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# THE SPECIAL THEORY OF RELATIVITY AND THEORIES OF DIVINE ETERNITY

William Lane Craig

Recent theories of divine timeless eternity have appealed to the Special Theory of Relativity, either illustratively or substantively, in order to explicate and defend the notion of a timeless God's being really related to temporal moments and events. I argue that besides in some cases misusing STR, these theories presuppose without justification a certain interpretation of STR which, while widespread, is ill-founded and dubious.

## Introduction

Although studies of divine eternity written during the previous generation—such as Nelson Pike's standard work, *God and Timelessness*<sup>1</sup>—paid scant attention to the nature of time insofar as it plays a role in physical theory, contemporary analyses of divine eternity often make explicit appeal to physical theory, and particularly to the Special Theory of Relativity (STR), in support of the doctrine of divine timelessness. This appeal may be primarily illustrative, as in the case of the Stump-Kretzmann model of divine eternity.<sup>2</sup> On the other hand, STR may play an essential role in the construction and defense of the coherence of a model of divine eternity, as in Brian Leftow's theory.<sup>3</sup> If the appeal to STR turns out to be nugatory, then in the former case one has lost a physical analogy to one's theory and thereby any credibility which that analogy may have lent to one's metaphysical model; but in the latter case the results are more serious because with the removal of its relativistic underpinnings one's model collapses into incoherence.

It is important, therefore, especially for proponents of the latter sort of model, that the legitimacy of the appeal to STR be thoroughly explored. It is my fear, however, that this exercise has not been carried out by proponents of divine timeless eternity and that as a result STR may have been both misused and naively interpreted by them. In order to explore this question, let us consider Leftow's recent exposition and defense of his theory.<sup>4</sup>

## Examination of Leftow's Theory

Two fundamental tenets of Leftow's theory, namely, (i) that temporal things exist both in time and in timeless eternity and (ii) that the timeless presence of all things to God in eternity is compatible with objective temporal becoming, depend essentially upon the legitimacy of the application of Einsteinian



relativity to temporal events in relation to God. Let us look more closely, therefore, at Leftow's exposition and defense of these two tenets.

(i) *The Existence of Temporal Things in Timeless Eternity*

(a.) *The Zero Thesis*

Leftow bases his defense of (i) on what he calls the Zero Thesis: that the distance between God and every spatial being is zero. The argument for this thesis is simple: if God is not located in space, there can be no spatial distance between God and spatial beings; therefore, there is none.

This argument seems to involve a category mistake, however. Leftow himself states the objection clearly:

...God is not the kind of thing of which we can affirm *or* deny distance: ...'there can be no spatial distance between God and spatial creatures' is a category-negation rather than an ordinary negation, and so its semantics are such that it does not entail the Zero Thesis....the Zero Thesis is actually ill-formed. For it arguably is equivalent to 'there is a distance between God and spatial creatures, and this distance is zero,' a conjunctive proposition whose first conjunct the doctrine of categories declares nonsensical.<sup>5</sup>

One may not therefore validly infer from God's spacelessness that the distance between God and any spatial being is zero.

The foregoing objection seems to be well-founded. The dispute between Lorentzian and Einsteinian Relativity provides a salient example from the history of science of the crucial difference between a category-negation and the negation of a property. Nineteenth century aether theories originally posited as the medium of transmission of electromagnetic radiation an invisible, rigid liquid, like glass, which was nonetheless completely intangible and utterly at rest with respect to absolute space. With the publication of his STR paper in 1905, Einstein rejected the existence of the classical aether and along with it the privileged rest frame. But in 1916, at the prompting of Lorentz that the General Theory of Relativity (GTR) admits the possibility of a stationary aether, Einstein introduced a new relativistic conception of the ether: the space-time itself as described by the metrical tensor  $g_{\mu\nu}$ .<sup>6</sup> When Einstein lectured at Lorentz's University of Leiden in 1920, he drew a fundamental distinction between the classical aether and his new relativistic ether on the basis of the applicability of the category of motion to the aether frame:

As regards the mechanical nature of Lorentz's aether, one might say of it, with a touch of humor, that immobility was the only mechanical property which H. A. Lorentz left it. It may be added that the whole difference which the special theory of relativity made in our conception of the aether lay in this, that it divested the aether of its last mechanical quality, namely immobility....

The most obvious viewpoint which could be taken of this matter appeared to be the following. The aether does not exist at all....

However, closer reflection shows that this denial of the aether is not demanded by the special principle of relativity. We can assume the existence of an aether; but we must abstain from ascribing a definitive state of motion to it, *i.e.*, we must by abstraction divest it of the last mechanical characteristic which Lorentz had left it....

Generalizing, we must say that we can conceive of extended physical objects to which the concept of motion cannot be applied.... The special principle of relativity forbids us to regard the aether as composed of particles, the movements of which can be followed out through time, but the aether hypothesis as such is not incompatible with the special theory of relativity. Only we must take care not to ascribe a state of motion to the aether.<sup>7</sup>

Privately Einstein confessed to Lorentz, "It would have been more right if I had limited myself, in my previously published papers, to lay emphasis only on the non-existence of any velocity of the ether instead of the defense of the total non-existence of the ether."<sup>8</sup>

When Einstein denied a velocity or state of motion of the ether, he was emphatically *not* ascribing to it the property of immobility. For that would be to admit that the ether constitutes a reference frame, as Lorentz claimed, and therefore serves in virtue of its immobility as a privileged frame relative to which absolute motion, simultaneity, and length exist. Rather the relativistic ether is, as Kostro puts it,<sup>9</sup> an ultra-referential reality to which the category of motion does not even apply.

