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Unity, Holism and Emergent Theology: A Reflection on Mendel Sachs "The Principle of Relativity"

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- ¶1. Professor Sachs presents a provocative and imaginative synthesis of the holism implicit in Einstein's principle of relativity and the various manifestations of holism in both Eastern and Western traditions of thought. His primary thesis is that the principle of relativity implies a field ontology of continuity, becoming and unity which is generalizable from the physical object of science, the universe, to social and spiritual relations. Sachs argues for the primacy of relations over the particulate relations by appeal to the fundamental ontological reality that subtends them, the concept of the field. Working from Martin Buber's "I-Thou" relationship, Sachs argues that consciousness is but a mode, a la Spinoza, of Thou, i.e. God, Brahmin, Tao, etc., which is the underlying and overarching unity posited by the objectivity of fundamental laws of physics.

- ¶2. I want to examine in this paper three claims made by Professor Sachs: 1). The particular concept of holism he employs: that "the universe is a single continuum with an infinite number of distinguishable manifestations."^[1] 2) The generalizability of the principle of relativity to all other domains of knowledge. And 3) the social and theological relations that Professor Sachs analyzes in terms of this generalization of the principle of relativity and the holism it implies. My goal here is not necessarily to challenge Professor Sachs' claims. By and large, I agree with many of his conclusions. But the concept of holism is not necessarily monistic, and there is more than one way to skin a holistic cat, whether that cat is dead, alive, or indeterminable! I want to offer here a dialectical analysis of the logic of relations and the holism Professor Sachs has so elegantly described. Perhaps the holism Professor Sachs articulates as the ontological implication of the principle of relativity can be enriched by a dialectical interpretation, and perhaps they are incompatible. Be that as it may, however, I am firmly committed to the claim that a dialectical logic of relations is far more capable of articulating the logic of a host of higher order relations, from the

biological to the social, and perhaps even the theological. Thus, while I think that in these domains, holism is the appropriate category to understand these relations, I think the fundamental logic of these relations is dialectical, and not monistic, as Professor Sachs claims.

- ¶3. I must confess to having taken advantage of Professor Sachs detailed analysis of Einstein's theory of relativity in relation to the Copenhagen school's theory of quantum mechanics in his *Einstein versus Bohr: The Continuing Controversies in Physics*.^[2] This is a lucid and penetrating examination of the historical genesis of these two competing theories of fundamental physics. Professor Sachs is a very clear writer, and has a remarkable command of both the history of physics, as well as its theoretical content. I would highly recommend this book to anyone interested in exploring this area further.
- ¶4. Although it was Einstein who originally suggested the concept of a "wave-particle" dualism, Sachs argues in this book that the principle of relativity inevitably leads to a wave monism, whereby matter is conceived not in terms of static "things" that we perceive in our daily experience—in a word, atomism—but rather matter must be understood as a wave phenomenon, highly localized to be sure, but which in principle trails off to all parts of the universe. Thus, matter is fundamentally non-localized. Sachs writes:
- ¶5. ...the materially confirmed continuous wave nature of material particles reveals them to be nonlocalized entities—the distribution of this matter does not actually cut off anywhere in space, except at the boundaries of the domain where it is supposed to be contained. If this domain should be all of space, then the boundaries of an electron would be at infinity. Thus with this continuous view of the elements of matter, they have a nonlocalized description. The implication here is that there are no truly separable entities; all of the supposed 'particles' of matter are in fact correlated, although distinguishable *modes* of a single continuum. This is a view of holism.^[3]
- ¶6. Now, my first question is: what exactly are these wave functions modes of? Professor Sachs frequently refers to the analogy of waves across a body of *water* to emphasize that the waves are not separable parts of, for instance, a pond, but rather are manifestations of the pond itself.

