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A FOUR-LAW LOGIC COMMENT ON
TIME, QUANTUM CHANGE, AND UNIVERSE CLOSURE

Thomas E. Bearden

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REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) A Four-Law Logic Comment on Time, Quantum Change, and Universe Closure,		5. TYPE OF REPORT & PERIOD COVERED
7. AUTHOR(s) 10 Thomas E. Bearden		6. PERFORMING ORG. REPORT NUMBER
9. PERFORMING ORGANIZATION NAME AND ADDRESS System Development Corporation 4810 Bradford Blvd., N.W. Huntsville, Alabama 35805		8. CONTRACT OR GRANT NUMBER(s) n/a
11. CONTROLLING OFFICE NAME AND ADDRESS Thomas E. Bearden 1902 Willis Road S.E. Huntsville, AL 35801		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS n/a
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office) 12 16p.		12. REPORT DATE 11 28 Apr 1977
		13. NUMBER OF PAGES 13 + i
		15. SECURITY CLASS. (of this report) Unclassified
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE n/a
16. DISTRIBUTION STATEMENT (of this Report) Approved for public release; distribution unlimited.		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report) C 1977 Thomas E. Bearden. Printed by permission.		
18. SUPPLEMENTARY NOTES		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) antimatter, cosmology, closed universe, Einstein's spherical model, existence, future, hologram, identity of opposites, logic, many-worlds interpretation of quantum mechanics, mental phenomena, metalogic, mind, mind quantization, nonexistence, object, objectivity, observation, open universe, orthorotation, parapsychology,		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) From the fourth law of logic, the universe is both open and closed simultaneously, although unobservably so. When observation is operationally applied, the universe may appear exclusively open or exclusively closed, depending upon the conditions of applying the operational observation. The argument over whether space is positively or negatively curved, and hence closed or open, is therefore specious since the answer will vary depending on the logic which applies to the particular		

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19. (continued) parapsysics, past, perception, perceptron, photon interaction, physical phenomena, present, quantum change, quantum mechanics, reality, reference frame, relativity, simultaneity, structure of time, superspace, time, two-slit experiment, vacuum, virtual state.

20. (continued) → observational conditions.

Obtaining information about an external object forms a closure between observer and object in that only an internal change to itself is detectable by any detector. A fundamental particle (detector) represents a boundary between externality and internality and hence by the fourth law of logic must represent a closure of the entire universe. Reality is thus holographic: The entire universe is inside each internal point of itself, and each internal point is also external to its entire universe. The many-worlds interpretation of quantum mechanics is the only interpretation which will withstand four-law logical analysis.

The assumed simultaneity of each spatial point in a reference frame lattice -- i.e., the concept of the simultaneous existence of all points in a three-space -- violates the third law of logic, as does the two-slit experiment upon which quantum mechanics is based. Thus only by four-law logic can physics have a sound logical basis.

Time is a cyclic carrier wave containing patterned oscillating energies which can interact with mind and matter, as pointed out by Muses in 1958. The cyclic action of the time carrier generates quantum change itself. The positive half-cycle presents the fissioned quantum -- and hence all finite forms and relations -- while the negative half-cycle fuses the quantum fragments back together, absenting the quantum -- and hence all finite forms and relations. As the cyclic time frequency increases, the universe of physical change thus approaches simultaneous existence (being presented) and nonexistence (being absented). The limit represents simultaneous presence and absence, creation and annihilation -- and accounts for the simultaneous existence of infinite positive energy and infinite negative energy existing at the zero-point. This is also Wheeler's superspace, where duration and length (in any monocular sense) lose all meaning.

In infinite-dimensional spacetime containing nested 4-spaces such that a single time dimension is shared by all and the respective time-differentiated 3-spaces are successively orthogonal, all 3-spaces three or more orthoturns away from the laboratory frame (i.e., from the frame of the mass of the detector) are mind worlds and virtual. Mental phenomena are thus concretely and physically real in their own 3-space, and minute dynamic crosstalk occurs between all frames, mental and laboratory, through the medium of the oscillatory time carrier, as modulations of minute size riding on the carrier.