When Leftow infers from God's spacelessness that the distance between God and spatial things is zero, he seems to commit the same error as would someone who inferred from the ultra-referential status of the relativistic ether that its motion is zero. Leftow defends his inference by asking how, if the Zero Thesis and its equivalent "There is a distance between God and spatial creatures, and this distance is zero" are ill-formed nonsense, we can understand them well enough to tell that they are equivalent. The answer is that we understand analogous well-formed statements about spatially distant objects (and rest frames) well enough to see what has gone wrong in these ill-formed statements about a spaceless being or an ultra-referential reality. Leftow further defends his inference by asserting that the equivalent mentioned is problematic only if a zero distance is a positive distance. By "positive" he does not mean positive in the numerical sense, for that would be not merely problematic but contradictory. Rather he means positive in the sense of ontological status. But if Leftow means to assert more than a category-negation, he must be ascribing positive, existential status to the zero distance between creatures and God. That is just as problematic as ascribing zero motion to the relativistic ether. Finally, Leftow defends his Zero Thesis by claiming that it is an entailment of the true and intelligible statement that "Necessarily, there is no distance between God and any spatial thing." But this statement is true and intelligible only insofar as it is a category-negation, and as such it does not entail the Zero Thesis.

What is disquieting about this apparent failure of the Zero Thesis is that Leftow's entire theory of divine eternity appears to balance like an inverted pyramid on this Thesis, so that with the untenability of that thesis the whole theory threatens to topple. Without the Zero Thesis, I do not know how to save Leftow's theory, for without it there is no "frame of reference" in which all things exist changelessly relative to God—which fact should become clearer as we proceed.

According to Leftow, the Zero Thesis has a startling consequence: since the distance between God and any creature is always the same (zero), there is no motion relative to God. Now, of course, in the sense of a category-negation there is no motion relative to God, since God is not a reference frame any more than is the relativistic ether. But Leftow takes this consequence to mean that God is or has a reference frame and that the motion of things in space relative to that frame is zero. He writes, "That there is no motion relative to God does not entail that there is no motion relative to *other* things. There is nothing problematic in the thought that an object at rest in one frame of reference (e.g., God's) is in motion in other reference-frames."<sup>10</sup> What *is* problematic, however, is the slide from speaking colloquially of God's "frame of reference" to treating this as a sort of reference frame related relativistically to other physical reference frames. A reference frame is a conventional standard of rest relative to which measurements can be made and experiments described. In STR our concern is specifically with inertial frames, which are reference frames comprising certain regions of space and time within which, to some specified degree of accuracy, every test particle which is initially at rest remains at rest and every test particle that is initially in motion continues that motion without change in speed or direction.<sup>11</sup> Such a conception obviously cannot be applied to God in any literal sense; He has no reference frame as such. But then it is simply inept to speak of objects at rest (zero motion) relative to God.

(b.) *Thesis (M)*

Leftow proceeds to broach the following thesis, which he characterizes as "eminently defensible":<sup>12</sup>

M. There is no change of any sort involving spatial, material entities unless there is also a change of place, i.e. a motion involving some material entity.

This is a sweeping claim which would require for its defense some account of what constitutes a change (cf. Cambridge changes). But let that pass. I simply want to observe at this point that (M) is incompatible with a tensed, or (to borrow McTaggart's convenient terminology) A-theory of time. For according to that theory, the physical world undergoes objective changes in tense; indeed, this is the essence of temporal becoming. There are tensed

facts, such as that *It is now t*, that are constantly changing whether anything changes spatially or not.<sup>13</sup> Temporal change does not entail spatial change.<sup>14</sup> Insofar as he endorses (M), therefore, Leftow is implicitly endorsing a tenseless, or B-theory of time. This conclusion is important because Leftow avers that his theory is compatible with an A-theory of time and becoming.

(c.) *Reduction of Time to Physical Time*

Since there can be no spatial motion relative to God, (M) is said to imply that no spatial thing can change in any way in relation to God. Leftow then goes on to make the surprising assertion that “if there is any truth in contemporary physics,” then even non-spatial entities such as changeable angels or disembodied souls do not exist.<sup>15</sup> He justifies this assertion by pointing out that time is one of the dimensions in the four-dimensional space-time manifold and that whatever is located in one dimension is *ipso facto* located in the others as well. Therefore, if it is correct to represent time as a dimension of the manifold, nothing can be in time unless it is also in space; only spatial things are temporal. Since only temporal things can change, it follows that only spatial things can change.

One could quarrel with this argument on the grounds that it takes insufficient cognizance of the difference between coordinate time and parameter time. Insofar as time plays the role of a coordinate, it is connected with a system of spatial coordinates, so that anything to which a temporal coordinate can be assigned is such that spatial coordinates are assignable as well. But insofar as time functions as a parameter, it is independent of space, and something which possesses temporal location and extension need not, arguably, be held to exist in space as well. In Newtonian mechanics, time plays the role of a parameter, not a coordinate, and, interestingly, the same is true of Einstein’s formulation of STR—the familiar space-time formulation derives later from Minkowski. STR can be validly formulated in either way. Moreover, since STR is a local theory only, we must, in order to achieve a global perspective, consider time as it functions in GTR-based cosmological models, which Leftow neglects to do.

But let all that pass. My reservations about Leftow’s argument at this point are much more deeply laid; namely, I have deep misgivings about the very conception of time which seems to underlie his reasoning. Leftow’s argument appears to rest upon a crucial presupposition that will affect fundamentally one’s theory of eternity and time and therefore deserves to be discussed at some length, namely, a reductionistic equation of time and space with *physical* time and space.

