Polarization

1. Introduction

The Impressionist Theory of Everything (IToE) studies the relationship between structures that define a common space but are paradoxical for their properties. Specifically in physics, this is the identifying feature of EPR-type phenomena. These spaces contain two distinct dimensional structures one for which is our classical fame of reference.

Paradox is the mechanism that prevents us from observing classically based commonality between parts formed in the above manner. The signature of all examples of such paradoxical structure is that some critical feature of relationship and identity has been reversed for the two descriptions within the common frame of reference.

by application of apparatus to fundamental objects of the classical domain sub-classical space can be opened. However, this space must be left nonobserved if the structure is to remain intact. If the observer enters the quantum-mechanical state of an EPR-type structure, by observation or obstruction of its parts the state must collapse to the classical level. This conserves the subclassical nature of the objects and their relationships at the subclassical level. Thus, the determining factor between the quantum-mechanical and classical formats is whether or not observation occurs. Under the above limits, the observer is free to cycle across these levels by either observing or not observing.

Thus, the quantum mechanical and classical versions of the same space are housed in a common framework, and we find two sets of objects. The quantum-mechanical set is a *not-set* and the fundamental linguistic representation of this not-set is found in Russell's paradox. This not-set is called the Russell set object, R. EPR-type experiments allow us to explore the generic structure of the not-set and how it represents the precursor to emergence of the more complex classical version of the same space.

In dynamic structures *R* generates its own dimensional complexity and shape through an outward development from a null state. No outside influence is required or allowed under the logical imperative that applies which is a bootstrap process. The self-generation of cycle and the shape that are results are described in Chapter 1.5 on this web site, The Cross-Dimensional Development of Angularity. The not-set *R* takes on physicality as a pressure. Each location in the universe and the universe itself are subject to the pressure of *R*. The cycle of *R* is responsible for an increasing, self-organized complexity. Under IToE, this development is traced to the limit of two dimensions.

In EPR-type experiments the otherwise dynamic process of cycle across the subclassical and classical components of a domain can be studied statically. For the phenomenon of polarization the following topics will be discussed.

1. Simple polarization and its application in a two-polarizer experiment
2. The three-polarizer paradox
3. The paired- or parallel-polarization-state experiment, which leads to the discussion of Bell's inequality

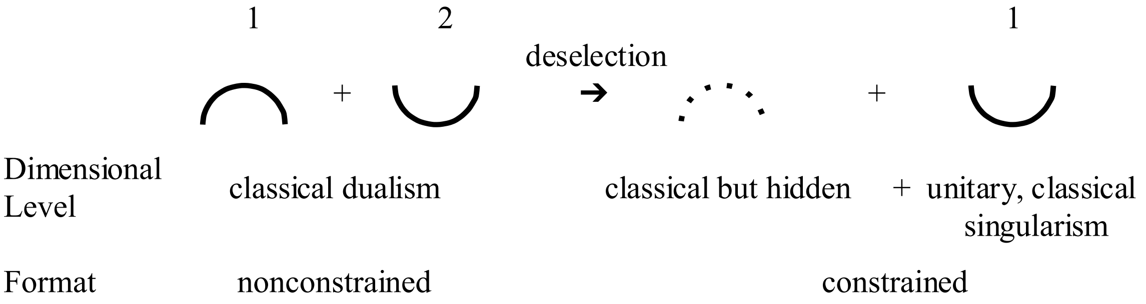
2. Deselection of the classical dualism

The first requirement, for opening the subclassical structure of a classical state is schematically illustrated in Figure 1. The two-value dynamic attribute for polarization at the classical level is shown on the left side of Figure 1(a). When a measurement occurs using a calcite crystal, the polarization is found either along the optic axis or at right angles to it.

For apparatus that open sub-classical structures, a mechanism of deselection across the two-value state always applies. In the creation of a polarized beam this singularism is the direction of polarization and in the case of paired polarization this singularism is the entanglement of two photons. In both cases singularism at the classical level has emerged. For the second example, when the two photons are separately measured by calcite crystals having the same angle, we do not know which orthogonal value of polarization will result, but we do know that the values will be the same.

The deselection of a dynamic two-value attribute occurs at the arrow in Fig. 1(a). This is the preparation stage for opening the subclassical structure of the system. The resulting classical state on the left side of Figure 1 is a single attribute. Please note that in this a generalized representation of the process of deselection.