Four-law logic thus encloses both mind and matter into a common physics based on Everett/Wheeler's many-worlds interpretation of quantum mechanics.

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A FOUR-LAW LOGIC COMMENT ON TIME, QUANTUM CHANGE, AND UNIVERSE CLOSURE

Thomas E. Bearden

For years, physicists have speculated (and argued!) whether the universe is open or closed. The argument can quickly be resolved, however, if one notes that there is no information outside a closure, outside a fully closed system. But even if there is no information, by the fourth law of logic no information is identical to total information, and "fully closed system" is identical to "fully open system." I.e., the universe is both totally open and totally closed, yet neither exclusively, which is permissible by the fourth law of logic. The argument then is much like the principle of complementarity; it presupposes monocular perception and a single reality. I.e., in the monocular view, a system is either closed or open exclusively, while in the multiocular view it can be both closed and open simultaneously, in which case the argument vanishes.

Before the advent of relativity and quantum mechanics, physicists thought in terms of a model wherein the observer (mind) was totally excluded from physical phenomena. That picture is now considered invalid by a substantial number of physicists, who instead consider that the observer (mind) is immutably bound into the equations and assumptions of quantum mechanics. The final reason for this, however, has remained somewhat obscured. In this author's opinion, the question cannot be clarified by three-law logic, since the answer is a statement of the fourth law of logic.

Separate observation itself must form a closure if it is bounded (i.e., if it is finite) because the boundary can only be made by invoking the fourth law, the closure of two opposites into an identity. By the fourth law of logic, a bounded system must be both open and closed (each nonexclusively) in the unobserved

present, prior to openness and closure being separated in a mutually exclusive manner in the past (monocular observation). Young's two-slit experiment² clearly establishes this for all fundamental particles. From this experiment -- upon which all of quantum mechanics, and hence all of physics, rests -- a particle is dualistic (both corpuscle and wave, but neither exclusively) until the photon interaction is invoked. Until photon interaction occurs, the particle is dimensionally L^3T , and its behaviour is totally indescribable by classical means -- i.e., by the first three laws of logic, which hold rigorously only for L^3 entities. The photon interaction invokes the operator $\partial/\partial T$, reducing the L^3T nonclassical, nonobjective, present entity to an L^3 classical, objective, past corpuscle, and thereafter classical "objective" behavior is observed³.

It can also be shown that obtaining information about an external object forms a closure between observer and object.

In a monocular observation, the observer must utilize an operational sensor (signal) to detect any "external" object. Some type of first operation must be conducted which corresponds to "sending a signal from the detector/observer to the object's position," and then a second operation must be conducted which corresponds to "receiving a signal from the object's position." Separation of observer and object -- in either distance or time -- is correspondent to the time delay measured by the observer/sensor. In unaccelerated frames, $\Delta L = c \Delta T$ where c is the speed of light in vacuum.

An observer change (emission) occurs in the transmission and another observer change (absorption) occurs when the return signal is received. To reduce this situation to its boundary limit, the fourth law of logic must be applied, for the fourth law is the law of the boundary, and it applies on all boundaries.

The fourth law can be applied by invoking the perceptron approach.⁴ To the perceptron, detection and change are synonymous -- to detect is to change, and to change is to detect, totally, not partially. I.e., when the perceptron detects, there is no part of it which does not detect, and when the perceptron changes, there is no part of it which does not change. The perceptron represents a closure of the universe; any fundamental particle may be taken as a perceptron.