In making this assumption, it must be admitted, Leftow does stand within the mainstream of philosophy of space and time since Mach.<sup>16</sup> Under the influence of Mach’s positivism, twentieth century philosophy of space and

time has been dominated by a reductionistic, verificationist conception of time which equates time with time as it plays a role in physics. Physicists and philosophers of space and time during the first half of this century shared alike Mach's abhorrence for what was called "metaphysics." An instructive piece is a 1941 article by Henry Margenau ostensibly defending metaphysical elements in physics. Observing that "our time appears to be distinguished by its *taboos*, among which there is to be found the broad convention that the word *metaphysics* must never be used in polite scientific society," Margenau counters that there not only are, but ought to be, metaphysical elements in physical science.<sup>17</sup> But then he emasculates this bold contention by explaining that he means thereby that we must have "epistemology"; but as physicists "we reject ontology."<sup>18</sup> He reduces metaphysics to what he calls the methodology of science, and insists that we must not relax our standards here, lest the "obnoxious ontological elements" find their way back into science.<sup>19</sup> What these elements are he leaves in no doubt: the luminiferous aether and simultaneity in different Lorentz frames are classed along with the external world and the *Ding-an-sich* and dismissed as "ultra-perceptory and hence meaningless."<sup>20</sup> This judgement is based on the "positivistic criticism" that propositions not verifiable in principle are meaningless, a criterion which elicits Margenau's ringing endorsement: "this recognition should be one of the premisses of philosophy of science; it enjoys, indeed, almost universal consent."<sup>21</sup> As a result of positivism's influence, contemporary philosophy of space and time has implicitly and almost unquestioningly been the philosophy of *physical* time and space.

But the question arises, why should we follow in the Machian train? This is a *philosophical*, not a *scientific*, question. Rejection of the equation between time and physical time would not contradict "any truth in contemporary physics." What the reductionist fails to appreciate is that time as it plays a role in physics may be but a pale abstraction of a much richer metaphysical reality. Newton realized this when he drew a distinction between time itself and our "sensible measures" of time. People "defile the purity of mathematical and philosophical truths who confound real quantities with their relations and sensible measures."<sup>22</sup> I am not here plumping for a substantialist, as opposed to relational, view of time, but merely saying that however time is constituted, there is no reason to think it identical with the measurement procedures which are used to define time operationally in physics.

Take, for example, the question of the status of temporal becoming. According to Newton, time itself "flows equably without relation to anything external, and by another name is called duration...this duration ought to be distinguished from what are only sensible measures thereof..."<sup>23</sup> In time itself physical events become successively present; but Newton seems to leave it open whether this aspect of time is preserved in our physical measures

of time. A persuasive case can be made, I think, that physical time is a tenseless, B-theoretical time which has been abstracted from the richer A-theoretical metaphysical time in order to rid scientific theories of indexical elements and thus render them universalizable. Max Black explains:

It is easy to understand why theoretical physics should express its formal results in a language that is independent of context, using formulas or sentences from which the occasion words are absent. This procedure has the great advantage of no reconstruction of the original context being required on the part of any reader.... If a scientist were to say, 'I *then* saw a green flash at the edge of the sun's disk,' anyone who was absent at the time of the original observation would need to know who spoke, and where and when, in order to obtain the intended information. No such supplementary information is needed in order to understand Boyle's law or any other freely repeatable scientific statement.<sup>24</sup>

Because of its universalizing tendency, its abstraction from the here and now, physical time does not seem to possess an A-theoretical structure. As a result, Black went so far as to advise physicists to stop talking about "time" in their theories and to refer to their own concept simply as "t"!<sup>25</sup> This is no doubt asking too much. But it does show that the simplistic equation between time and physical time is illicit. Hence, (*pace* reductionists like Grünbaum, for example) it does not follow from the B-theoretical structure of physical time that temporal becoming is therefore mind-dependent or non-objective. As Peter Kroes points out in his discriminating book *Time: Its Structure and Role in Physical Theories*, the universality of the laws of physics seems to preclude the introduction of the notion of the flow of time on the basis of these laws, but that does not imply that temporal becoming is therefore unreal: "Whether or not it is in principle impossible for physics to incorporate the flow of time in its descriptions of physical reality, is still an open question. Up to the present, all attempts to capture this mysterious *but essential aspect of time* in the language of physics have failed."<sup>26</sup> In Kroes's view, the notions of past, present, and future are essential for what he calls "real time," even though, in his judgement, these notions have yet to be successfully integrated into physical time. The contention here is not that temporal becoming is incompatible with physical time; there are a number of ways of showing how, for example, objective temporal becoming can be made compatible with STR, as Leftow himself recognizes. But the point is that such an integration involves the introduction of something into physical time from outside physics; physical theory itself knows nothing of A-determinations and temporal becoming. But these notions can be legitimately integrated with physical time only if there exists a metaphysical time from which physical time has been abstracted.

Even some positivist philosophers of science are willing to admit that notions which find no proper place in the time of physics are quite legitimate



once one broadens his scope of inquiry. Thus, Philipp Frank, who denounces metaphysical sentences as meaningless, qualifies this by stating, "...they are meaningless *as far as science is concerned*."<sup>27</sup> When we begin to ask questions of a broader scope, the meaningfulness of such sentences may emerge:

Our judgment about the usefulness of such expressions may change considerably if we consider the realm not only of physical facts in the narrower sense (e.g., the motion of planets) but ask also for a general picture of the world and include the phenomena of human behavior as facts to be represented.<sup>28</sup>

Frank even goes so far as to state that here religious beliefs may enter the picture—a commendable display of openness for a positivist philosopher!

Now obviously, Leftow does not regard metaphysical sentences as meaningless; but his view of time as constricted to the time of physics does seem to be positivistic and reductionist, leading him in turn to deny the existence of non-spatial, temporal beings and thus evincing a scientific attitude which even a positivist like Frank would consider too narrow. I am reminded in this connection of Alvin Plantinga's advice to Christian philosophers that they have their own agenda to pursue and should display more boldness and autonomy over against the concerns which secular philosophy deems legitimate.<sup>29</sup> It would be ironic if a Christian philosopher like Leftow were, out of some misplaced deference to the "truth of contemporary physics," led to adopt a positivistic view of time and to deny, as a consequence, important Christian doctrines pertinent to angelology/demonology and to the intermediate state of the soul after death.<sup>30</sup>

Of course, Leftow's motivation for denying the existence of changeable angels/demons and disembodied souls is clear: if there are non-spatial, changing beings, then there will exist a metaphysical time and, hence, a "frame of reference" in which things are changing relative to God. But then it will be false that all things are timelessly present to God in eternity. Therefore Leftow is obliged to deny the existence of temporal, non-spatial beings. This he accomplishes by the positivistic constriction of time to physical time. There is not only a theological price to be paid for this reduction, however; since physical time is a B-theoretic time only, Leftow's theory of the relationship of eternity to time will be incompatible with the A-theory, which fact he is anxious to deny.

