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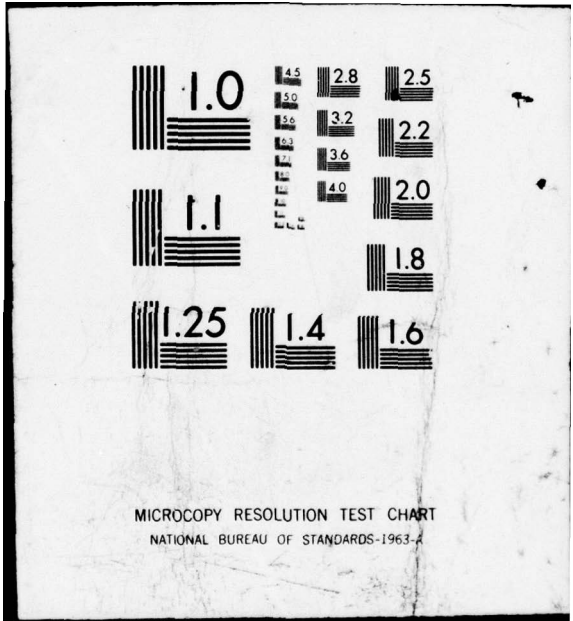
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SOLUTION OF THE FUNDAMENTAL PROBLEM OF QUANTUM MECHANICS

Thomas E. Bearden

January 3, 1977

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January 3, 1977

Ms. Alice Healy  
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Dear Ms. Healy:

I am enclosing two additional reports which I would appreciate your placing in the DDC system if possible. I believe these reports contain information on the very forefront of science and philosophy.

This letter of course constitutes permission to publish the reports.

Your courtesy and consideration is most appreciated, and I hope you had a marvelous holiday season.

Sincerely,

*Tom Bearden*

Thomas E. Bearden  
Research Scientist  
MS Nuclear Engineering

2 incl

1. The One Human Problem, Its Solution, and Its Relation to UFO Phenomena
2. Solution of the Fundamental Problem of Quantum Mechanics

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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) Solution of the Fundamental Problem of Quantum Mechanics ✓		5. TYPE OF REPORT & PERIOD COVERED n/a
7. AUTHOR(s) ⑩ Thomas E. Bearden		6. PERFORMING ORG. REPORT NUMBER
9. PERFORMING ORGANIZATION NAME AND ADDRESS System Development Corporation 4810 Bradford Blvd Huntsville, Alabama 35805 ✓		8. CONTRACT OR GRANT NUMBER(s)
11. CONTROLLING OFFICE NAME AND ADDRESS n/a		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS n/a
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office) n/a ⑫ 24p.		12. REPORT DATE ⑪ 3 January 1977
16. DISTRIBUTION STATEMENT (of this Report) Approved for public release. Distribution unlimited.		13. NUMBER OF PAGES 20
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		15. SECURITY CLASS. (of this report) Unclassified
18. SUPPLEMENTARY NOTES © T.E. Bearden 1977. Reproduced by permission of the copyright holder.		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE n/a
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) action, axioms of logic, biofields, boundary, coherence, complementarity, conservation of energy, death, dimension, duality, electron, frames, free energy, hyperchannel, identity of opposites, life, logic, many-worlds interpretation of quantum mechanics, mass, mind, orthogonal frames, orthorotation, paradox, particle, philosophy, photon,		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) The fundamental problem of quantum mechanics is posed by Young's two-slit experiment, which is impossible to explain in any classical way. This implies that the solution does not exist in accord with Aristotle's three laws of classical logic; ergo the solution must exist in the <u>negation</u> of those three laws. The author demonstrates a fourth law of logic -- the boundary identity of opposites -- and demonstrates how this law may be comprehended. Since the fourth law contains the negation of each of the		

*letter on file see abstract sheet*

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*next page*

Block 19. (continued) photon absorption, photon emission, photon interaction, perception, physics, probability, psychotronics, quantum, quantum mechanics, relativity, reality, spacetime, time, time waves, two-slit experiment, virtual photon, virtual state, wave.

Block 20. (Continued). → other three laws, then the four together form a closed operational system (a metalogic). The first three laws apply to individually observed entities while the fourth law applies to multiocular perception. The first three laws deal only with the past, the determined, the singularly exclusive, the localized; while the fourth law deals with the present, the undetermined, the nonexclusive, the nonlocalized, the unperceived/unobserved. ←

The author presents an informal analysis of primitive perception and shows that it is one-to-one correlated with the photon interaction. The photon interaction, however, constitutes a time-differentiating operation imposed upon 4-dimensional Minkowskian reality (which is unperceived reality), producing three-dimensional, objective, determined, past reality. Photon absorption constitutes dimensional differentiation of reality, while photon emission constitutes dimensional integration. Objective concepts have been developed in correspondence to the photon interaction.

In the two-slit experiment, the electron is 4-dimensional, not 3-dimensional. When shielded against the photon interaction, it remains four-dimensional, possessing its time dimension, and capable of interacting in a timelike manner.