(a) deselection at the classical level



(b) opening the subclassical parts of the deselected state from (a)

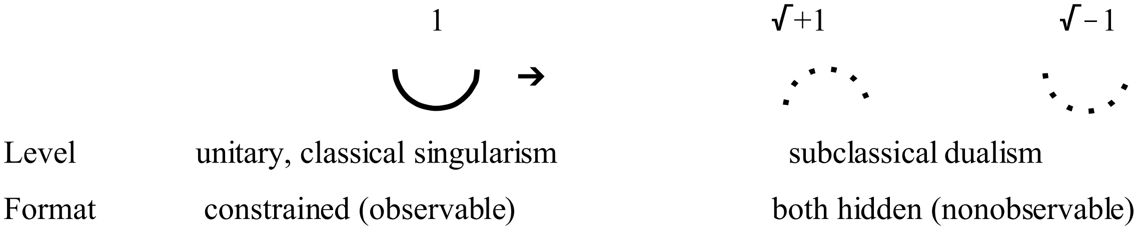


Figure 1. In 1(a) the two-value classical state is constrained as a singularism by deselection of one-half of its structure. In 1(b) this singularism is represented as a subclassical dualism of parts. The structure of the photon is ideal for such manipulation.

A dimensional transformation occurs across the arrow in 1(b) because a two-value attribute has opened that is not classically based but is rather subclassical. This is the key to understanding the nature of the EPR-type mechanism. First there is a process for limiting a two-value classical attribute to one of its values, and then this single attribute is opened subclassically. Once this subclassical structure has been opened, the observer has the option of leaving the space undisturbed or raising it to the classical level by collapse of the wavefunction.

If no measurement occurs then there is no effect on the classical singularism. This object crosses the state and exits and the sequence of cycle across the subclassical two-attribute system is not affected. In other words on each event, the same subclassical cycle applies. the subclassical structure is returned to the classical level, and it is as if the object were never opened subclassically. In the case of the half-silvered mirror experiment this exit occurs at the second half-mirror and in the two-slit experiment this exit point is the photosensitive screen of projection.

If, these subclassical phases are not disturbed then there is no way to draw conclusion on their state. they are categorically not observable. However, at the level of theory it is possible to represent the parts of the subclassical state. We can get around the prohibition to observation by constructing the parts and their relationship as not-sets. The identities of the objects and their relationship are then not rational, and, equally, in theoretic terms, not observable. this is a neat trick to allow representation of what is not representable in a rational construction. The identities and relationships of these subclassical objects is paradoxical.

In the schematic illustration of 1(b), each of the mathematical values ($\sqrt{+1}$ and $\sqrt{-1}$) is paradoxical in a complementary format for how meaning can be applied at the classical level. See Chapter 1.3, Two Mathematical Spaces Under One Roof: The Local and Nonlocal Structures of the Unit Circle, for discussion of why $\sqrt{-1}$ and $\sqrt{+1}$ represent complementary formats of paradoxical relationship at the subclassical level.

2.1. Entry into the subclassical two-attribute structure

The two possible relationships of the observer to the opened subclassical state are represented in Fig. 2. The observer's position is always from the classical level since this is the only level that contains sufficient dimensional complexity to allow the existence of discrete objects including the observer. Thus, there are two possibilities for observance of the subclassical state created.

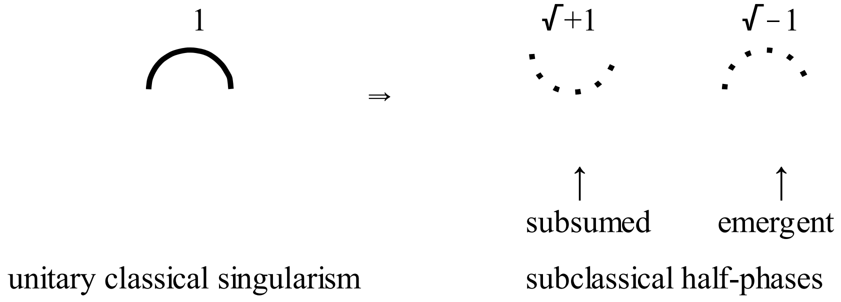
The first possibility is that the observer does not choose observance of this space. The integrity of the condition of non-observance is exclusively dependant on what form sensitivity to disruption can take. Suffice it to state that any form of disturbance of observation, measurement, or obstruction will cause the state to be raised to the classical level. The format this disruption can take is entirely dependant on the experimental factors that apply.

The manner in which the subclassical state evolves is based on the sequencing of half-phases at the subclassical level. As described above, if the state is undisturbed then the half-phases evolve as they would if the state had not been opened in the first place. All of the action at the subclassical level that establishes the fixed identity of the classical state is unaffected.