- ¶7. ...the ripple is not a separable thing in the pond, that could be removed and studied on its own, say by measuring its weight, size, color, and so forth. Rather the ripple is not more than a mode of behavior of the entire pond: it is of the pond. As we come to understand the ripple more fully, we see that it reflects the nature of the *entire pond, holistically*.[\[4\]](#)
- ¶8. In this case, the wave is a wave of *water*. What is the underlying substance that the wave functions of matter are *modes* of, or is it rather the case that the wave fields subtend what we phenomenologically take to be substance? Or is the claim that there is no substance, only waves? Or is it the case that the matter waves are simply waves of the underlying field?
- ¶9. If we press further, the claim for the continuity of matter is a logical result of the principle of relativity itself, namely that the laws of nature are objective and apply in all frames of reference. Professor Sachs writes:
- ¶10. The principle of relativity...asserts that all of the laws of nature must be independent of the reference frame in which they may be expressed, from any other arbitrary reference frame.[\[5\]](#)
- ¶11. He continues...
- ¶12. It then follows, because of the continuity of the space and time language parameters that the expressions of the laws of nature are necessarily in terms of *continuous functions* of the space and time parameters, rather than in terms of the motions of discrete points, as in atomistic theories. This then is a *field theory*...In this approach matter does not appear as a collection of separate, discrete things. The totality that is the universe-including ourselves!-must then instead be characterized by a set of distinguishable *modes* of the continuous universe, rather than things in it.
- ¶13. So I would invite Professor Sachs to specify more clearly what defines these wave functions and the field that they imply.[\[6\]](#)

- ¶14. Let us now get down to dialectics. Professor Sachs asserts that the holistic view is a "view of a system of matter without actual separable parts, although with distinguishable *modes*..." Nevertheless, these *modes* are dynamically related:
- ¶15. ...no component of this system is meaningful as a thing by itself; its only meaning is in terms of the totality of the closed system. For the *field theory* that follows from Einstein's relativity concept leads to the elementarity of relation rather than relata.[\[7\]](#)
- ¶16. Now, in order to have relation, there must be a plurality. What the field theory actually states is the *abstraction* that all *modes* of the universe are expressions of one and the same continuum or field, that is, there is an underlying common unity to all manifestations of the universe. Not to belittle this concept or the intellectual achievement it represents, nevertheless, this seems to be only half the story. Equally important is an account of how and why this unified continuum *differentiates* itself into the plurality of modes-particle/waves-that appear to both the physicist and our immediate perception.
- ¶17. Or to return to the pond analogy, why do waves appear on the surface of the pond? Of course, we know why waves appear on the pond: some *force* disturbs its quiescence, either a breeze blows across its surface or some object breaks the surface of the pond. But for the analogy to hold good, we must consider the pond as the entire universe, of which there is nothing outside. Therefore, the disturbance that generates the wave in the pond would have to be generated *internally*. Yet if the principle of relativity implies a continuum-a unity of all that is-then from whence does the difference that generates the plurality of this continuum arise? Why are there distinct *modes* of the universe, and not simply an undifferentiated continuum or monad?
- ¶18. There seem to me to be three ways to look at this question. One way is to accept as given that there are differences and hence a plurality, but to recognize that the relata thus given are in principle in constant relation to all other relata within the universe. Because the same principle of relativity represents the terms of these relations, we recognize that underlying the relata and their relations form a unified continuum and that these relata are not really separate "things", but rather, as Professor Sachs has commented, modes of this continuum. Thus difference within the posited unity (plurality) is taken as given and it is only on the basis of the given plurality that the relata can establish the relations which are the basis of the claim that there is in principle no difference amongst the relata. The circle of reasoning here is not vicious, provided that we can account for the constitution of the differences that generate the relata in the first place.