#### (d.) *Timeless Presence of Temporal Events to God*

On the basis of the Zero Thesis, (M), and the constriction of time to physical time, Leftow concludes that there is no change relative to God. Unfortunately, none of the supporting theses for this inference is plausibly true. All of the errors described thus far seem to come home to roost in the following conclusion: "So if a frame of reference is a system of objects at rest relative to

one another, then it appears that God and all spatial objects share a frame of reference, one in which nothing changes.”<sup>31</sup> This conclusion is analogous to the statement that spatial objects and space-time (the relativistic ether) are at rest relative to one another and therefore exist in a common reference frame—as though God or space-time could be said to constitute a reference frame and so be at rest with respect to spatial objects or to exist in the same reference frame as spatial objects!

Since an event occurring in one reference frame occurs in all (albeit simultaneous with different groups of events), explains Leftow, all events which occur in other reference frames also occur in the frame at rest relative to God. All temporal events are therefore timelessly present to God. By invoking Relativity Theory at this point in his argument, Leftow is able to stave off the Eleatic conclusion that because God is changeless and there is no change relative to God, therefore motion and change are mere illusions masking a static reality. By holding that change is real in physical reference frames and making all change relative change, Leftow is able to hold that while change is real relative to some frames it is non-existent relative to God’s “frame.”

But the difficulty I have with this account of how all temporal events can be timelessly existent relative to God’s “frame of reference” is that there just does not seem to be any such “frame of reference” in which all events are simultaneous. Certainly there is no such physical reference frame, and the addition to these of God’s “frame of reference” does not seem to change the picture, since the timelessness of events in the eternal frame depends upon the defective Zero Thesis, (M), and the reduction of time to physical time. Unless some more secure foundation can be found for the existence of such a frame, it will remain problematic how all temporal events can exist timelessly relative to God.

(ii) *The Compatibility of the Timeless Presence of All Things to God in Eternity and Objective Temporal Becoming*

(a.) *Local Simultaneity in God’s “Frame”*

On the basis of his argument for tenet (i) Leftow claims that “...relative to God, the whole span of temporal events is always actually there, all at once. Thus in God’s frame of reference, the correct judgment of local simultaneity is that all events are simultaneous.”<sup>32</sup> This is a dark saying. If we are to make sense of it, we must construe “always” to mean something like “tenselessly,” since God’s frame of reference is timeless, not sempiternal. For the same reason, Leftow cannot mean by “simultaneous” “occurring at the same time,” but something like “co-existent” or “coincident.” The statement that God judges all events to be locally simultaneous is very obscure. He cannot mean that all events exist in God’s timeless frame of reference, but are tenselessly

ordered by a "later than" relation such that no event occurs (tenselessly) later than any other, for that would be to affirm that there is only one time and all events occur at that moment of time. If we take literally Leftow's appeal to STR's doctrine of the relativity of simultaneity to reference frames, then we must say that just as a given set of causally unconnectable events will be calculated to sustain among themselves different relations of "earlier than," "simultaneous with," and "later than," in various reference frames, so in God's "frame of reference" no events are judged to be earlier or later than any other or even as occurring simultaneously. Rather in God's "frame" all events are judged to be timelessly coincident. In other words, in God's "frame of reference" the very topology of time is voided. It would be as though one took the series of real numbers and removed from it any ordering relation such as "greater than." The one-dimensional temporal continuum has been divested in God's "frame of reference" of those topological properties which make it isomorphous to a geometrical line, so that all that is left is an amorphous collection of points. Notice that in God's "frame" even causally connected events, such as one's birth, development, decline, and death, are judged to sustain no temporal relations among themselves; they are all just timelessly coincident. It might be objected that if God judges one's birth to be coincident with one's death rather than earlier than it, then He is surely deceived. But if we take relativity seriously, as Leftow wishes to do, that is not the case. There is no privileged frame. Hence, no observer can impugn the temporal ordering of events determined by any other observer in another reference frame. Of course, in all *physical* frames the temporal order of causally connectable events is invariant. But in the special case of God, if Leftow's argument for (i) is correct, this invariance does not hold with respect to His "frame of reference." In fact, if anyone's frame is privileged, it will surely be God's, for the relativity of simultaneity arises only for events spatially distant from the observer; judgements of local simultaneity are neither conventional nor relative. But given Leftow's Zero Thesis, all events are in a sense local for God. Therefore, His judgement that all events are timelessly coincident should be absolute, and it is we who are deceived when we judge that they are temporally ordered (shades of McTaggart!). In fact, it is not clear to me that Leftow can avert also voiding space as well as time of any topological properties in God's "frame of reference." For in Relativity Theory, a difference in the value of the temporal coordinate of some event relative to two distinct reference frames requires a mathematically determinate difference in the spatial coordinates of the event as well. Doubtless, Leftow would not say that the Lorentz transformation equations hold relative to God's "frame of reference" as for physical frames. Nonetheless, since an event's spatial coordinates are partially dependent upon its temporal coordinates, events in God's "frame of reference," lacking any temporal coordi-

nates, cannot be located in space either. To paraphrase Leftow: something is located in one dimension of a geometry if and only if it is located in all; so if it is correct to represent time as another dimension, it follows that whatever is not in time is not in space either: *only temporal things are spatial*. It therefore seems to follow that in God's "frame of reference" events not only occur timelessly but spacelessly as well. The topological structure of the four-dimensional space-time manifold has come completely unglued in the divine "frame of reference" so that all God is confronted with is a chaotic collection of points which are ordered neither spatially nor temporally.