However, if the observer enters the state, this entry can occur in either part of the evolution of the half-phases, and since observation of these nonrational parts is prohibited, the subclassical state must instantaneously collapse. In this condition the sequence of collapse is no longer predetermined by the classical identity of the singular (deselected) classical-level attribute. Thus, what was the subsumed half-phase of nonobserved evolution has some factor of probability to emerge at the classical level. If no weighting is applied this probability is 50-50 between the half-phases. Thus, classical probabilities are again a factor in determining the attribute that is observed. Over repeated events possibility is fully expressed at the classical level.

Each half-phase at the subclassical level is paradoxical (in complementary terms to our classical sense of what is definable as a singular state.

(a) the subclassical state is opened but undisturbed by the classical observer



(b) the classical observer disturbs the subclassical half-phases

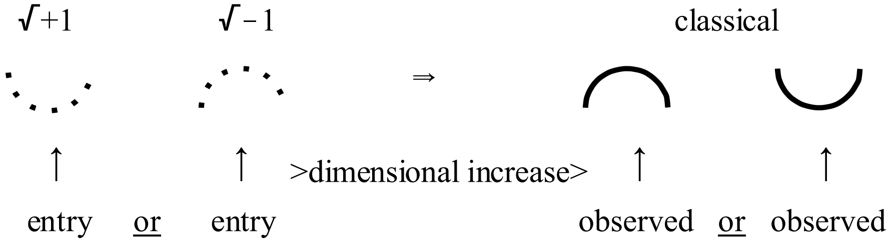


Figure 2. In (a), the dualism at the subclassical level always collapses to the same half-cycle. In (b) the state that emerges is weighted across the subclassical half-phases. If weighting is equal then the probability at the classical level is 50-50.

3. The two-polarizer experiment

The intricacy of relationship for the attribute of polarization makes this phenomenon ideal for the study of EPR structure. In all of the various experimental formats that apply, the central issue is that a singularism at the classical level is split to form a nonlocal structure. As described, this is a process of opening the subclassical structure of a fundamental object of classical space. Once this internally nonlocal space is superposed on classical space-time, the observer has the option of either intruding upon this space or leaving it closed. These options reflect the fact that two categorically separate spaces are found for a common domain.

The subclassical space, which has been opened through the particular apparatus, can coexist without consequence in a spatially and temporally expanded classical domain as long as it is not raised to the classical level by some act of interaction. As described in IToE the collapse of the wavefunction conserves the differing levels of complexity found at the subclassical and classical levels.

In Fig. 3, a beam of photons has been *V*-polarized. Thus, only vertically polarized photons are transmitted, and there is no component of *H*-polarization in the beam.

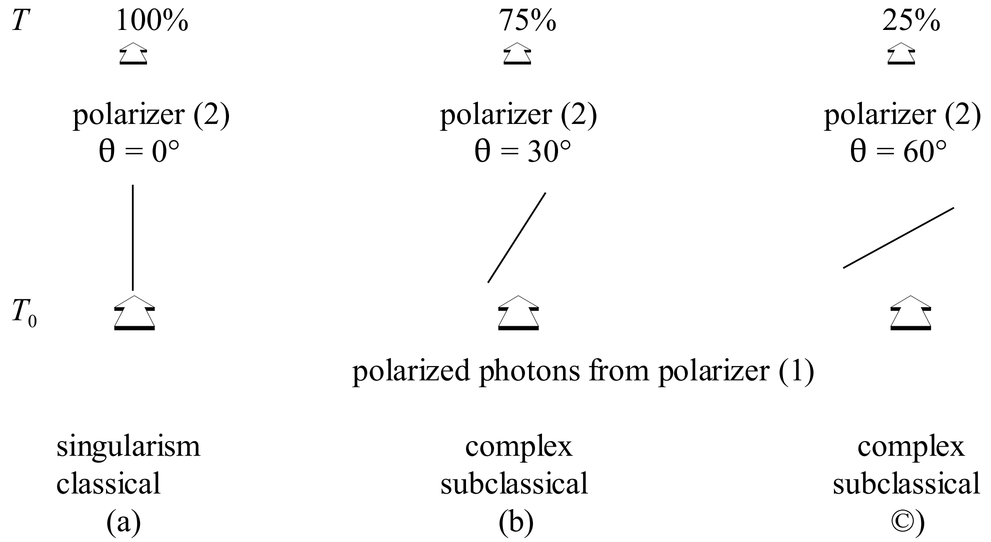


Figure 3. A polarizer (not shown), has created a *V*-polarized beam. (V) = (D) $\oplus$ (S). These photons are directed through a second polarizer called Polarizer (2) which is shown in 3 different angles of rotation. In any event that the superposed sate (D) $\oplus$ (S) is observed it must collapse to some classical value. The state that results is a combination of the weighting by rotation and timing of the collapse, which is random. For transmission (*T*), $T = T_0 \cos^2 \theta$.