- ¶19. The second way to look at this question is to assume the relata as primary, and that the relations into which the relata enter are secondary. This position leads to atomism and is implied by the quantum mechanical view of physics. However, Professor Sachs makes it very clear that the wave aspect of matter indicates that all "particles" are in principle related to the entire universe, since their wave function has no null value in all space-time positions and frames of reference. I am persuaded by Professor Sachs that the atomism and logical positivism of the quantum mechanical view is inadequate. However, does this require that we go to the other extreme and privilege relation to the point that we deny any ontological reality to the relata as Professor Sachs wave monism does?
- ¶20. The dialectical point of view is to accept both positions as true, or at least partially true, and to think through the contradiction to a resolution that accounts for both. I cannot pretend to even start this thought process in the domain of physics, but I can offer an alternative logical model of relations and relata, in which neither is privileged over the other. This model will also demonstrate my second claim, namely, that I do not think the model of holism offered by Professor Sachs can easily be generalized to other domains, though this is not to say that some sort of holism does not operate in these domains.
- ¶21. As an example, let us take a very simple biological system, indeed, perhaps the simplest. Let us take as given an organic polymer similar in structure to RNA. As is well known, the sequence of nucleic acids in these polymers is enormously variable. Let us assume that in a soup of such sequences there arises spontaneously a short polymer which has the peculiar property of catalyzing its own replication. You will no doubt recognize in this thought a story similar to a variety of "beginning of life" stories. Whether in fact this is a true story is besides the point. By whatever particular bio-chemical process life may have started, the logic of life-reproduction coupled to the contradictory demands of fidelity in replication and variance in replication- requires a similar story.
- ¶22. In this first evolutionary story, we take as given atoms and molecules. We can even understand these in the atomistic, substantialist sense that has animated most empirical scientific investigation since Newton (relativity theory, excepted, of course). However, the result of the evolutionary process is quite the reverse.
- ¶23. Our nascent "living" molecule that catalyzes its own replication will have the peculiar effect of swamping the "primordial soup" with copies of itself, provided that its rate of self-replication exceeds the rate of spontaneous decay of the molecule itself. Even a very marginal "advantage" in assisting its own replication will, by the mathematics of exponential growth, quickly lead to a dominance of this particular sequence of nucleic acids in our primordial soup.

- ¶24. We will indeed assume that the sequence of RNA that we start with has only a very slight effect upon its own replication, sufficient, however, to keep its population disproportionately represented in the large number of other such RNA polymers. At the same time, the replication of these sequences is far from perfect, and there arise a number of variations upon this "original" self-catalyzing polymer, some of which may have no self-catalyzing effect, some of which may have less catalyzing effect, and some of which may have a greater catalyzing effect on its replication. Those that have a greater catalyzing effect will, just as their predecessors, come to quickly swamp the population with their own specific sequence, and the process will continue until the maximum efficiency in self-replication is reached. That search continues to this day, and you are witness to the latest version of self-replicating systems to achieve dominance....to date.
- ¶25. If we now examine the logical nature of this evolution, we find first that the particular sequence that we start with, the so-called "original" sequence that first evidenced the property of self-catalyzation is in some sense irrelevant. Any of a possibly large number of sequences that have this property could have been the first. Thus the particular sequence is not so important as its function. Secondly, through the mutations that arise in the copying process, we see that what "survives" is not the particular molecule, nor yet its sequence, but rather the structure of self-replicating organization. This organization has over time increased enormously in complexity. Mechanisms evolved to target catalyzing functions to the specific RNA template by isolating this activity from the surrounding environment. Error correcting mechanisms were evolved, along with mechanisms to capture energy, and more efficient means of catalyzing all of the chemical reactions that enhance the ability of the organism to replicate its genetic structure. The result is a complex system and division of labor.
- ¶26. What survives in life is not the particular molecule or even the individual, but the form or organization. This form is a functional and structural relation of parts. But the parts here are not linear parts. Life is not a mere sum of parts. Rather the parts that make up the organism are parts that have generated each other in the process of ontogeny, and that have been selected for their particular functions through the process of evolution. The organic part is what it is only in relation to the whole of which it is a part. The parts of organisms, whether they be enzymes or organs, have their being in the reciprocal relations through which they are both produced and maintain themselves.