By wavelength one refers inversely to a time interval. Synchronization of time intervals between slit dimensions and electron wavelength results in time interaction between the electron's time dimension and the time dimension of the two slits. Thus the electron interacts with both slits if shielded against the photon interaction, and time waves are propagated forward from both slits. If the slits are made much larger, time synchronization is destroyed and the classical effect reappears. If the photon interaction is imposed upon the electron, it is time-differentiated and becomes a classical object, having lost its time dimension. When the electron encounters the screen, it meets a region of randomly varying time oscillations of the orbital electrons around the individual atoms comprising the screen. Thus the exact location of the orbital electron in the screen which will first precisely time-synchronize with the electron wavelength reciprocally is a random choice, and the "place" where the electron hits the screen is randomly selected along the screen, when the electron is four dimensional. The time pattern of the 4-d electron, however, had a distribution induced by its previous time interaction with the two slits. The pattern of this time distribution is wavelike, and is recovered when the distribution of the number of electron hits per screen length (which involves cumulation over time) is plotted.

Thus the two-slit experiment can be explained once the fourth law of logic is comprehended, and once the dimensionality of the electron and other parts of the experimental apparatus are taken into account.

The author points out that ordinary instruments and devices can be made to process entities in the unseparated state (multiocular state), as demonstrated by the two-slit apparatus itself. Some consequences of this fact are mentioned, and the author refers to a basic mechanism he has proposed for the deliberate and controlled violation of objective reality.

## Solution of the Fundamental Problem of Quantum Mechanics

Thomas E. Bearden

The fundamental problem of quantum mechanics is posed in one well-known and simple experiment -- Young's two-slit experiment.<sup>1</sup> In referring to this experiment, Feynman has observed that it is a phenomenon "... impossible, absolutely impossible, to explain in any classical way, and which has in it the heart of quantum mechanics. In reality, it contains the only mystery."<sup>2</sup> Feynman further stated that "In telling you how it works we will have told you about the basic peculiarities of all quantum mechanics."<sup>3</sup>

One must also realize that today quantum mechanics provides the base for essentially all of physics. According to d'Espagnat, "... nowadays the general principles of quantum mechanics underlie the whole of physics..."<sup>4</sup> In addition, one must also realize that the observer is integrally a part of physics; specifically, the complete observer, including his "mind." Again to quote d'Espagnat, "The mathematical formalism of modern physics...increasingly refers to our observations. Nowadays it is indeed so much dominated by this concept, treated as a primeval one, that it is best described...by a mere set of rules interconnecting past and future observations. All these considerations, then, support the view that observations, and more generally perceptions, truly constitute the backbone of physics."<sup>5</sup>

A final quote necessary for a factual basis for analysis is taken from Parnov. "...interactions between electrical charges are effected by photons. An electromagnetic field represents photons continually emitted and absorbed by a charged particle. Theory explains the behaviour of electrons in electromagnetic field, assuming that every electron continuously produces and absorbs photons. Such pulsations are the means whereby field and electrons interact.

This is the main type of interaction in quantum electrodynamics. The emission

and absorption of photons is a vivid example of what is called a virtual process. It is a conception characteristic of quantum mechanics and it extends to all particles without exception. A virtual process presumes an apparent violation of the law of conservation of energy. To understand this, it should be remembered that a photon possesses energy, and when an electron spontaneously emits a photon an apparent sudden increase occurs in the total energy of the system. Quantum theory easily skirts this submerged rock. The point is that the photon is emitted and reabsorbed so quickly that the increase in energy cannot be detected by any means, even in principle. But once a virtual photon cannot be detected, the conservation law is not violated since, according to the principles of quantum mechanics, its laws are applicable only to observable quantities. The obvious question then is whether virtual photons can become real photons? Certainly. Only for this an input of outside energy is needed.

Virtual photons take part in all interactions between charged particles and electromagnetic field. It is due to the virtual photon field that the electron is attracted to the proton. However, for protons the predictions of quantum theory are not so precise as for electrons." 6

With these quotes, we establish a data base for analysis.

Parnov's quote establishes that quantum theory describes two different kinds of reality, one observable and the other not observable. Since this applies to all particles without exception, then this is one of the fundamental assumptions of quantum mechanics. The present author has abstracted this basic idea of two kinds of realities separated by a threshold given by a quantum principle, and constructed a new theory of perception,<sup>7</sup> albeit in rather crude form at present. However, from this theory it has been possible to derive Newton's laws of motion in relativistic form,<sup>8</sup> Newton's law of gravitation,<sup>9</sup> and Einstein's postulates of



special relativity.<sup>10</sup>

In this paper we briefly show that a proper consideration of what is already well known about the two slit problem leads directly to the formulation of a fourth law of logic, one which enables an understanding of the two slit experiment and therefore the fundamental problem of quantum mechanics.

First, we accept Feynman's straightforward statement that the behavior of a particle in the two slit experiment is totally impossible to explain in any classical way. We then consider the implications of this summary characterization.

In effect, we have said that the entirety of logic, classical logic, is inadequate to explain the experiment. This means that Aristotle's three axioms of logic do not contain the explanation. I.e., the experiment violates Aristotle's three axioms of logic. This is paramount to stating that the solution is contained in the negation of Aristotle's three axioms. Accordingly, let us simply accept that and then write the negations of the three axioms of classical logic.