When a second polarizer is placed in the polarized beam and rotated relative to the first, there is some probability weighting at the subclassical level for whether the photon has polarization (D) or (S). This is a nonlocal (entangled) relationship before polarizer (2) that collapses instantaneously when the photon crosses the boundary of polarizer (2). What was a singular state displaying only the attribute *V*-polarization, is displays collapse to classical dualism. Specifically, the photon is either transmitted through polarizer (2) because it has the same direction of polarization, or the photon is not transmitted because it is polarized in the second orthogonal direction that a photon can display relative to any device that measures polarization.

Whether or not the photon is transmitted or not depends on the amount of rotation of the polarizer, the random timing of passage of the photon through the polarizer relative to its subclassical half-phases.

As polarizer (2) is rotated from $\theta = 0°$ to $\theta = 90°$ the observer is undergoing orientation-reversal relative to the half-phases (D) and (S). A weighting is been applied to the relationship between the observer and these half-phases. At 90 degrees, the half-phase that is normally inflationary relative to the original and classical *V*-polarized state is the phase that the observer experiences. Across the rotation of polarizer (2), the nonlocal and subclassical cycle of half-phases is no longer closed in a fixed sequence of inflation and emergence to produce a *V*-polarized state, and the rate of transmission of individual photons is now determined by rotational weighting and the factor of chance as described above.

The structure of half-phases is nonlocal in the sense that at a single site the value of the photon in the second orthogonal basis of (D) and (S) should be clearly one of these values. However, this is not the case. This situation can only be properly described under quantum formalism.

3.1. The particle description under quantum mechanical formalism

The wave description fails to fully explain the phenomenon of polarization because the photons of the beam are known to be constructed of a collection of quantized particles. Each photon is a quantum of energy, and it cannot be divided. However, the particle description also fails under separate factors. Specifically, the flow of a stream of particles passing through a tap is controlled by the size of the opening. As the opening becomes smaller, the particles must pass more slowly. In strictly classical terms, given enough time, all particles should pass. However, this is not the case for the quantized stream of photons. Some photons are blocked absolutely, while other are allowed to pass. Under IToE, both descriptions fail in one regard. The issue is not which description correctly describes Nature but rather is that each is based in a separate dimensional framework across which the natural operational mechanism is paradox.

3.2. Conservation of potential across the singularism and dualism in the two-polarizer experiment

In the above experiment, the dualism (*V*) and (*H*) represent the classical level. The EPR apparatus deselects one of these directions (*H*) and it is no longer a factor in evolution of the state at the classical level. This result is that we do not find expression of dualism at the classical level. Rather, this dualism is subclassical between (*D*) and (*S*). However for direct observation, these subclassical directions represents too large a set of alternative directions to stand for a classically deselected singularism. Consequently, for the conservation of location in classical terms, the subclassical dualism must either remain nonobserved (this is represented as $\theta = 0°$ or $\theta = 90°$), or the subclassical states cause collapse of the artificially created classical singularism. In other words, at the classical level dualism is again a factor. This occurs when polarizer (2) displays rotation between $\theta = 0°$ and $\theta = 90°$.

3.3. Distributive and nondistributive logic

The logic of classical structure is a distributive framework of alternatives. In other words, every member of the state bears some rational relationship to every other member. This is not the case in the quantum description of the same space because these same members incorporate a dimensional boundary between them, and a nondistributive logic applies.

In the above experiment, under the quantum description, the two classical observables are (*V*) and (*H*), they are respectively the [All] and [Null] condition. For a discussion of the nature of distributive and nondistributive structures, see Quantum Reality.[1]

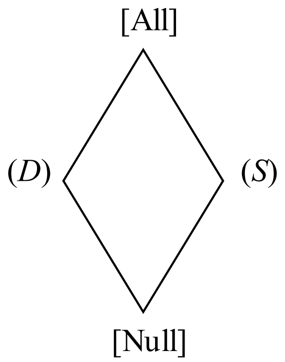


Figure 4. The nondistributive relationship of the two-polarizer structure is illustrated.

The directions that do not bear relationship to each other (for the classical observer) are those that are subclassical. These are the directions (*D*) and (*S*). these directions display relationship only to the states [All] and [Null]. For [All], these subclassical parts are displayed to the classical observer only by the whole (when a photon is recorded on exit). For [Null], these same parts are displayed to the classical observer only as a null condition (when a photon is not recorded on exit). Finally, as can be seen in Fig. 4 there is no display of rational relationship between (*D*) and (*S*).