Leftow, however, clearly does not interpret the "local simultaneity" of all events in God's "frame of reference" in the above way. He states, "In eternity events are in effect frozen in an array of positions corresponding to their ordering in various B-series."<sup>33</sup> In a footnote he explains that God does not see all events spread out in one B-series, since each reference frame generates its own unique B-series. There are thus a plurality of B-series and God must be aware of all of them.<sup>34</sup> Now this seems an eminently more reasonable account of the existence of temporal events in God's "frame of reference," but I do not see how this account concords with the theory of timeless eternity developed under (i). It needs to be understood that that account does not merely eliminate the A-determinations of events (monadic predicates like *past, present, and future*) relative to the divine "frame of reference," for STR itself takes no cognizance of such predicates in handling temporal relations among events in physical reference frames. Rather Leftow's account must also eliminate the B-determinations of events as well (dyadic predicates like *earlier than, simultaneous with, and later than*) relative to God's "frame of reference." For the relativity of simultaneity, which Leftow employs in order to stave off the Parmenidean conclusion that change is illusory and reality is a static whole, entails that events are classed relative to a reference frame as being either earlier than, simultaneous with, or later than any arbitrarily chosen point on the inertial trajectory of a hypothetical observer, and that observers in different frames will draw at any arbitrary point on their world-lines different lines of simultaneity connecting events determined to be simultaneous with that point and dividing later from earlier events. Hence, relative to God's timeless "frame of reference," God must judge of any two events that one is neither earlier than the other, nor later, nor even strictly simultaneous; they are just timelessly coexistent relative to His frame. Therefore, Leftow's theory must void even B-relations relative to the divine "frame of reference." Of course, an omniscient God must also know the lines of simultaneity which would be drawn by hypothetical observers relative to any physical reference frame; but in His "frame" events are chaotically co-existent.

If the proponent of divine timelessness wants to preserve the B-relations among events, then it seems to me that his most plausible move will be to

identify God's "frame of reference" with the four-dimensional space-time manifold itself, which God transcends, and hold that that manifold exists tenselessly. In short: the B-theory of time is correct. Given the B-theory of time, the metaphorical and problematic notion of God's "frame of reference" becomes perspicuous and it becomes easy to see what is meant by divine timelessness and the presence of all things to God in eternity.

(b.) *The Relativity of Simultaneity*

Leftow, however, denies that his theory of divine eternity entails the B-theory. He claims that "...a defender of God's eternity can assert that (in a strictly limited sense) one and the same event is present and actual in eternity though it is not yet or no longer present or actual in time."<sup>35</sup> He explicates this by saying

That is, it can be true at a time  $t$  that an event dated at  $t+1$  has not yet occurred in time, and yet also correct at  $t$  to say that that very event exists in eternity. That all events occur at once in eternity...does not entail that they all occur at once in time.<sup>36</sup>

Unfortunately, it is not apparent to me that this explication is anything but a statement of the B-theory. A B-theorist like Grünbaum would be adamant that at  $t$  an event at  $t+1$  has not yet occurred in time (otherwise it would be earlier than  $t$ ) and nonetheless this event exists tenselessly with as much actuality as the event at  $t$ ; moreover, the B-theory does not assert the absurdity that all events occur at once in time, for then there would be only one moment of time! What Leftow needs to show is that his theory of the timeless existence of all things relative to God is compatible with the reality of tense, the objectivity of temporal becoming, the denial that all events exist tenselessly, and so forth.

It is at this point that the Einsteinian interpretation of STR takes center stage in Leftow's defense. He argues,

If simultaneity and presentness are relative to reference-frames, then if present events are actual in some way in which future events are not, this sort of actuality is itself relative to reference frames. Thus there is a (strictly limited) sense in which the relativity of simultaneity entails a relativity of actuality, if one restricts full actuality to present events.<sup>37</sup>

This represents one way of integrating objective temporal becoming with STR, though it strikes me as enormously implausible. Sklar notes that a peculiarity of such a relativized view of becoming is that at my given space-time point there will be events which are now such that they will be in my real past at some future time, but which will never have a present reality to me at all.<sup>38</sup> In fact, that is true of *all* events except for those lying on the single thread of my inertial trajectory which passes vertically on a Minkowski diagram through the vertex point of my past light cone. This follows from

the fact that all events having a space-like separation from me or lying inside or on my future-directed lightcone do not exist; at a later space-time point vast numbers of such events will be past for me and therefore real, though they were never present. Oddly enough, then, the present is not the moment of becoming for most events. Since, on the A-theory of time, things in the past, having become, are no longer existent, Sklar charges that the view under discussion collapses into a relativistic solipsism, in which reality is reduced to a single point!<sup>39</sup> On a theistic metaphysic, the charge of solipsism would not quite be justified, since as well as what exists here-now, God also timelessly exists. That still seems to be a pretty attenuated reality. But, of course, on Leftow's view, all events also exist timelessly in eternity with God. So reality is restored in its fullness; even though in my reference frame no events other than that which is here-now exist, nonetheless there is a reference frame in which all events exist. This escape from solipsism depends on the truth of tenet (i), which I have argued to be incoherent; but at least Leftow can claim that his view is not further burdened by solipsism.