By thus moving the observer question to fundamental particles, one is immediately confronted by the fact that the external is totally internal and the internal is totally external. The perceptron consists of nothing but the changes, the external objects it detects, and the external objects consist of nothing but the detections the perceptron makes. A fundamental particle lives in a totally different kind of reality from that of "objective physics" in the classical view. Specifically, a particle has no past or future, except with respect to a macroscopic observer. This of course is directly related to the "observed observer" problem in physics, which has been adequately dealt with only by the many-worlds interpretation of quantum mechanics⁵ (the Everett/Wheeler theory of the universal wave function). Except in that interpretation, all of physics is interpreted for a single observer at a time; i.e., monocularly. This conventional interpretation is in fact a determined attempt to retain the basis of physics on Aristotle's three laws of logic -- i.e., on classical logic -- and it is already well known from Young's two-slit experiment that classical logic totally fails to describe fundamental quantum mechanics.⁶ A fundamental particle exists in a spaceless, timeless void where no definite length or definite time has been determined, for no observation (photon interaction) has occurred. This is a total closure of the universe into a single giant hologram, which can be seen only by multiocular perception, not by monocular perception. Thus the Everett/Wheeler theory remains essentially ignored

by mainstream physicists. Nonetheless, the many-worlds interpretation remains the only interpretation which will withstand rigorous logical analysis, if full four-law logic is admitted.

At any rate, the acquisition of information by the observer is the initiation and evoking of change by each perceptron, and since any change of a perceptron represents a closure, itself constitutes closure. To detect an external object is to form a closure with it, of that part (the perceptron) actually involved in the detection.

Often one thinks only of receiving a return signal from the "external" object, without previous action of the observer/perceptron. Light falling on an observer from a distant star, e.g., is normally conceived of by the physicist in this manner. However, complete detection cannot have occurred unless a reference corresponding to where the initial signal was transmitted from was previously established, i.e., unless the first necessary part of the observation closure had already been accomplished. The very concept of a reference frame a priori requires that a transmission from the origin and a consequent reception (a closure) has been made to each and every point in that frame. I.e., that must have been done before the frame can be taken as existing all-at-once, each point simultaneously. Let us examine that prospect a little closer.

To show how cleverly physicists hide the closure of a system even from themselves, one can examine the hidden closure implicit in the concept of a spatial reference frame. E.g., in special relativity one usually first constructs a reference frame, a lattice, by arguing that a travelling clock can be synchronized with a reference clock at the origin, and then the travelling clock can be slowly moved to any other point in the spatial frame and used to synchronize another clock there.⁷ This operation is considered to have been repeated for each and every point in the

reference frame. Each spatial point in the frame is then considered to "exist at the same time." This simultaneous existence of each point of a spatial frame is assumed a priori in the very concept of "the existence of a spatial frame."

This of course is simply a ploy to get around three-law logic -- specifically, to get around the law of the excluded middle. For by that law, if the ΔT time separation between two points is zero, then the ΔL spatial separation is zero also since $\Delta L = c \Delta T$. The third law specifically prohibits $c \Delta T = 0$ and $c \Delta T \neq 0$ simultaneously existing. So the concept of a coordinate spatial frame assumes the violation of the third law of logic.⁸ This can also be seen another way as follows:

One could, e.g., take the alternate view that an infinitely distributed observer is assumed, one who is located at, and looking out through, every point in the spatial reference frame simultaneously. But such an observer then is not local, and by the third law of logic this destroys the locality on which physics itself is based -- i.e., it destroys the notion of the localized event, on which relativity is founded. So the idea of a reference spatial frame either makes physics nonlocal and hence nonobjective, or else it violates the third law of logic, by the third law itself.

Since it is well known that physics is local, then it is the third law of logic which must be modified. This immediately drives one to the fourth law -- opposites are identical on their common boundary -- and thus physics can both be local and possess reference spatial frames.