First, the three laws are simply

$$A \equiv A \quad (1)$$

$$A \neq \bar{A} \quad (2)$$

$$A \vee \bar{A} \quad (3)$$

and their negations in order are thus

$$A \neq A \quad (4)$$

$$A \equiv \bar{A} \quad (5)$$

$$A \wedge \bar{A} \quad (6)$$

and this author has already pointed out that all three negations are contained in the statement that

$$A \equiv \bar{A} \quad (7)$$

when this statement is properly comprehended. Admittedly we have in statement 7 the age-old "identity of opposites" idea, the necessity for which has been met by innumerable philosophers without resolution. However, the present author has also given a simple means by which the statement of the identity of two opposites can be grasped. <sup>11,12</sup> Briefly, perception is a monocular process; only one thing at a time is perceived (outputted by the process). A finite increment of time is required for the process to occur. Thus when A is perceived, say in increment of time number one, A and only A is outputted. When  $\bar{A}$  is perceived, in increment of time number two,  $\bar{A}$  and only  $\bar{A}$  is outputted. Now suppose that, in time increment number three, what had been A in time number one and what had been  $\bar{A}$  in time number two are both gathered up and shoved through the output simultaneously. In this case, only a single "thing" is outputted, and that thing is neither A exclusively nor  $\bar{A}$  exclusively, but contains each nonexclusively and totally without separation or differentiation. Thus in time three, what had been A in time one and what had been  $\bar{A}$  in time two have no distinction, hence are identical. Thus, using subscripts to represent the time interval during which an entity is perceived, statement 7 is properly written as

$$A_1 \equiv \bar{A}_2 \mid 3 \quad (8)$$

and this statement can now be understood simply as a prescription or characteristic of the operation of perception.

Statement 8 now represents a fourth axiom of logic, and together with the other three, closes logic into a metalogic which encompasses all logical thought. I.e., since perception is operational, one may think of it in a vectorial manner. From that aspect, a logic system must contain negation axioms for each of its assertive axioms if the system of logic is to be closed. Since statement 8 negates each of the other three, then the four-law system is closed.

Specifically, the fourth law of logic must contain the resolution of every paradox, where by "paradox" we mean something which has been found to negate one or more of the first three laws of logic. Resolutions of several examples which have baffled thinkers in foundations of physics and foundations of mathematics have been given by the present author.<sup>13</sup>

We are now in position to resolve the two-slit problem. Since a resolution cannot be given in terms of the first three laws of logic, the problem must involve a situation which invokes the fourth law, since all other cases are covered by the fourth law. But first we must digress for additional considerations which will clarify the situation. We must discuss how our concepts of objects and relations between objects, and hence our three logical concepts (axioms) dealing with the perception of objects and their relations, are formed.

All our basic perceptual concepts are essentially built on primitive observation of the macroscopic universe.<sup>14</sup> The very idea of an object -- i.e., of a perceived object -- is so conditioned. Everything else one thinks of is then conceived as some sort of objects or relations between objects.<sup>15</sup> All our structured concepts are so constructed and so based.<sup>16</sup> Specifically, it is from this approach that our entire idea or concept of "objectivity" is constructed, and from which our physical concepts of "observed" and "observable" are constructed.

But if one examines carefully exactly how one perceives an object in the macroscopic world, one realizes that it is seen by means of photon interaction. We think of light being absorbed onto the surface of the object, and then emitted or reradiated from the surface, eventually entering the eye. There the photons are again absorbed by the material on the retina. The photoelectric effect then moves what are called electrons, constituting a signal, which goes to the brain for interpretation.

Specifically, what one sees as an "object" has undergone interaction with photons of light twice. Further, light itself cannot be detected -- only its interaction with matter (in this case electrons) can be detected. Thus the primitive perceptual operations of the human brain are one-to-one correlated with photon emission and absorption interactions, usually paired interactions at the "object reality" domain. The very concept of object or mass or three-dimensionality or observation is directly correlated to the photon/mass interaction, and ultimately to the photon/electron interaction occurring in the human retina.

The idea of a "boundary" or surface in primitive perception thus involves two contradictory interactions: Absorption and emission. Because they are constantly intermingled, primitive perception cannot separate between the two. Thus the primitive concept of a boundary consists of a simultaneous duality. Here the object both begins and ends. Here opposites are identified. This is the basis for the fourth law of logic, the law of the boundary.

The dimensionality and orthogonality (spatially) of the primitive perception process is interesting. Photon absorption constitutes spatial integration for the photon, dimensionally speaking. I.e., one additional dimension is gained by the two-dimensional light wave in turning itself into the three-dimensional mass state. Photon emission constitutes spatial differentiation, dimensionally speaking. One spatial dimension is lost by a little hunk of three-dimensional mass turning itself into a two-dimensional wave. Going from "outside the object" toward inside, the boundary marks the end of the two-dimensional wave region, so the "object" (or more precisely, the interaction region) is two-dimensional on the outside, three-dimensional on the inside. Going from "inside the object" toward the outside, the boundary marks the end of the three-dimensional region and the beginning of the two-dimensional region. So the "object" is three-dimensional on the inside, two-dimensional on the

outside. So on the boundary, one dimension is gained in going in, and one dimension is lost going out. Gain or loss of a dimension is accomplished by, and only by, orthogonal rotation between orthogonal spatial frames. Photon absorption constitutes orthogonal rotation one right angle turn into the laboratory frame, while photon emission constitutes orthogonal rotation one right angle turn out of the laboratory 3-space frame.