- ¶27. Here then is a different relation between parts and whole, in fact, a dialectical relation. Each part has its being only in the whole, and yet it is the parts in their relations to each other that generate both themselves, and the whole. Yet it is the whole (the phenotype) that faces the cutting edge of natural selection, and hence determines the order and relations of the parts within itself and to each other. Each part is what it is-has being- only through its relations to the whole and the other parts. Is the part a substantial "thing"? Sure, you can take my liver out and examine it, weigh it, dissect it, and test it. But once you remove my liver from me, my liver ceases to be what it is, because you have removed it from its context of relations. I would also note that once you remove my liver from me, I will quickly cease to be what I am, lest you put it back the way you found it, or quickly find another to put in its place.
- ¶28. From the evolutionary point of view, relations do have a priority over relata, since it is the relations that determine the place and function of the relata within an organism. Nevertheless, organisms are not simply relations. The relata are a necessary condition to the existence of the organism. We need substance to survive. Pure relation is an *abstraction*.
- ¶29. I do not intend to generalize from this particular model of parts and whole to suggest that it is adequate to the problem of atomism and field continuum that Professor Sachs has addressed. But I do hope to have shown that even if we start from atomism or substantialism, we can arrive at a different kind of holism, a dialectical holism which recognizes that relation and relata are co-dependent, or co-constitutive. Whether this is a helpful model in theoretical physics, I am in no position to judge, but given the theoretical impasse between relativity and quantum mechanics, it offers an alternative logic by which the contradiction might be subsumed.
- ¶30. My second point that I hope to have demonstrated by this analysis is that the monistic holism articulated by Professor Sachs is probably not generalizable to all domains. I think that what is generalizable, or rather, what we must find, in all domains is some form of holism. If holism in some form, whether it be monistic or dialectical, is indeed true of the universe as a totality, then of necessity we must find it in all domains. But there are a variety of ways in which the whole can be related to the plurality it unifies. Monistic holism may be the fundamental character of the material universe. But this does not necessarily imply that this form of holism defines all holistic relations within it. I would suggest that just as the biological form of holism is dialectically structured, so too are the social relations that Professor Sachs comments on in his discussion of the I-Thou and I-It relations of Martin Buber. The dialectics of these relations were worked out most explicitly by Hegel. I don't mean to assert here, that Hegel has it right, but only to suggest that a non-monistic holistic logic is available to understand these relations as well.

- ¶31. I now want to turn to the theological implications of holism that Professor Sachs has raised, but I will do so by first analyzing in more detail the dialectical holism I have just sketched out. One of the striking features of organic systems understood in terms of their dialectical part-whole relations is that they are fundamentally nonlinear. I have explored this aspect in previous Field-Being Symposia. For our purposes here, a short sketch of the concept will do. The parts of a complex (organic) system are conceived as in reciprocal relations whereby each part is both the cause and effect of other parts within the system. Thus, for instance the tension on a bone produced by a developing muscle causes the bone to grow in the direction the *force* is applied. Yet without the bone to attach to, the muscle cannot grow into its proper form either. Such reciprocal relations, and many much more complicated relations are the basis of ontogenetic development. If we examine the logic of these relations more closely, we find that they result in self-referential modes of causality.
- ¶32. Conceptually, this self-referential causality is quite easy to understand. Part A has an effect on part B, which in turn effects A. Thus Part A effects itself through the mediation of B, and vice-versa. Such relations in biology are much more complex than this simple example, and the degree of self-reference much richer. For instance, in the evolutionary sense, since it is the whole that faces the cutting edge of natural selection, it is the whole that determines the order and relations of the parts. Yet ontogenetically, the parts determine the whole. The whole is thus reciprocally cause and effect of itself. Such relations present a serious problem for scientific modeling because these systems are nonlinear. Not all self-referential relations lead to nonlinearity, but those that do present intractable problems. Abstract linear models can in some cases *approximate* the development of a nonlinear system over time, and nonlinear mathematical models may provide an analogy, but nonlinear systems are in some sense, their own simplest model. The inability to model a nonlinear system implies the inability to predict that systems behavior, though such systems are nevertheless deterministic. That is, given identical circumstances, they will evolve to an identical endpoint, it is just that mathematical models cannot predict in advance what this endpoint will be.
- ¶33. There are seemingly contradictory implications of the self-referentiality that results from highly context dependent systems:
- ¶34. (1) Each part is constituted as a *separate* entity on its own, yet only through its reciprocal causal relations to other parts within the overarching whole. Each part is both caused by its other parts, and yet also caused by itself. Thus, we need not erase the separateness of the part as merely a mode of the whole which is the implication of monistic holism. Rather, we understand separateness, or difference more generally, as intrinsic to the constitution and activity of the whole to begin with.