Without the fourth law of logic, physics is illogical and thus has no sound logical basis. For quantum mechanics, this essentially has already been surmised or suspected by a great many physicists -- as Feynman pointed out, the two-slit

experiment contains the total -- and the only -- mystery of quantum mechanics, and the experiment absolutely cannot be explained by any classical means.⁹

Now to continue, let us note another interesting thing. To even conceive a 3-space frame as an entity, one must assume its "objectivity" -- its boundedness -- for only finite things can be perceived totally, i.e., such that all points/parts¹⁰ of them can be gripped in the single observation. But a finite thing is a separated thing; one has then unconsciously invoked an "outside or separated detector/observer" and that is the mind. Rigorously speaking, the "mind" exists in or occupies the same time dimension as physical phenomena, but does not occupy any of the three spatial dimensions occupied by physical phenomena. More precisely yet, one should state that the mind exhibits the same time dimension as is exhibited by physical phenomena, but it does not exhibit (normally!) any of the three length dimensions in the spatial frame exhibited by physical phenomena. The "mind" thus exists in time or exhibits time, but does not exist in the 3-space of physical phenomena. In one sense mind is time and time is mind.

Also, time is in yet another sense a negative 3-space. As we have previously seen, adding the time dimension to a 3-space reference frame -- i.e., invoking simultaneity to each and every point of the 3-space reference frame -- annihilates all lengths in the frame, hence 3-space itself. Adding time is the same as adding mind -- rigorously, observed phenomena are forever past and gone, and thus exist in the mind (memory) and only in the mind. Their existence in the mind thus corresponds completely to the annihilation of a 3-space by the addition of mind. To annihilate a 3-space by adding something, its negation is required to be added. Thus the addition of mind is equivalent to the addition of a negative 3-space, and in that sense a mind can be considered a negative 3-space. So the addition of simultaneity and the time dimension to a 3-space reference frame is the addition of

a negative 3-space, the annihilation of the reference, and the closure of the universe, leaving no difference between observer and observed. It is for that reason that objective phenomena, having been observed, have disappeared and are contained in/identified with the mind of the observer and only there.¹¹ Again, this is a universally observed fact, but one which has been ignored by physicists, or at best hidden in quite arbitrary constructs such as the "collapse of the wave function." The common assumption of a simultaneous time existing throughout the points of a spatial frame, which is implicit in the very idea of the frame itself, involves total closure/annihilation of the frame in an Einstein closure. It also invokes a 3-space frame structure for the observer (mind), but one that is negative -- i.e., three orthorotations away from ordinary 3-space in an infinite dimensional spatial frame containing a single time dimension. Mind turns out then to be as real in its own framework as are physical phenomena in theirs.

Since any point of an ordinary 3-space could have been taken as the origin for the reference frame, the closed space is totally holographic -- each most internal point in a 3-space is also the most external point.¹²

The old argument about a closed or unclosed universe can thus be resolved: the universe is closed an infinity of infinities of times, holographically, in each point of itself. In each event of itself. By the fourth law of logic, such total closure is also total openness.¹³ The argument over exclusive closure versus exclusive openness is thus specious.

So time is in one sense a negative 3-space. But it is assuredly not static! Instead, as Charles Musés pointed out even as early as 1958, time is much more than mere quantitative duration, for it contains patterned oscillating energies that interact qualitatively (the negative 3-space is outside the ordinary 3-space) with consciousness (time is mind in one sense, in that all phenomena/changes outside

ordinary 3-space are mental phenomena/changes) and which effect change!¹⁴ Then as time ($-L^3$ 3-space) interacts with L^3 3-space, these mindframe energies affect matter.