This constitutes the observation process (primitively) per se, and this is what is hidden in Einstein's postulate that the speed of light is the same to every observer. Every observer does this identical process; and as Einstein himself once pointed out, velocity can be regarded as simply the measure of rotation of an entity in a higher dimensioned space. While Einstein was apparently speaking of regarding the velocity of an object as a measure of its amount of rotation toward the time axis in 4-space (from the direction of its velocity vector in laboratory 3-space), it can also be regarded as rotation toward a fourth spatial axis in a 5-space (four length dimensions and one time dimension, all orthogonal). If one checks this, one will see that the projections in 3-space are the same; i.e., to the laboratory frame observer, there is no difference observable. Thus the photon interaction may be modelled as orthorotation of an entity spatially in a 5-space. To the laboratory observer, this orthorotation constitutes pure dimensional integration and dimensional differentiation, and this orthorotation constitutes or creates an object in the first place. The concept of "object" a priori involves the photon interaction as stated; if the photon interaction is not invoked, then the existent entity does not exist as a three-dimensional object at all, in the primitive sense. Outside this primitive process (dimensional integration and differentiation imposed upon the same region, which constitutes an object), all exists in the Omega nothingness void, without frame or form.

Ultimate reality (specifically, action) is dimensionless in the objective sense; for the "objective sense" exists only after an operation has been imposed. Specifically, a quantum itself is lengthless (has no exclusive length) and timeless (has no exclusive time) and energyless (has no exclusive energy) until differentiation is imposed upon it. Only after a quantum of action is fissioned does there exist a discrete piece of (change in) length, time, energy, mass, momentum, etc. The present author has already shown that perception itself can be modelled in terms of action quanta fission and fusion, and that most of the basic "laws" of physics can be derived from that model. Fission and fusion of action quanta involve orthogonal rotation between orthogonal 3-spaces sharing the same 4th dimension, time, in common. The words change, interact, localize, superpose, operate, move, oscillate, act, and cause and determine are only a few of the words used in physics which conceal the basic occurrence of orthogonal rotation in higher dimensional space.

Finally, it should be stressed that  $i$ , the square root of minus one, itself constitutes an orthogonal axis, hence an extra spatial dimension. The addition of this quantity to electromagnetic theory finally allowed the resolution of otherwise formidable problems, and led to the direct formulation of electromagnetic theory. Thus electromagnetic theory already includes higher dimensionality and orthogonal rotation in hyperspace. In that sense, inductance and capacitance are merely vector statements or amounts of rotation, one in a positive direction and the other in a negative direction, toward an orthogonal axis in higher dimensional space.

We now point out that the forming (beginning and ending) of a three-dimensional spatial object constitutes a time differentiation invoked on 4-dimensional Minkowskian space. I.e., the process of observation or detection itself involves

$$\partial/\partial T (L^3T) \Rightarrow L^3 \quad (9)$$

dimensionally speaking. This process is accomplished by orthogonal rotation, and the very concept of an object, one that has been observed/detected/perceived, implicitly involves this time differentiation invoked on four-space.

Velocity represents a statement of the switching of time into length, and length into time. It is hence a measure of rotation of the spatial three-dimensional frame, as Einstein pointed out. By this switching (orthogonal rotating, orthogonal flipping) of the "chopping of time" or "beginning and ending of a small piece of time," one creates a little  $\Delta T$ , just as one does each  $\Delta L$  for an "object".

But the photon interaction process is monocular. Each photon must attack matter individually, and live or die in the process. Each photon born from matter is also born independently. Thus the primitive observation process is monocular, since it is totally in one-to-one correspondence with photon interaction which is monocular. Thus the observed world is monocular, quantized, discretized. Because of the particular one-to-one correspondence between our primitive concepts and a single interaction, we can conceive the world in no other fashion, unless we change the very basic factor of one-to-one correlation. This in fact has already been done for physics by Everett, whose theory of the universal wave function incorporates multiple simultaneous observation, and hence direct insight beyond the limitations of the monocular correspondence to the photon interaction. It has been done for logic by the present author, although admittedly almost every philosopher at some point inevitably struggled with the "accursed necessity for the identity of opposites", but failed to resolve the problem of understanding how opposites could be identified.<sup>17</sup>