Leftow explains the result of relativizing actuality to reference frames:

If we take eternity as one more frame of reference, then, we can thus say that a temporal event's being present and actual in eternity does not entail that it is present and actual at any particular time in any temporal reference frame (though it does follow that this event is, was or will be actual in all temporal reference frames).<sup>40</sup>

Again, I feel constrained to say that God's "frame of reference" is not literally a reference frame; there is no reference frame in which all events are present and actual, since there are in every frame space-time regions designated absolute future or absolute past as determined by the light-cone structure at any event. The only thing corresponding to God's "frame of reference" as described by Leftow, so far as I can see, is Einstein's relativistic ether, the space-time manifold itself. But since it is not a reference frame, the relativity of simultaneity relation does not obtain between it and local frames. Temporal becoming cannot be objective, for all events simply exist in the four-dimensional manifold.<sup>41</sup>

In another place, Leftow shows himself prepared to fall back, if necessary, to a sort of Stump-Kretzmann model which does not appeal to the Zero Thesis, but relies exclusively on the relativity of simultaneity in order to justify the claim that actuality is reference frame dependent and therefore events which are not actual with respect to various temporal reference frames may all be actual with respect to God's "frame."<sup>42</sup> Suppose then that it is legitimate to speak of eternity's constituting a reference frame. My misgivings about Leftow's theory strike much deeper than anything heretofore expressed, indeed, at the very philosophical foundations of the interpretation of Relativity Theory itself; namely, I, quite frankly, see no reason to think that

the relativity of simultaneity obtains at all. Leftow's appeal to STR to ground this relation, it seems to me, evinces a certain naiveté concerning the philosophical foundations of the received physical interpretation of Relativity Theory and an uncritical acceptance of that interpretation, which is then (mis)applied to metaphysics.

There are, after all, other physical interpretations of the Lorentz transformation equations that constitute the mathematical core of STR which are empirically equivalent to the received interpretation and which, if correct, would lead to completely different conclusions when applied metaphysically. As the Australian physicist Geoffery Builder points out, the only formulation of STR which is verifiable is "the theory that the spatial and temporal coordinates of events, measured in any one inertial reference system, are related to the spatial and temporal coordinates of the same events, as measured in any other inertial reference system, by the Lorentz transformation."<sup>43</sup> But this verifiable statement is neutral, for example, with respect to the received Einsteinian interpretation and the neo-Lorentzian interpretation championed by Ives, Builder, Prokhovnik, and others.<sup>44</sup> These two interpretations, while empirically indistinguishable, are radically different due to the different ontologies presupposed.<sup>45</sup> On the Einsteinian view, there exists no preferred spatio-temporal order; rather space and time are relative to inertial frames, and no frame is privileged. According to the neo-Lorentzian view, absolute space and time exist, not necessarily in the substantial, as opposed to relational, sense of "absolute," but rather in the sense that there exists a spatio-temporal order which is privileged. There exists a universal, fundamental (or privileged) reference frame which is the analogue of the aether frame of nineteenth century classical physics but without the classical aether and which is usually identified with the frame of hypothetical fundamental observers stationary relative to the expansion of space itself as posited in current cosmological models. Light is propagated isotropically at velocity  $c$  relative to this fundamental frame alone and therefore will be propagated relative to observers in motion with respect to this frame at velocities exceeding or less than  $c$ . The consequence of motion relative to the fundamental frame will be certain anisotropy effects produced by dynamical causes operating on the moving systems, primarily length contraction in the direction of motion in order that the internal equilibrium of the system might be maintained. Time dilation effects follow immediately as a consequence of these anisotropy and contraction effects, as may be seen from the behavior of a light clock in motion relative to a frame at rest. It needs to be emphasized that on the Einsteinian interpretation length contraction and time dilation are no less real and objective physical effects, but there is under this interpretation no causal explanation for these effects, which follow simply as deductions from the two postulates of Einstein's formulation of the theory.<sup>46</sup> Under the neo-Lorentzian

interpretation, the constancy of the observed velocity of light relative to all frames, observed length contraction of objects in motion relative to frames taken to be at rest, and time dilation of clocks, including all physical and biological systems, in motion relative to an observer taken to be at rest become physically intelligible, rather than mere postulates or deductions lacking physical explanation.

Although it is often asserted that Einstein's version of the theory is simpler and therefore to be preferred, the claim that the Einsteinian interpretation is simpler is incorrect. Although Lorentz's own theory was more complicated than Einstein's, H. E. Ives was able to derive the Lorentz transformation equations from (i) the laws of conservation of energy and momentum and (ii) the laws of transmission of radiant energy. He showed that there is an apparent discrepancy in the equations for a particle governed by these laws which demands that the particle's mass vary with velocity. He then derived from these variations of dimensions the Lorentz transformations. "The space and time concepts of Newton and Maxwell are retained without alteration," he wrote, "It is the dimensions of the material instruments for measuring space and time that change, not space and time that are distorted."<sup>47</sup> On Ives's achievement, Martin Ruderfer comments that he succeeded in elevating Lorentz's *ad hoc* theory to an equal status with STR and did so with the same number of basic assumptions as Einstein, so that his theory has the same "beauty." "The Ives and Einstein interpretations represent two different, but equally valid, views of the same set of observations."<sup>48</sup>

We thus have two different interpretations of Relativity Theory which are radically different in their metaphysical foundations and yet which are, to date, experimentally indistinguishable and therefore unsusceptible to scientific adjudication. An examination of the philosophical foundations of Relativity Theory is therefore indispensable if we are to decide between these competing interpretations. Unfortunately, space does not permit me to delve into this fascinating issue here.<sup>49</sup> But if a neo-Lorentzian interpretation is philosophically preferable (as I suspect that it is), then the rug is pulled from beneath the feet of theories of divine eternity appealing to STR in order to justify notions like ET-simultaneity or the presence of all things to God in timeless eternity. It therefore seems to me that it is of the utmost moment that proponents of divine timeless eternity address themselves more closely to the scrutiny and justification of the interpretation of Relativity Theory which they prefer and on which their theories are predicated.