4. Three-polarizer paradox

For the Three-polarizer paradox a polarizer, P(1) has its optical axis in the vertical direction (*V*), and an unpolarized beam of photons is passed through it. A second polarizer, P(3), is placed in the beam with its optical axis in the horizontal direction (*H*), and the beam passes through it. These photons are blocked by the polarizer in the (*H*)-direction because its optical axis is orthogonal to the direction of polarization for the beam. This is the null condition of the

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[1] Herbert, 1985: p.179

classical singularism.

A new aspect of the phenomenon of polarization is revealed when an intervening polarizer, P(2), having some orientation in the beam between 0 and 90 degrees, is added. The effect is that some photons in the beam are now able to pass through the three polarizers. The classical singularism is forced to be interpreted as a relationship of sub-classical phases. At $\theta = 45°$, there is an equal weighting of subclassical phases and one quarter of the photons fired at the first polarizer (V) (consisting of a selected one-half of the classical state) are transmitted through the final polarizer (H). Thus, the beam that could not be transmitted when there were only two polarizers can now be partially transmitted.

4.1. The quantum mechanical explanation

The three-polarizer paradox cannot be explained by classical wave mechanics because the intervening polarizer should have no effect on the fact that the photon beam is blocked in both orthogonal directions. However, the quantum mechanical description is based on the principle that directions and objects can be superposed. The superposed structure of the photon beam is not blocked because it has presence on the path across the polarizers in a second set of orthogonal directions at 45 degrees to the first. this is the subclassical set of directions for polarization.

The direction (*V*), which is transmitted through polarizer (1), is defined quantum mechanically as a superposition of the diagonal (*D*) and slant (*S*) directions at +45 and −45 degrees to (*V*). This subclassical superposition of photons, in the diagonal (*D*) and slant (*S*) directions, is able to pass unaffected through the polarizer . When interference factors for these two subclassical directions are accounted for and this superposition is collapsed to a classical expression, some photons are transmitted.

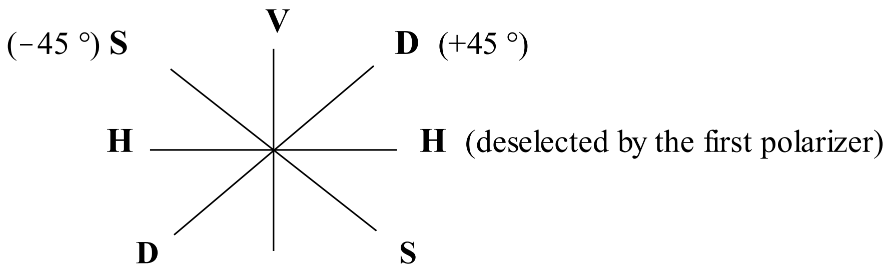


Figure 5. The vertical / horizontal structure (*H*) and (*V*) is shown as well as second space of property formed in the diagonal and slant directions, (*D*) and (*S*). When the second polarizer is rotated away from θ = 0° toward θ = 90° interference becomes a factor in the transmission of the photon beam. This space cannot be described classically because observables of property are superposed, not classically discrete.

$$(H \oplus \underset{\uparrow}{V}) \oplus (H \oplus \underset{\uparrow}{\mathrm{V}}) = \mathrm{H} \tag{4.1}$$

Interfere destructively

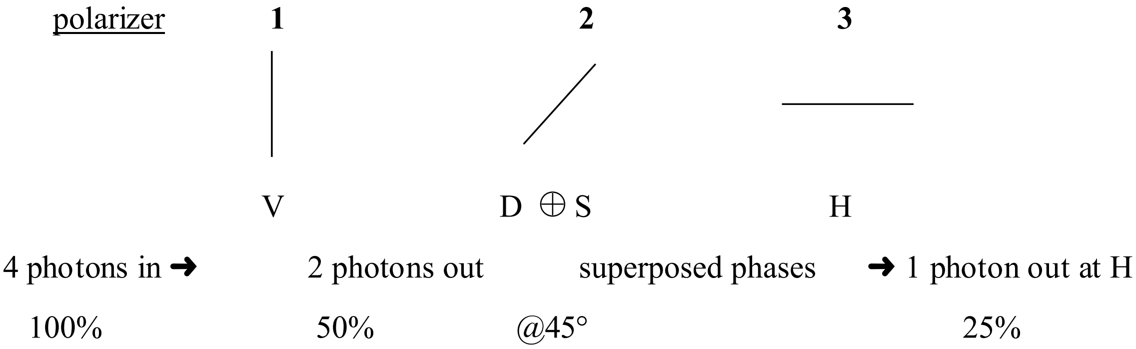


Figure 6. The angles of the three polarizers are illustrated as each one appears to the photon beam. Polarizer (2) is rotated between 0 and 90 degrees. When θ = 45°, the superposed phases are equally weighted. Statistically, when P(2) is at 45°, 4 incident photons produce 1 photon after the third polarizer.