Further, the observer has a "mind": i.e., one conceptualizes him as having a contingent sort of perceived phenomena which may be coherently synchronized timewise with primitive observation, but which do not occupy the three spatial

dimensions of primitive observation. However, these "mental" phenomena, in the most primitive case, are constructed so as to occupy seemingly a three-space as well, which is synchronized in one-to-one correspondence with the "external" phenomena three-space, but totally separate spatially. This of course invokes the basic concept of orthogonality: the "mental phenomena" three-space can be visualized and modelled as an ordinary physical three-space of "real" physical objects, but a space which is three or more orthogonal turns away (in higher dimensioned space) from the ordinary "physical" three-space of primitive observation. Thus the "observer's mind" may be precisely modelled as a separate four-space which shares its fourth dimension, time, in common with the "ordinary" four-space of primitive observation, but whose spatial dimensions are three or more orthogonal turns away from laboratory three-space, in n-dimensional space. Third order vector components crosstalk between changes in the two worlds. Thus "mental induction" of change onto ordinary three space is quite small, but finite nonetheless. This minute psychokinesis has been termed inception by the present author. The cumulated effect of inception (in macrophenomena) thus reveals a deviation from strict causality, which is the solution to the problem of "free will" and "intent" so ardently sought by the philosopher for so long. The definition of a living body or living organism follows immediately: A living organism is merely the coherent crosstalk synchronization of two sets of phenomena, each in a three-space three or more orthogonal spatial rotations from the other, and both sharing the same fourth dimensional axis, time, in common. Death, on the other hand, is simply the breaking up of the coherence between the third biofield (third orthogonal 3-space, the mind-world) and the zeroth biofield (laboratory 3-space).<sup>18</sup>

But if this model of the mind and its crosstalk with the physical frame is true, then the "snipping off of a little piece of time" by the observation process --



i.e., the forming of an object by dual and paired contrarywise orthogonal spatial rotation due to the analogue of the photon interactions -- also snips off a "piece of the mind" with it. I.e., in time-slicing the laboratory 4-space, the mental 4-space is time sliced also.

Thus the mind-space world is quantized just as is the lab-space world. Mind is quantized -- at least mind changes are-- in mind observations. Perceptual thinking thus is directly related to objectivity. Intuition or "transcendental knowledge" comes by "going through the cracks at the beginning and ending of each thought percept." This can be done with some reflective practice, and it is simply the fourth law of logic. This constitutes the "unobserved present," whereas the paired contrarywise orthorotation that is quantized perception/observation constitutes the determined past. The "undetermined present" is thus by definition multiocular, while the determined past is monocular.

We now bring all this to bear on the fundamental experiment of quantum physics: Young's two-slit experiment. We choose electron emission to examine. In this experiment, an electron is emitted from a cathode (figure 1) and travels through a two-slit region on its way to a screen where its impact is detected. The entire apparatus is shielded against light. Now notice all those "things" made up of conceptual objects in the primitive observational sense, where paired contrarywise orthogonal dimensional rotation has been applied. We may even be "object visualizing" the electron as a sort of hard little sphere. The hole or slit, each one, is also visualized as three-dimensional, i.e., as "objective," even though a "removal operation" has been implicitly applied to remove any "3-d object" from the hole. The screen, the box, the space in the box, etc. have all been "object conceptualized." In this object conceptualizing, reality (4-space) has been assumed differentiated with respect to time, to constitute 3-space concepts (object,

past, determined, observed, localized). This is very important -- we have unconsciously objectivised an image of each thing as if it had been dually contrarywise interacted with by light waves. In our conceptual image, the concepts are like that. That, however, corresponds to the past, and in the present, that is not true, since contrarywise light interaction has not occurred due to the shielding of the entire apparatus against light.

Notice that the electron must not interact with light, whenever the so-called quantum effect is noted.

At any rate, for a well-sealed unit, the electron emitted from the emitter will not be struck by light before reaching the two-slit region. Therefore in the present (not in the determined past, the observed) the unobserved electron is 4-dimensional, not three dimensional. So the 4-D electron goes around the 3-D slit region in the fourth dimension, in hyperspace. The electron is not objective at this point. To the 3-D laboratory frame, it is like a continuum blowing by, which one thinks of in a wave manner (fundamentally, a wave is an entity which is not localized). Thus the "electron" passes the two-slit region in a "wave" manner.

Now note that by "wavelength" being specified, one has actually specified the time interval stripped out of a quantum in fundamental quantum change, i.e., in "observed physical phenomena." Perfect time synchronization is what after all accomplishes or constitutes orthogonal rotation. So if the "length" (width) dimension of the slit is in the vicinity of the "wavelength" of the electron, one has the case where the quanta fission and fusion operations constituting the electron, and the quanta fission and fusion operations constituting the "hole" or slit, approach each other in time synchronization. In that case, the time aspects of the electron and the slit will strongly interact. If the hole is made much larger, e.g., this interaction will not occur. Since it is the time aspects which are synchronizing to cause

interaction between two or more 4-dimensional objects, then the electron will interact with both holes timewise. In following time sequences, this will constitute a part of the past history of the electron. As is well known, this interaction of the electron with the two slits may be quite simply calculated from ordinary geometrical considerations.

However, when the electron encounters the screen, it encounters a region of randomly varying time oscillations of the orbital electrons around the individual atoms comprising the screen. Thus the exact location of the orbital electron in the screen which will first precisely time-synchronize with the electron wavelength reciprocally is a random choice. Thus the "place" where the electron hits the screen is randomly selected along the screen. The time pattern of the electron, however, had itself a distribution induced by its previous time interaction with the two slits. The pattern of this time distribution is wavelike, and is recovered when the distribution of the number of electron hits per screen length is plotted.