### Conclusion

In conclusion, then, I think we can agree that there are reasons to doubt the legitimacy of the appeal to Relativity Theory to support the crucial theses (i) that temporal things exist in time and in timeless eternity and (ii) that the



timeless presence of all things to God is compatible with objective temporal becoming. The first of these rests upon category mistakes, presupposes a reductionist view of time, and seems incompatible with a tensed theory of time. The second involves the same conceptual mistakes, but also hinges upon a particular interpretation of STR which, though widespread, may by no means be the most plausible. It seems to me that a more promising route for defenders of divine timelessness to pursue would involve the explicit adoption of a B-theory of time and the explication of a transcendent being's relations to the space-time manifold—but then, of course, they must face up to the case for the superiority of the A-theory over the B-theory.

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#### NOTES

1. Nelson Pike, *God and Timelessness* (New York: Schocken Books, 1970).
2. Eleonore Stump and Norman Kretzmann, "Eternity," *Journal of Philosophy* 78 (1981), pp. 429-58.
3. Brian Leftow, *Time and Eternity*, Cornell Studies in the Philosophy of Religion (Ithaca, NY: Cornell University Press, 1991).
4. Brian Leftow, "Eternity and Simultaneity," *Faith and Philosophy* 8 (1991), pp. 148-79.
5. *Ibid.*, p. 162.
6. A. Einstein to H. A. Lorentz, June 17, 1916, item 16-453 in the Mudd Library, Princeton University, cited in Ludwik Kostro, "Einstein's New Conception of the Ether," proceedings of "Physical Interpretations of Relativity Theory," conference of the British Society for the Philosophy of Science, Sept. 16-19, 1988, Imperial College of Science and Technology, London.
7. A. Einstein, *Äther und Relativitätstheorie* (Berlin: Julius Springer Verlag, 1920), pp. 7-9.
8. A. Einstein to H. A. Lorentz, Nov. 15, 1919; item 16-494 in Mudd Library, Princeton University, cited in Kostro, "Einstein's New Conception."
9. Kostro, "Einstein's New Conception."
10. Leftow, "Eternity and Simultaneity," p. 163.
11. See Edwin F. Taylor and John Archibald Wheeler, *Spacetime Physics* (San Francisco: W. H. Freeman, 1966), pp. 9-10; J. G. Taylor, *Special Relativity*, Oxford Physics Series (Oxford: Clarendon Press, 1975), p. 13.
12. Leftow, "Eternity and Simultaneity," p. 163.
13. See A. N. Prior, "Changes in Events and Changes in Things," in *Papers on Time and Tense* (Oxford: Clarendon Press, 1968), pp. 1-14.
14. See Sydney Shoemaker, "Time without Change," *Journal of Philosophy* 66 (1969), pp. 363-81; cf. W. H. Newton-Smith, *The Structure of Time*, International Library of

Philosophy (London: Routledge & Kegan Paul, 1980), chapter 4, 10.

15. Leftow, "Eternity and Simultaneity," p. 163.

16. A giant of nineteenth century German physics, Mach's influence has been profound. Einstein once remarked, "Even those who think of themselves as Mach's opponents hardly know how much of Mach's views they have, as it were, imbibed with their mother's milk" (Albert Einstein, "Ernst Mach," *Physikalische Zeitschrift* 17 (1916) p. 101, reprinted in Ernst Mach, *Die Mechanik in ihrer Entwicklung historisch-kritisch dargestellt*, ed. Renate Wahsner and Horst-Heino Borzeszkowski (Berlin, DDR: Akademie-Verlag, 1988), pp. 683-89). Einstein also refers to Mach as "the greatest influence on the epistemological orientation of the natural scientists of our time." For Mach's strictures against metaphysical space and time see especially Mach, *Die Mechanik*, pp. 249, 252 (Ernst Mach, *The Science of Mechanics: A Critical and Historical Account of Its Development*, trans. Thomas J. McCormack (LaSalle, Illinois: Open Court, 1960), pp. 276, 280) and Ernst Mach, *Prinzipien der Wärmelehre* (Leipzig: J. A. Barth, 1896), p. 154 (Ernst Mach, *Principles of the Theory of Heat*, trans. T. J. McCormack, rev. and compl. P. E. B. Jourdain and A. E. Heath, with an Introduction by M. J. Klein, ed. Brian McGuinness, Vienna Circle Collection 17 (Dordrecht: D. Reidel, 1986), pp. 53-54).

17. H. Margenau, "Metaphysical Elements in Physics," *Reviews of Modern Physics* 13 (1941), p. 176.

18. *Ibid.*, p. 177.

19. *Ibid.*

20. *Ibid.*, p. 178.

21. *Ibid.*

22. Isaac Newton, *Sir Isaac Newton's "Mathematical Principles of Natural Philosophy"* and his "System of the World," trans. Andrew Motte, rev. with an Appendix by Florian Cajori, 2 vols. (Los Angeles: University of California Press, 1966), volume I, p. 11.

23. *Ibid.*, volume I, pp. 6, 8.

24. Max Black, review of *The Natural Philosophy of Time*, *Scientific American* 206 (April 1962), p. 181. Cf. idem, "The Direction of Time," *Analysis* 19 (1958-59), pp. 54-63.

25. Black, review of *Natural Philosophy of Time*, p. 182. See also Mary F. Cleugh, *Time and its Importance in Modern Thought*, with a Foreword by L. Susan Stebbing (London: Methuen, 1937), pp. 46-47; Herbert Dingle, *Science at the Crossroads* (London: Martin Brian & O'Keefe, 1972), pp. 31-32; Peter Kroes, "Physics and the Flow of Time," in *Nature, Time, and History*, ed. P. A. Kroes, Nijmegen Studies in the Philosophy of Nature and its Sciences, volume 4, number 2 (Nijmegen, The Netherlands: Catholic University of Nijmegen, 1985), p. 49.

26. Peter Kroes, *Time: Its Structure and Role in Physical Theories*, Synthese Library 179 (Dordrecht: D. Reidel, 1985), p. xxiv; cf. p. 209 (my italics).