$$V = D \oplus S \tag{4.2}$$

Equation 3.1 shows that (D) and (S) are the superposition of (V). Furthermore, (H) and (V) are superpositions of (D) and (S), as shown in 3.2.

$$D = H \oplus V \text{ and } S = H \oplus V \tag{4.3}$$

At P(3), which has its axis in the horizontal direction (*H*), (*V*) is blocked (destructively interfered with). This must be the case since there is no possibility of transmitting photons that are polarized in the orthogonal direction to the axis of the polarizer. The direction (*H*) is not interfered with, and consequently some photons, with polarization (*H*) subclassically composed as a superposition of (*D*) and (*S*), pass through the final polarizer.

4.2 The Impressionist explanation

As in the two-polarizer experiment, the three-polarizer experiment demonstrates the relationship of observable and nonobservable states in a description that is larger than rationally representable in a single perspective. The reason for this is that the structures represented in the two orthogonal based of the domain are found across a dimensional boundary. This boundary prevents the description of the relationship of the parts across it because the structural basis of identities and relationships is different. In the undisturbed state, we find singularism at the classical level and dualism at the subclassical level. Neither the classical nor the quantum-mechanical descriptions provides explanation of the relationship across this dimensional boundary.

The basis (*D*) and (*S*) is nonlocal in the sense that two distinguishable states, at the classical level, are indistinguishable in the single direction represented by the original direction of polarization for the beam.

A new perspective applies on how the structure of directions is conserved. Singular structure at the classical level can only be observationally conserved at the subclassical level (where a dualism of location is described) if the components to this dualism, and their relationship, is not observable. In theoretic and empirical terms, the mechanism of nonobservability is paradox.

5. The parallel-polarization-state experiment and Bell's inequality

In this experiment, a central source emits pairs of photons [(*A*) and (*B*) in Fig. 5] at 180 degrees that are correlated in a twin state for polarization. This means that, in the space of the classical observer, for this identified property of polarization, the photons display separation in space at their unique locations yet single identity - as if only a single unique location of classical space was observed. This is paradoxical for how locations in classical space are defined. The same can be said of the separation in time that is displayed between the twin-state photons. Namely, although the photons are separated in time they act as if they represented a single location in time.

The reason we draw the above conclusion, for the space-time of the photons, is that when a measurement is performed on them, both display the correlation of property instantaneously. Thus although each photon possesses its own unique local space-time, these space-times cannot be distinguished by the classical observer, and therefore, they display non-locality.

The apparatus of the above experiment employs calcite crystals to measure the polarization-property of the photon. Calcite has an optical axis that sends the photon in two different directions depending on the state of polarization for the photon. If the crystals have the same orientation in space the polarization observed for each photon is the same (both are found to be up or down). If the crystals have some relative rotation across their axes, errors are found between the values. These errors are not determined by local factors of how much rotation applies but rather are linked, and quantum formalism rather than classical probability must be used to explain the action.

Bell assumed that the inequalities for agreement between the polarizations recorded for both photons would be determined by local factors at each measurement site. Thus, when these error rates were found to be higher than predicted by local factors, Bell's inequality was violated.(see Figure 5). There is a discrepancy between classical theory and what is actually observed.

(a) crystal (*A*) ← [paired photons] → crystal (*B*)

source of

↕ ↕

photon measured by by crystal (*A*) θ = 0°

photon measured by crystal (*B*) θ = 0°

no difference, *P*(0) = 1 (no errors)

(b) photon (*A*) ← [paired photons] → photon (*B*)

source of

⤡ ⤢

photon measured
P(30) = 3/4.
(error at site: 1 in 4 from
original polarization of the photon)

photon measured
P(30) = 3/4
(error at site: 1 in 4 from
original polarization of the photon)

difference = 60, *P*(60) = 1/4
(errors across the sites are found to be 3 in 4)

Figure 7. The parallel-polarization-state experiment. In (a) the crystals have the same angle and the error rate is zero. When either crystal is rotated 30 degrees, the error rate between the sites is 1 in 4. Thus, each site independently should contribute an error rate of 1/4. When both sites are rotated 30 degrees, the error rate should be less than 1 in 2, but instead it is 3 in 4. The correlation for error between the sites is too high to be determined by addition of classically independent error rates.