In another version of the experiment, a photon gun may be incorporated so that as each single electron is on its way from the emitter to the two-slit region, it is hit by a photon and the photon interaction imposed. In that case, the electron is forced to become a three-dimensional "little baseball" since it has been operated upon by a time-differentiating operation, and hence has lost its time dimension. In this case, the electron remains in the 3-dimensional state until another operation is imposed upon it. Thus it goes through the two-slit region in an objective manner, and will thus go through only one hole. Specifically, the distribution pattern on the screen will now reveal this effect.

One statement of the fourth law of logic is that a thing is that which it does, and does that which it is. Since the screen is 3-dimensional, it is itself

time-differentiated. Thus it itself time differentiates, by the fourth law of logic. Thus each electron hitting the screen will be placed in the objective state, if it is not already. For this reason, the impact of each single electron will occur at a localized point. So each electron hit on the screen is like the impact of a little spherical baseball, regardless of whether the electron passed through only one slit or time-interacted with both slits.

The present author has already shown that the set of all "most immediate pasts" constitutes the "most immediate future," by the fourth law of logic, thus resolving the logical difficulties inherent in the definition of probability.<sup>19</sup> The fourth law is in fact just the present. It is by definition multiocular.

When the electron travels through the two slit region in the present form, it interacts with both slits simultaneously, assuming that their dimensions are such that time synchronization occurs. Therefore it travels through the two slits as per the set of all possible future distributions, of all future pasts, assuming interaction with both slits. I.e., the "most immediate future" in this case is the set of "where the object will have hit" cases, and two time interactions (time waves from both slits, if one prefers) propagate forward to determine the set of all "future pasts."

Merely striking the electron with a photon before it reaches the two-slit region enforces time differentiation and objectification -- i.e., it forces the electron into the past -- and in the "past" state it becomes 3-dimensional and determined/localized. Hence an "objective" impact pattern is obtained on the screen. All that happens in this case is that the electron is forced to correspond to the objects of primitive observation -- which situation is described by the first three laws of logic. So long as it is not so enforced, the electron is not an "observed object." In that case it acts as the beginning and ending of an object -- i.e., as a boundary of three-dimensions, which boundary is two-dimensional -- and

the localized impact points on the screen reveal a wave distribution pattern when they are collected.

Since every fundamental particle is a boundary between the perceived and the unperceived, the detected and the undetected, three-dimensional reality and four-dimensional reality, then every particle acts in this fashion, whether one is speaking of photons, neutrons, electrons, whatever.

And this is the explanation of the two-slit experiment which Richard Feynman, Nobel Prizewinner in Physics and one of the founders of quantum electrodynamics, has stated that no physicist in the world understands. It cannot be understood until the fourth law of logic is comprehended, because its explanation lies outside the first three laws of logic. And it cannot be understood without understanding the dimensionality imposed by interaction or noninteraction with photons.

This now brings us to another point: The fundamental assumption of quantum mechanics -- of virtual states separated from observable states by a quantum principle -- should be intensely abstracted and modelled. The importance of time synchronization between orthoframes, which leads to orthogonal rotation from one frame to the other, should be realized and dealt with. A very great collection of virtual phenomena, if synchronized, move to the boundary between "virtual" and "observable" where the fourth law of logic, the law of the boundary, applies. On the boundary itself, it is meaningless to speak of "virtual" and "observable" in the mutually exclusive sense, since the two terms become synonymous, by the fourth law of logic. On the boundary, virtual and observable are identical. Further, any object moving through the boundary from one side emerges on the other side in the opposite state if it interacts in the boundary region in time-synchronized fashion. The normal condition is the boundary condition, without distinction or duality. Only when the process of observation is invoked is it possible to state that observation

occurred or did not occur; hence only in this case can one speak of an exclusively virtual state or an exclusively observable state.

Further, ordinary instruments and devices can be made to process entities in the unseparated state, i.e., in the multiocular state.<sup>20</sup> In this fashion, the ordinary limits of objectivity, of that which corresponds to primitive observation, can be violated at will.<sup>21</sup> And in fact, a basic mechanism for the deliberate violation of objective reality has been derived and proposed by this author.<sup>22, 23</sup>

Virtual states are in fact real -- they constitute one type of fundamental reality. Virtual reality is structured, and changes can be transmitted across the fundamental quantum barrier simply by time synchronization, if the time-differentiating action of photon interaction is not permitted.<sup>24</sup>

Reality is infinite-dimensional, and crosstalk between orthogonal frames sharing the same time dimension occurs continually. Life, mind, matter, travel to the stars, and free energy -- all are open and available if we but unfetter our imaginations from the mechanism physics and dogma of a century ago. Einstein was fond of stating that the Infinite does not play dice with the universe. While at one level a dice game definitely is being played, at another level all games have already been played and the play is hence gameless. Everett has already written the physics of the New Science, and now must come the engineering.