The basic time dimension evidenced in physical phenomena is thus really a cyclic sine wave carrier, as Kozyrev has assumed and demonstrated. On one half-cycle of the time wave the negative 3-space is presented, added to the ordinary 3-space, thus annihilating (absenting) both. This accounts for the lengthless, timeless vacuum, and its zero point energy is thus infinite, since it is composed of an entire positive universe and an entire negative universe. On the second time half-cycle, the negative 3-space is absented from the ordinary 3-space, which means that both positive 3-space and negative 3-space are presented. Thus one has the presence of the ordinary world and also of the antimatter world, but separated one from the other. The successive positive 3-space presentations form the familiar space frame of the observed world, and the successive presenting of the negative 3-space separately from the positive 3-space (i.e., the absenting of the negative 3-space) constitutes an antimatter world -- the world in which Dirac predicted the electron traveling backward in time, which in the ordinary world would be seen as the positron, a positive electron traveling forward in time.¹⁵ The simultaneous existence of both worlds also accounts for the simultaneous existence of infinite negative energy and infinite positive energy at the zero-point at the same time, and the fourth law of logic accounts for the fact that they can simultaneously coexist without blowing the universe apart! In fact they do blow it apart at a fantastically high frequency, but in so doing, actually create it again repeatedly, at the same fantastically high frequency.

The cyclic action of the time carrier generates quantum change itself. I.e.,

it is a single quantum that is generated or extinguished in each half-cycle. It takes an operation to present a quantum of action -- i.e., to exclusively separate it from the universal nondetermined action continuum -- and another operation to absent the quantum -- i.e., to integrate it back again into the unseparated action continuum. The action continuum is unperceivable/unobservable/virtual. It is thus filled with and composed of hosts of virtual entities -- in fact, with every conceivable virtual entity, and every conceivable structure of virtual entities, each of which has $\Delta E \Delta T < h/(4\pi)$. But the ΔT portion of each of these virtual entities is quite ordinary and real. Each of these virtual entities possesses a "frequency" inversely proportional to its own ΔT , and all the virtual entities may be regarded as frequencies or modulations riding upon the ordinary time carrier frequency of observed phenomena.

Einstein pointed out that velocity could be interpreted as the degree of rotation of 3-space toward an orthogonal axis. While it is usually regarded as toward the time axis, it can also be regarded as being rotated away from the 3-space toward another spatial axis in 5-space. To completely separate from ordinary 3-space, three complete orthogonal turns away from 3-space, in a departing manner, must be taken, at which time the 3-space so rotated will have zero intersection with the ordinary 3-space. Actually, however, orthogonal rotation differs slightly from plane geometry ideas, since orthogonality occurs when the compression factor (the projection of the rotated frame into the laboratory frame) reaches $1/c$. I.e., the speed of light simply is the correct measure of an orthogonal turn, by the Lorentz transformation. Three orthogonal turns reduce by the factor $1/c^3$. Thus virtual entities must be reduced in effective magnitude in the laboratory 3-space by a factor of $1/c^3$. Virtual entities are thus of extremely minute effect, normally completely immeasurable, but finite nonetheless. Thus the ordinary time carrier

is "jittered" by the virtual modulations a very small degree, in real time. All the virtual entities -- all possible virtual entities -- may thus be regarded as separate, minute frequencies riding as modulations upon the ordinary time carrier frequency, like clothes hanging on a clothesline with clothespins, or like little baby opossums hanging on their mother's tail with their own little tails. There are an infinite number of virtual realities/mental worlds modulated upon the ordinary time wave and jittering it by an extremely minute but finite amount.¹⁶

During what we take as the positive time carrier half-cycle, the world is objective (presented) and its inverse (antiworld) also exists. During what we take as the negative time half-cycle, the world is virtual (absented) (extinguished) as is its antiworld. The virtual world is also the mindframes, and these are riding on the time carrier. Mind itself is quantized by quantum change, induced by time carrier oscillations.

Since closures and separations of the entire universe are constantly being made within each point inside itself, then zero-point energy is infinite. All the energy in the universe is continually being captured in each point of it, and is continually oscillating between zero and simultaneous positive and negative infinite magnitudes.

Higher frequency time oscillation involves a higher rate of closing and opening, of annihilating (absenting) and creating (presenting) the material universe.