- ¶35. This would be analogous to the Ernst Mach's concept of inertia. I draw here from Profesor Sachs' discussion in *Einstein versus Bohr*. Mach demonstrated that the relation between *force* and *mass* in Newtonian physics could be re-expressed as a ratio of forces and masses, from which he derives an alternative equation to Newton's $F=ma$. Mach's equation is $m=k|F|$. Professor Sachs comments:
- ¶36. Now this mass-force relation may be interpreted quite differently from Newton's atomistic interpretation of his second law of motion. For [Mach's] equation appears to say that the inertial *mass* of a body is caused by the total external *force* that acts on this body. According to this view, the inertial *mass* of any quantity of matter is not an intrinsic property of that matter. It is rather an expression of coupling between this body and all other bodies that interact with it, that in themselves give rise to the total external *force* F that acts on that body. In Mach's view, then, inertial *mass* must have a strictly relativistic connotation and matter must be described, not atomistically, but rather in terms of a closed system. This is because the forces that matter exerts on matter generally have infinite range. The implication here is that the inertial *mass* parameter for any quantity of matter depends on all of the other matter of the universe—since, in principle, the latter gives rise to the total external force that acts on the observed matter that has the inertial *mass*.^[8]
- ¶37. One can take several perspectives on this relational or field concept of *mass*. One can focus on the fact that what we take to be a *separate* "thing" with *mass*, really derives its fundamental determination from outside of itself, namely, from the field of *force* by which it is constituted. But this would be to focus solely on the *force* side of the equation. On the mass side of the equation, we have the substantial entity. It is the play of forces, a play that invokes the totality of *force* in the universe, that constitutes the thing and the *force* by which it resists these other forces (inertia). Yet without the substantial entity with mass, we could not have this play of forces. Indeed, is the universe not already contained in the simple substantial entity, and vice-versa? Mass and *force* are reciprocal concepts.
- ¶38. Mach's concept of inertial mass calls to mind Hegel's very different analysis of the Newtonian concept of *force* in the *Phenomenology of Spirit* (1806). Hegel writes in *force* and the Understanding regarding the solicitation of forces:

- ¶39. The first *force* has its determinateness only through the other, and solicits only in so far as the other solicits it to be a soliciting Force; and, just as directly, it loses the determinateness given to it, for this passes over-or rather has already passed over-to the other. The external, soliciting *force* appears as a universal medium, but only through its having been solicited by the other *force* to do so; but this means that the latter gives it that character and is really itself essentially a universal medium; it gives the soliciting *force* this character just because this other determination is essential to it, i.e. because this is really its own self...The fact that the extremes, from the standpoint of both these sides, are thus nothing in themselves, that these sides in which their different essences were supposed to consist are only vanishing moments, are an immediate transition of each into its opposite, this truth becomes apparent to consciousness in its perception of the movement of Force.[\[9\]](#)
- ¶40. Hegel articulated this play of forces in the logical categories of *being-for-self* and *being-for-other* and was able to demonstrate both the unity of the concept of force in the concept of infinity, as well as to show the dialectical necessity of the diremption of this concept into the plurality of forces. Thus, my question of how to account for the plurality of the monistic whole as conceived by Professor Sachs is a direct application of Hegel's analysis.
- ¶41. (2) We have already touched on the second seemingly contradictory implication of a dialectical holism in the discussion above. If each part is affected by its context, that is, those parts into which it enters relations, each part is in principle related to all the other parts, and consequently to the whole. Biological systems have developed ways to buffer ontogenetic development so as to minimize contextual causes that disrupt the development of the organism, but genetic influence on each cell, for instance, is a product of evolutionary selection which implicates the environment in the formation of each individual, regardless of how well it is protected from this environment. Each part of a biological system is determined by the whole of which it is a part as well as the relations of each part of the system it both affects and is affected by.