In the example considered in this section, crystal (A) is first rotated by 30 degrees, and crystal (B) is not rotated. Crystal (A) is said to have a polarization attribute of *P*(30). The disagreement between the crystals is found empirically to be 1/4. This is predicted by the equation $P(\theta) = \cos^2 \theta$. Similarly, when crystal (B) is rotated by −30° and crystal (A) is not rotated, the disagreement between the crystals is again 1/4, as expected.

The problem for the classical description appears when both crystals are rotated. In classical terms, the error rate is based on the random difference that each site contributes, which is an error rate of 1/4. In classical terms, the error rate contributed by both sites is $1/4 + 1/4 = 1/2$. The classical error rate between the two sites must include the possibility that, on some occasions, the sites will randomly have the same error. Thus, the final statistical error rate will be 1/4 + 1/4 − (the chance factor of agreement). The error rate across the sites calculated from the combination of the two sites, which each contribute a factor of random error, should be $< 1/2$.

However when the empirical results are analysed, the error rate is found to be 3/4, which is considerably greater than classically predicted. This error rate is predicted by the trigonometric function $P(60) = \cos^2 (60) = 3/4$, and not by a simple random relationship of error rates at the classically separated sites. The rate of error across the sites is too great to be explained by a classical interpretation of randomness. Rather, the large error rate is only allowed if the sites act nonlocally as a closed, unitary, quantum-mechanical structure under the format.

5.1. The significance of Bell's inequality

Bell's inequality has a special status in discussion of the relationship between classical and quantum mechanical structure as represented in EPR-type phenomena. For the first time, facts established statistically in the classical description were used to prove that the classical description appears wrong. The conclusion drawn is that, even though the experiment is classically based, classical statistics cannot be applied to it. The quantum description applies where the classical description fails for its own terms of reference. Thus, the quantum-mechanical description must be fundamental and the classical description nonfundamental.

5.2. Bell inequality and the Impressionist Theory of Everything (IToE)

The Impressionist Theory of Everything (IToE) describes the cross-dimensional relationship between structures that display both fundamental singularism and dualism for the same domain. This format of fundamentality is paradoxical because there is a confusion of how fundamentality is established - either as a domain closed and thus, singular or open and dualistic. What is classically based and, *local* is also found to be nonlocal and quantum-mechanically based.

In EPR-type experiments the singularism/dualism dichotomy is displayed in two separate descriptions of a common domain. There are two general formats for constructing such a space.

1) classically separate sites of space-time are nonlocal (e.g., the half-silvered mirror and paired-polarization experiments) or

2) A single classical site has internal observable properties that are nonlocal (e.g., the phenomenon of polarization that a second orthogonal basis of polarization exists and 45 degrees to that which exists at the classical level).

The unique feature of the parallel-polarization-state experiment is that when the entangled photons are observed at the classically separate calcite-crystal locations, the polarization of the photons is entangled and remains so. Although the polarization observed for each photon collapses to some value (up or down), the relationship of the photons as entangled does not. The reason that the entangled relationship between photons does not collapse is that the parts of this dualistic state (that create this structure of superposition) are both classical - not subclassical

The familiar format of EPR-experiment is one in which some nonlocal structure collapses to a classical state. In this situation the instantaneous agreement between separate local sites in classical space-time is paradoxical to the fact that communication across space-time cannot be instantaneous but is rather limited to the speed of light. However, in the paired polarization experiment what is observed, on measurement, is quantum-mechanically based not classical. If the state that results on observation were the result of collapse, we would observe a classical relationship between the parts not quantum-mechanical.

5.3. Comparison of the half-silvered mirror experiment and the parallel-polarization-state experiment

The parallel-polarization-state experiment and the half-silvered mirror experiment share the same characteristic: a single observable of property in each experiment is classically split.

The difference between the constructions is that, in the half-silvered mirror experiment, one photon is split to form an entangled pairing at the subclassical level, and in the parallel-polarization-state experiment, two photons are linked to form an entangled pairing. Nevertheless, a quantum-mechanically linked dualism is found in each instance. The paradoxical situation for the classical description in both cases is that the observables of properties (displaced in space-time) should have a random relationship but they do not. In both occurrences, property is linked nonrandomly since it is instantaneously communicated across the dualism regardless of the distance that applies, and the limit of communication for classical causality, which is established by the speed of light, is therefore violated.

Under IToE, this violation must occur in order to conserve the potential and complexity of structure across the two dimensional levels (subclassical and classical). Subclassical sites are less dimensionally complex than classical sites and accordingly they are inherently not observable.