27. Philipp Frank, *Interpretations and Misinterpretations of Modern Physics*, Actualités Scientifiques et Industrielles 587: Exposé de Philosophie Scientifique 2 (Paris: Hermann & Cie., 1938), p. 38.

28. Philipp Frank, *Philosophy of Science* (Englewood Cliffs, NJ: Prentice-Hale, 1957), p. 144.

29. Alvin Plantinga, "Advice to Christian Philosophers," *Faith and Philosophy* 1 (1984), pp. 253-71. Plantinga specifically blasts verificationism as a philosophical fashion which Christian thinkers ought to have rejected *tout court*.

30. The doctrine of the intermediate state of the soul after death may prove to be essential to the coherence of the Christian doctrine of eschatological resurrection and the final state, due to the need to preserve personal identity between earthly and resurrected human beings. Doctrines pertinent to angelology/demonology may have important practical ramifications in the Christian's spiritual struggle (Eph. 6:12).

31. Leftow, "Eternity and Simultaneity," p. 164.

32. *Ibid.*

33. *Ibid.*, p. 170. Cf. his definition: "...R is an eternal reference-frame iff within R, the relations 'earlier' and 'later' can hold only between locations in the atemporal analogues of a B-series..." (*Ibid.*, pp. 171-72).

34. *Ibid.*, p. 179.

35. *Ibid.*, p. 165.

36. *Ibid.*

37. *Ibid.*

38. Lawrence Sklar, "Time, reality and relativity," in *Reduction, time and reality*, ed. R. Healey (Cambridge: Cambridge University Press, 1981), p. 138.

39. *Ibid.*, p. 140.

40. Leftow, "Eternity and Simultaneity," p. 167.

41. Suspicions that Leftow's theory really presupposes a B-theory of time are accentuated by his remarks on God's knowledge of what is happening now:

That in God's frame of reference all events occur simultaneously does not entail that God does not know all the facts about simultaneity which obtain in temporal reference frames. God's being located in just the eternal frame of reference does not put a limit on what he knows. From any reference frame one can extrapolate what judgements of simultaneity would be correct in other reference frames. Presumably, then, an eternal God can have this knowledge in His own way. So...for every temporal now, God knows what is happening now (i.e., simultaneous with that now)..." (Leftow, "Eternity and Simultaneity," p. 168).

Notice the conflation of the indexical A-determination "now" and the non-indexical B-determination "simultaneous with." God could know the appropriate simultaneity classes relative to every reference frame and still not have any idea which class of events is occurring now with respect to any frame. This can be clearly seen by reflecting on the fact that appropriate lines of simultaneity can be drawn on a Minkowski diagram through *any* point on the inertial trajectory of a hypothetical observer connected to that frame. Leftow's theory of divine eternity will not result in an attenuation of divine omniscience only if he holds, with the B-theorist, that there are no objective tensed facts and therefore divine knowledge of simultaneity relations is sufficient to grasp all that there is to be known with respect to the facts about what is happening now.

42. Brian Leftow, "Time, Actuality and Omniscience," *Religious Studies* 26 (1990), pp. 303-21. "The claim that actuality is a function of a relation may seem bizarre, but if time

is tensed and the special theory of relativity is true, this claim follows.... One can hold...that events really occur sequentially in time and also all at once for God, without it thereby being the case that they really do all occur at once" (*Ibid.*, pp. 318, 320).

43. Geoffery Builder, "The Constancy of the Velocity of Light," *Australian Journal of Physics* 11 (1958), pp. 457-80, reprinted in *Speculations in Science and Technology* 2 (1971), p. 422.

44. H. E. Ives's papers have been conveniently assembled in the (unfortunately polemical) volume *The Einstein Myth and the Ives Papers*, ed. Richard Hazelett and Dean Turner (Old Greenwich, Connecticut: Devin-Adair, 1979). Geoffery Builder, in the several years prior to his death, published a remarkable series of eleven articles on Relativity Theory from a neo-Lorentzian perspective. Two of his papers, "Ether and Relativity" and "The Constancy of the Velocity of Light," along with references to the others, have been reprinted in abridged form in *Speculations in Science and Technology* 2 (1979). Among the many works of Simon J. Prokhovnik, the most prominent contemporary neo-Lorentzian relativity theorist, are *The Logic of Special Relativity* (Cambridge: Cambridge University Press, 1967) and *Light in Einstein's Universe* (Dordrecht: D. Reidel, 1985).

45. A point emphasized by Dennis Dieks, "The 'Reality' of the Lorentz Contraction," *Zeitschrift für allgemeine Wissenschaftstheorie*, volume 115, number 2 (1984), p. 341.

46. See, for example, A. Einstein, "Zum Ehrenfest'schen Paradoxon," *Physikalische Zeitschrift* 12 (1911), pp. 509-10; John A. Winnie, "The Twin-Rod Thought Experiment," *American Journal of Physics* 40 (1972), pp. 1091-1094; M. F. Peklaha, "Length contraction and time dilation in the special theory of relativity—real or apparent phenomena?" *Indian Journal of Theoretical Physics* 25 (1975), pp. 74-75; Dieter Lorenz, "Über die Realität der FitzGerald-Lorentz Kontraktion," *Zeitschrift für allgemeine Wissenschaftstheorie* volume 13, number 2 (1982), pp. 308-12.

47. Herbert E. Ives, "Derivation of the Lorentz Transformations," *Philosophical Magazine* 36 (1945), pp. 392-401, reprinted in *Speculations in Science and Technology* 2 (1979), pp. 247, 255.

48. Martin Ruderfer, "Introduction to Ives' 'Derivation of the Lorentz Transformation,'" *Speculations in Science and Technology* 2 (1979), p. 243.

49. I take up this debate in a projected book on divine eternity and God's relationship to time.