- ¶42. As we saw above in the discussion of Mach's concept of inertia, Hegel's analysis of this structure leads to the rather startling conclusion that each part contains within itself the whole of which it is a part. Consequently, each part contains within itself the whole and all the other parts in their ordered relations. I will spare you the logical derivation of this claim, but it can be illustrated by the simple fact, remarked upon by a biologist named Blumenbach from whom Kant, in the *Critique of Judgment*, [10] claims to have learned the solution to the contradiction that living (organized) beings present to scientific reasoning:[11] that the paleontologist can reconstruct the structure of an organism on the basis of a very few bones. This is possible because each bone, although a simple "thing" bears the mark in its form and structure of the whole of which it was a part. Hegel takes his logical analysis much further and draws the conclusion that each part of a system, be it an organism, a person or so called "lifeless" matter, contains within itself the whole of which it is a part. The whole in this case being totality, the principle of which is the Hegelian concept of infinity.
- ¶43. If we use this logic to interpret Professor Sachs' articulation of a monistic holism, the dialectical logic of parts and whole allows us to come to a different understanding of the relationship between so-called "things" and the unity of which they are a part. Rather than conceiving of matter as a mode of the continuum, a dialectical interpretation would conceive of matter as having separated itself off from the whole, yet containing within itself the very whole of which it is a part. As in the organic domain, we see that difference is intrinsic to the whole. There are indeed substantial entities, but they are derived from the self-differentiating activity of the whole. Relations and relata are thus coextensive.
- ¶44. Professor Sachs mentions the Hua Yen school of Buddhism as an example of the kind of monistic holism he has derived from the principle of relativity. Yet the Hua Yen principles of li-shih-wu-wei-the interpenetration of the principle in each of the particulars, and of shih-shih-wu-wei-the interpenetration of each of the particulars within each of the particulars, argues for the dialectical interpretation of holism.
- ¶45. I cannot, of course, comment on whether the dialectical logic I have suggested here is adequate to the task of interpreting relativity theory, but I do believe that it has a distinct advantage in other domains of analysis. One of the implications of any holism is that the activity of any of the parts or modes of the whole implicates the entire whole. To identify any single thing as the cause of an event fails to take into account the context of the entire whole which is of necessity implicated in each event or activity. Thus, with respect to consciousness, for instance, Professor Sachs writes:

- ¶46. ...the human consciousness itself is not more than one of an infinitude of manifestations of the continuous and nonseparable universe. The role of any manifestation of the universe (such as a single consciousness) is analogous to a ripple of a pond. Indeed, the ripple is not a separable 'thing' that could be removed from the pond and studied on its own, say by measuring its weight, size, color, etc. This is because the ripple is not more than a mode of behavior of the entire pond-it is of the pond and not a thing in it.[\[12\]](#)
- ¶47. The problem I see with this monistic holism is the inability to conceive of any thing as *separate* from the whole. Without such separation, there can be no freedom and no responsibility. Why did I pull the trigger on the night of August 4, 2000? Well, because I am simply no more than a mode of the behavior of the entire universe! A dialectical holism, on the other hand, admits difference and provides for separation of the part from the whole, even as the part is still recognized not only as a part of the whole but as containing the whole within itself. The self-relation that constitutes the part as an quasi-independent thing or consciousness is the opening of freedom and moral responsibility. The social, moral and spiritual task is then not to dissolve the boundaries per se that constitute the thing as *separate*, but instead the reconciliation of the part within the whole in a way that does not destroy the separateness of the part.
- ¶48. Separateness, difference, is a part of unity, at least a dialectical unity. The mistake of atomism and substantialism more generally, is to assume that separateness-the thing-is ontologically prior. But if we go to the opposite extreme, then the part is dissolved into the whole. We must rather think of the whole and the part as dialectically constitutive of one another. Each part is a whole, and yet becomes a whole only through its relations to other parts. To be a part is to be a whole, and to be a whole is also to be a part.
- ¶49. This latter statement leads us to a similar conclusion that Professor Sachs has drawn, namely that any domain of objective knowledge is unbounded. I would go further and argue that although the universe is a whole, a closed system, yet it is also unbounded, forever open to further differentiation and the consequent evolution of higher orders of *organization* and unity. Is God really the undifferentiated whole from which we start-if there ever was such a beginning-or is God a higher order of *organization* that we achieve through the transcendence of our particularity, a transcendence not of the boundaries of the self, but rather the constitution of higher orders of *organization* of which the self is a part? Is God the totality or an emergent property of the whole, or both?

END NOTES

1. Mendel Sachs, [The Principle of Relativity](#), *International Journal for Field-Being*, 1(1) 2001, ¶14.
2. Mendel Sachs, [Einstein Versus Bohr](#), La Salle: Open Court (1988).
3. Mendel Sachs, [From Atomism to Holism](#), 2001, http://apps.fairfield.edu/ijfb/www.compukol.com/mendel/From_Atomism_to_Holism.PDF .
4. Mendel Sachs, [The Principle of Relativity](#), *International Journal for Field-Being*, 1(1) 2001, ¶16.
5. *ibid.*, ¶9.
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7. Mendel Sachs, [Einstein Versus Bohr](#), La Salle: Open Court (1988), 266.
8. *ibid.*, 16-17.
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