Imagine that this rate is increased without limit. One then has the entire universe totally present and totally absent everywhere/anywhere/nowhere in the everytime/anytime/no time void. This is the void that is devoid even of void. This is the omega point, which Wheeler called superspace.¹⁷ Duration and length lose all exclusive meaning. A thing exists and does not exist at the same time. This

is astounding and incomprehensible to three-law logic, but quite comprehensible to four-law logic. This is the present, the pregeometry that is the nature of reality before exclusive separation/observation/perception is applied or invoked. And the pregeometrical present -- the identification of geometry and not-geometry -- requires the fourth law of logic to be represented and understood.

NOTES AND REFERENCES

1. For development and discussion of the fourth law of logic, see Thomas E. Bearden, An Approach to Understanding Psychotronics, Defense Documentation Center (DDC), June 1976, AD-A027 866; Writing the Observer Back Into the Equation, DDC, June 1976, AD-A027867; and Solution of the Fundamental Problem of Quantum Mechanics, January 3, 1977, DDC.
2. A particularly good discussion of the two-slit experiment can be found in Richard P. Feynman, Robert B. Leighton, and Matthew Sands, The Feynman Lectures on Physics, Addison-Wesley Publishing Company, 1963, Vol. 1, pp. 37-1 to 37-12.
3. See Bearden, Solution to the Fundamental Problem of Quantum Mechanics, 1977 for a discussion of the relation between primitive observation, conceptualization, photon interaction, and objectivity.
4. Thomas E. Bearden, Quiton/Perceptron Physics: A Theory of Existence, Perception, and Physical Phenomena, DDC, AD 763210, March 1973.
5. See The Many-Worlds Interpretation of Quantum Mechanics, A Fundamental Exposition by Hugh Everett, III, with papers by J.A. Wheeler, B.S. DeWitt, L.N. Cooper and D. Van Vechten, and N. Graham; eds. Bryce S. DeWitt and Neill Graham, Princeton Series in Physics, Princeton University Press, 1973.
6. Feynman, loc.cit.
7. E.g., see Edwin F. Taylor and John Archibald Wheeler, Spacetime Physics, W. H. Freeman and Company, 1966, pp. 18 and 19 for a discussion of two ways of synchronizing latticework clocks in a reference frame. Taylor and Wheeler also point out that the entire frame lattice is the "observer," and that one real observer could not easily do what is asked of the "ideal observer" in an analysis of relativity.
9. Feynman, loc. cit.
10. Or more precisely, what had been separate points/parts in previous one-at-a-time observations.
11. To perceive a thing is to have perceived it, put it into the past, and destroyed it. To observe an event is to have observed it, put it into the past, and destroyed it. There is no perceived or observed present; the present is unperceivable and unobservable.
12. Which of course is the same as Einstein envisioned in his spherical model of the cosmos.
13. Which was not envisioned by Einstein in his closed spherical model of the cosmos.

14. With the possible exception of Kozyrev -- whose more technical works on time remain undisclosed to open science -- no other person known to this author seems to have grasped the implications of a dynamic structure of time as deeply and penetratingly as has Charles Musés. E.g., see Musés' foreword to Jerome Rothstein, Communication, Organization, and Science, The Falcon's Wing Press, Indian Hills, Colorado, 1958, pp. vii - xcvi. Western scientists have not grasped the engineering implications of Musés' work -- matter materialization, dematerialization, and consciousness processing -- on time and his brilliant work on hypernumbers. It is little short of astonishing that the genesis point for a totally new science and technology has been shelved since 1957-58 in the works of Everett and Musés, and that even today Western scientists continue to ignore works of such fundamental importance.
15. Dirac, P.A.M., "Quantized Singularities in the Electromagnetic Field," Proc. Roy. Soc. London, Ser. A, 133, 60 (1931).
16. Specifically, all virtual entities may be regarded as mental or mind entities. All co-temporal orthogonal 3-space frames three or more orthoturns away from the laboratory frame are mental frames or mind worlds.
17. Cf Charles W. Misner, Kip S. Thorne, and John Archibald Wheeler, Gravitation, W. H. Freeman and Company, 1973, pp. 1181-1194.