being a prerogative of God, and that *countless globes are populated with living, conscious beings like ourselves!*

Pars III calls *Man before the Fall*, a created god, a union of Creator and creation, absolute & contracted being in one, depicting *Man after the Fall* as a corrupt and stained being, depending for its salvation on that mercy of God which is obtained only through faith in our mediator, Jesus Christ. Finally, anticipating the crucial *sola fide doctrine* of Martin Luther, Nicholas expressly wrote:³

"Humanitas in Christo Iesu omnes omnium hominum defectus adimplevit ... Non est iustificatio nostra ex nobis, sed ex Christo ... quem cum in hac vita per fidem formatam attingamus, non aliter quam ipse fide iustificari poterimus ..." (iii.6).

Nicholas was inspired by the great mystic, Johann Eckhart. According to Eckhart, "The eye whereby God beholds me is the very same as that eye whereby I behold God. It is all one eye, one sight, and one love!" He also said: "If God could depart from truth, I would follow truth and skip God!". These words, expressing the essence of modernity, may be seen as a maxim for the development of science in modern times.

However, an important addition is needed. What Eckhart really meant to assert was in its effect nothing but a simple *suppositio ex impossibile*. In fact, as he added: "God cannot separate himself from Truth, for **God is Truth**".

Nicholas' own ideas were not condemned, and his books were never put on *Index*. Some atheists, e.g., Sløk, have charged him accusing him of pantheism, a serious heresy; but he can be defended by citing from his *De Deo Abscondito* (a gem of a dialogue!):⁴

Gentilis: *Mira affirmas Deum, quem adoras, nec esse nihil, nec esse aliquid ...*

Christianus: *Deus est supra nihil et aliquid, quia ipsi oboedit nihil, ut fiat aliquid. Et haec est omnipotentia eius qua quidem potentia omne id quod est aut non est excedit.*

NOTES to §8:

1. This is the medieval view of God and Time. For a modern view, see chs.10 &11!
2. *Hence the world system is as if it had its center everywhere and its periphery nowhere, its periphery and center being God who is at once everywhere and nowhere!*
3. *The humanity in Jesus Christ makes satisfaction for all the defects of mankind ... Therefore our justification is not from ourselves, but from Christ ... to whom we adhere by faith in this life, since we cannot be justified except alone by our faith ...*
4. Pagan: *You claim ... that the God you adore is neither nothing nor something ..?*
Christian: *God surpasses both nothing and something because nothing obeys his command so that thereby something is made. This is God's omnipotence that by his very power he exceeds everything, both that which is and that which is not ...*

=//=