The solution to the fundamental problem of quantum mechanics involves the advancing of a fourth law of logic, the law of the boundary. With that law, the problem posed by differentiated and undifferentiated reality is solved. And all the solutions follow: the problems of mind, consciousness, observer, time, being, life, death, and existence -- the solutions of all of them are also contained in the solution to the fundamental problem of quantum mechanics posed by the two-slit experiment.

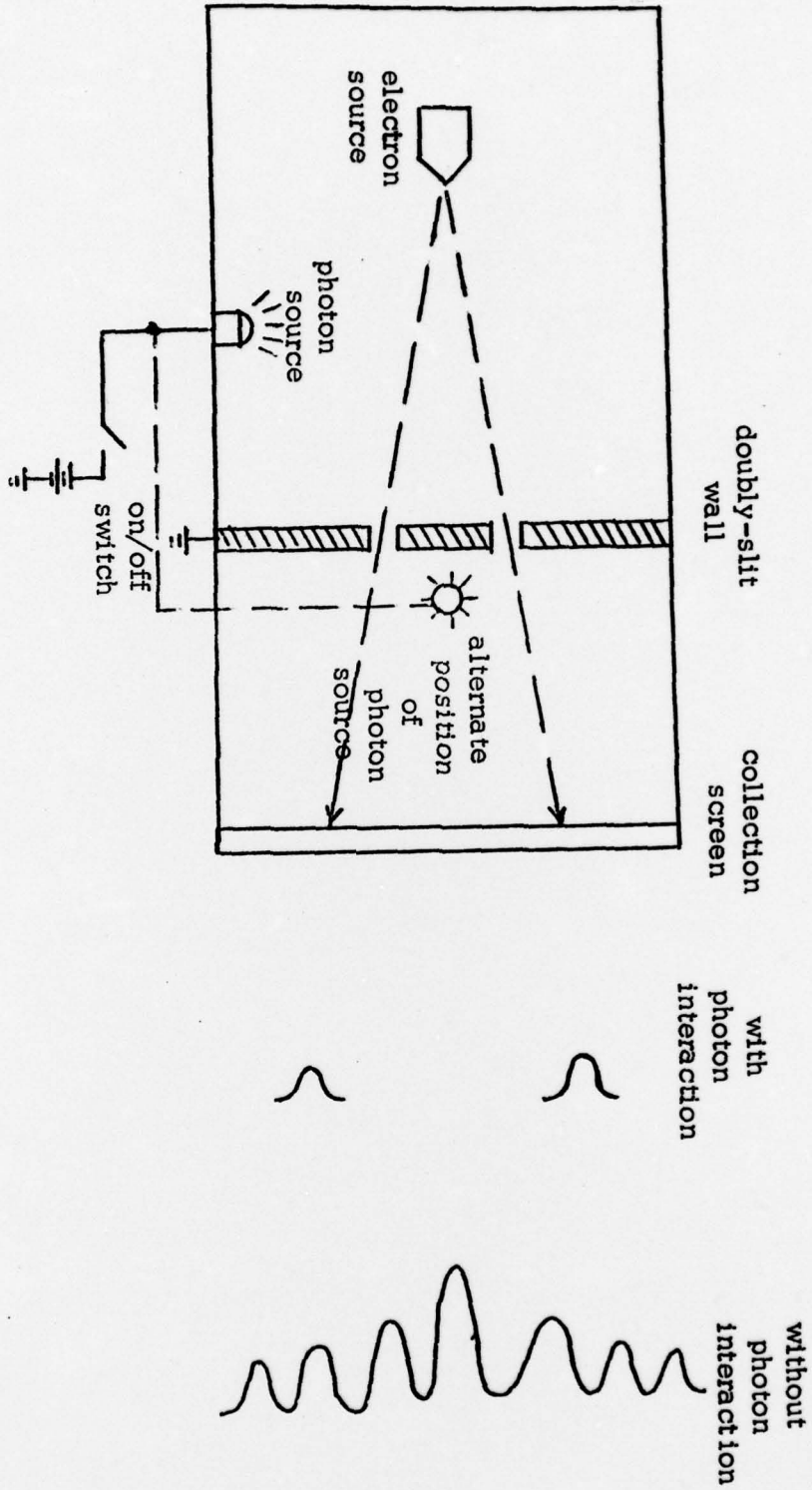


Figure 1. Young's two-slit experiment.