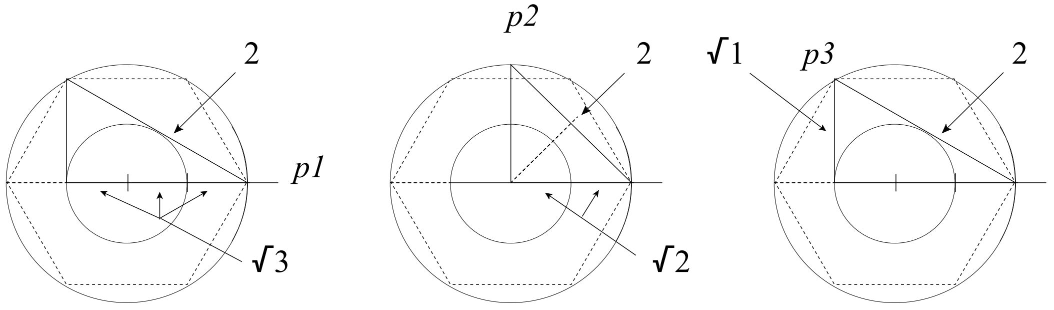
6. The trigonometric architecture of the hexorthogonal geometry at the subclassical level

There are two geometries described for the unit circle under IToE (see 1.4 Two Geometric Spaces, One Roof: The Local and Nonlocal Structures of the Unit Circle). The first is based on the Wessel-Argand-Gauss plane, and the second is based on a redistribution of what is imaginary in this unit circle to produce an eccentic hexorthogonal structure that has two eccentric origins and a central null domain.

Key trigonometric functions are established by the projection of points found on the circumference of this structure. The relationship of the position for these points under rotation, and their linear projection around the structure, demonstrate the reason that $\cos^2 \theta$ is the basis of transformation between rotationally closed (quantum mechanical) and linearly open (classical) structures in EPR-type experiments.

That there are two fundamental descriptions of the unit circle at the subclassical recognizes the fact that at this space contains a fundamental dualism. Transformations across dimensional boundaries are open, and the relationship of locations must be interpreted relative to these boundaries. Thus, the trigonometric values are established by interpolation using two criteria:

1. the dimensional neutrality of a particular vector (if the vector is not neutral, the square-root function must be applied)
2. the number of dimensional boundaries crossed



$(\text{adjacent/hypotenuse})^2$ (based on values determined under IToE)

$\sqrt{3}/2 = 0.87$	$\sqrt{2}/2 = 0.71$	$\sqrt{1}/2 = 0.50$
$(0.87)^2 = 0.75$	$(0.71)^2 = 0.50$	$(0.50)^2 = 0.25$
$= \cos^2(30)$	$= \cos^2(45)$	$= \cos^2(60)$

Figure 8. The figures show the relationship of positions and directions to the values generated as trigonometric functions. The hypotenuse is the only dimensionally neutral plane. All others project across dimensional boundaries. The horizon of the inner shell limits the angle of the hypotenuse. Points *p*1, *p*2, and *p*3 are rotated positions that project around the inner domain. Ratio values are determined by the number of parts and their cross-dimensional structure.

The full range of values over 180 degrees cannot be derived because the complexity of the model is inherently restricted to two dimensions. The values established are for 30, 45, and 60 degrees. The central null domain represents an horizon for angularity in this limited two-dimensional structure. Finally, each of the three values is established from a separate observational perspective in the rotation around the circumference, not a single location. This factor follows naturally from the fact that quantum mechanical structure is based on a nondistributive structure of relationship. In other words, rational relationship for the whole cannot be interpreted from a single position.

7. Conclusion

Polarization is an ideal phenomenon to present the relationship between these subclassical and classical structures. The transformation across rotational and linear formats and the presence of paradox in a domain constructed as a singularism/dualism is demonstrated.

The key elements of the Impressionist Theory of Everything (IToE) illustrated here are:

1. Paradox is a systemic and fundamental mechanism in the universe. The format that results for fundamental domain is the combination of the observational perspectives of singularism and dualism. The entirety of this construction cannot be rationally contained in any single observational perspective for property.

2. A mathematical and geometric model is derived from analysis of the consequences that are naturally inferred by the presence of paradox.

3. The Impressionist Theory of Everything (IToE) describes a principle of conservation for the relationship between two absolutely separate dimensional levels (subclassical and classical). The subclassical level is the support that creates the structure required from the process of observation.

REFERENCES

1. Herbert, Nick. 1985. Quantum Reality, New York: Doubleday.