## Notes and References

1. 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.
2. Ibid., p. 37-2.
3. Ibid.
4. Bernard d'Espagnat, Conceptual Foundations of Quantum Mechanics, W. A. Benjamin, Inc., 1971, p. 368.
5. Ibid., p. 420.
6. E.I. Parnov, At the Crossroads of Infinity, translated from the Russian by Vladimir Talmy, MIR Publishers, Moscow, 1971, pp. 115-116.
7. Thomas E. Bearden, Quiton/Perceptron Physics: A Theory of Existence, Perception, and Physical Phenomena, Defense Documentation Center (DDC), AD 763210, March 1973.
8. Ibid.
9. Ibid.
10. Thomas E. Bearden, A Conceptual Derivation of Einstein's Postulates of Special Relativity, DDC, 8 October 1975.
11. Thomas E. Bearden, An Approach to Understanding Psychotronics, DDC, June 1976, AD-A027 866.
12. Thomas E. Bearden, Writing the Observer Back Into the Equation, DDC, June 1976, AD-A027 867.
13. Bearden, An...Psychotronics, 1976.
14. Which after all is the primary reason that so many final arguments of philosophers raise an appeal to the "natural man," i.e., to how a primitive observer would react to the premis.
15. We are referring specifically to the structured thinking process. Feelings are not so structured.
16. And that is why sets (of perceptual objects) and their relationships form the basis for axiomatic logic, mathematics, and physics. Set theory is simply the synthesized and abstracted game of elementary perception of the macroscopic world. Thus even the most abstruse mathematics forms a part of the game of perception and can be applied to perceived/observed physical phenomena.



17. The reason philosophers failed to solve the problem was their unconscious assignment of independent, external existence to a perceived mental object. I.e., if A is assumed to concretely exist in some sense independent of its perception, then one has assumed that a reality exists independent of the observing or perceiving operation. By taking the view that thought itself is perceived and the result of an operation -- i.e., that to think is to perceive thought objects or entities -- one then must "add back the omitted adjectives." Thus one has "perceived A," not "A" per se, and "perceived object," not "object" per se. By then accounting for the finite time required for each perceptual operation and numbering these finite time intervals with subscripts, one can more precisely rewrite the laws of logic and decipher them, if one is also careful to account for the perceptual operation that is assumed or implied by each logic operation symbol. In this fashion the first three logic laws are

1.  $A_1 \equiv_3 A_2$  (law of linear repetition)
2.  $A_1 \neq_3 \bar{A}_2$  (law of nonlinear repetition)
3.  $A_1 \vee_3 \bar{A}_2$  (law of monocularity)

One should notice that the time three operation requires processing both A and  $\bar{A}$  simultaneously, although this is not permitted by the third law. This multiple or multiocular processing implicitly assumes the fourth law, and always has. I.e., to ascertain that two previous observations are identical or nonidentical, or singular or multiple, requires a third operation wherein both are involved.

The fourth law is the negation of each of the first three and may be written

4.  $A_1 \equiv_3 \bar{A}_2$  (law of multiocularity; boundary identity of opposites)

The four laws then form a closed system. There is now no appreciable difficulty in comprehending the fourth law, since it simply states a characteristic feature or rule of an operation. As a direct example of the fourth law, one may cite the absolute value operator, which cannot tell the difference between +1 and -1. To that operator, +1 and -1 have no difference, hence are identical.

18. For a brief discussion of some unusual effects related to this, see Appendix 2, "How to Develop a Hyperchannel Brain Linkage System" to Thomas E. Bearden, The One Human Problem, Its Solution, and Its Relation to UFO Phenomena, January 3, 1977, in publication (DDC). See also V.P. Kaznacheev et al, "Distant Intercellular Interactions in a System of Two Tissue Cultures," Psychoenergetic Systems, Vol. 1, No. 3, March 1976, pp. 141-142. See also V.P. Kaznacheev et al, "Apparent Information Transfer Between Two Groups of Cells," Psychoenergetic Systems, Vol. 1, No.1, December 1974, p. 37. The results reported in these latter two papers are closely associated with the results of the two-slit experiment. I.e., the photon interaction quenches the unusual effect, since it imposes the operator  $\partial/\partial T$  on the four-dimensional reality/entity/anenergy actually involved.

19. Bearden, An Approach...to Psychotronics, 1976.
20. The two-slit apparatus itself is an example. With an on/off switch to control the photon gun/light source, the experimenter can determine in advance whether the quantum effect shall be exhibited or whether the classical effect shall be exhibited.
21. For direct verification of precognition under controlled experimental conditions, see H.E. Puthoff and R. Targ, "A Perceptual Channel for Information Transfer Over Kilometer Distances: Historical Perspective and Recent Research," Proceedings of the IEEE, Vol. 64, No. 3, March 1976, pp. 347-349.
22. Thomas E. Bearden, The One Human Problem, Its Solution, and Its Relation to UFO Phenomena, January 3, 1977, in publication (DDC). Specifically Appendix 2, "How to Develop a Hyperchannel Brain Linkage System."
23. The present author has also discovered that time oscillations can be shown to generate or cause quantum change itself. A future paper along these lines is envisioned. Kozyrev's work, e.g., takes on great significance from this viewpoint. ( Cf N.A. Kozyrev, "Possibility of Experimental Study of the Properties of Time," Pulkovo, O vozmozhnosti eksperimental 'nogo issledovaniya svoystv vremeni, Russian, September 1967, pp. 1-49, JPRS 45238, 2 May 1968.)
24. E.g., exponential collection of time-synchronized virtual changes, each containing virtual energy, breaches the quantum threshold and turns virtual energy directly into observable energy. This directly violates the conservation of energy law -- which applies only to a closed, unbreached system -- and produces free energy. Thus the energy problem can be solved in quite straightforward fashion by present technology if we change our dogmatic thinking. Time synchronized, light-shielded switching is the key -- not input of energy.