

# Two Geometric Spaces, One Roof: The Local and Nonlocal Structures of the Unit Circle

## 1. Introduction

The unit circle is the infinitely symmetrical structure of the two-dimensional plane. Because of its dimensional simplicity, the unit circle is ideal for geometric representation of the Impressionist Theory of Everything (IToE). Chapter 1.3, Two Mathematical Spaces, One Roof: The Local and Nonlocal Structures of the Unit Circle, presents the concept that, under IToE, there are two fundamental mathematical descriptions of the space within the unit circle. The first description is composed of parts that are observable because they are rational, and the second is composed of parts that are nonobservable because they openly display paradox. The distinction between the two noncommon descriptions contained in the same space is established by the orthogonal structure of each.

The classical and observable version of the unit circle is based on the real coordinate system  $(x, y)$  of the Cartesian plane. Both the  $x$ - and  $y$ -axes contain real values for location. The nonclassical and nonobservable version of the unit circle is based on the complex coordinate system  $(x, iy)$  called the *Wessel-Argand-Gauss plane*. This plane is formed when the value  $\sqrt{-1}$ ,  $i$ , transforms the vertical axis to  $iy$ . Each location on this axis is imaginary. The value of  $i$  is the fundamental representation of paradox in the formal structure of mathematics. It is complementary to the Russell set, the same structure stated in linguistics.

In Chapter 1.3, the mathematical consequences that arise out of the paradoxical structure found within the unit circle are explored. The present chapter takes the discussion in a new direction, focusing on the existence of a paradoxical dualism of geometric properties within the unit circle. Again, two noncommon spaces are found in the same limit of the unit circle.

## 2. A fundamental dualism for the placement of paradoxical parts within the unit circle

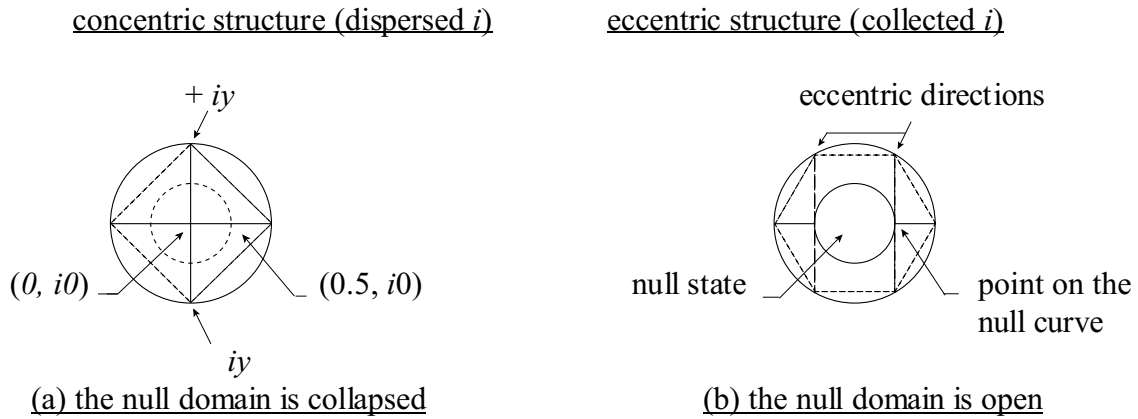
In the two-dimensional space of the unit circle, two orthogonal directions are required to define the domain. Furthermore, within the subclassical version, because of the open presence of paradox, each of these orthogonal directions contains paradoxical properties to the other. The classical observer is denied knowledge on the nature of one half of the state because the second half represents a conflicting or paradoxical structure of property to the first.

There is no rational basis in which the two formats can be included as one. Rather the observer is forced to fundamentally change perspectives in the shift between the two half-bases that form the complete and larger space. The half-structures that are observed are incomplete in terms of the larger domain that is not singularly observable. The symmetry of both parts cannot be rationally represented. Thus, one half is necessarily missing in any singular view of the boundary for the larger space.

Under the Impressionist Theory of Everything, the portion of any space that is undefined (and undetected) to the observer is called a *null state*. As has been seen in Chapter 1.3, the nature of this undefined space changes its form as it incorporates more features. The fact that a null state exists within the complex, subclassical unit circle, and cannot be rationally placed within it, opens the possibility that there are alternative placements of the null portion. This is just another way of stating that a confusion for location of the parts applies for the complex unit circle, and in the most general case leads to the existence of two possible structures. These structures do not have a common basis of rationalism.

The two possible placements of the null portion of the interior to the subclassical unit circle are illustrated in Figure 1. The null portion can be dispersed to produce an overall concentric structure, or it can be collected in a single location to produce an overall eccentric structure for the interior of the boundary to the space. These geometries represent a linear

superposition of states because alternative structures are found simultaneously in the same space. Each contains unique properties.



**Figure 1. The subclassical linear superposition of ortho structures:** The *Wessel-Argand-Gauss plane* is the representation of complex space in two dimensions. It is used to describe the unit circle in 4(a). Locations on this plane are imaginary but are mathematically correct. In (b), liberty is taken for placement of the imaginary locations of the unit circle. A central *null* domain is formed that is a collection of what is geometrically imaginary. The concentrically structured coordinate system necessary for mathematical relationships is destroyed. However, the intersections displayed become geometrically true and continuous.

In Figure 1(b), the null domain represents one half of the space because the inner circumference is a curvilinear boundary having one half the length of the outer circumference. Thus, the area represented in each portion is also one half. Note: the area of the inner circumference is inflationary for the specification of the area of the outer circumference. When the outer area is calculated, the area of the inner imaginary null domain is subtracted.

### 3. Concentric, mathematically computable subclassical structure

If the imaginary half of locations (classical null states) are dispersed throughout the space contained by the simple unit circumference, then a symmetrical arrangement of combined real and

imaginary structures in each location of the space is found (see Figure 1(a)). The ortho directions remain in the locations they occupied in the classical plane and, given the fact that the rules of operation have been reversed (see Chapter 1.3), calculation in the entirely subclassical domain is possible. However, the locations (intersections) and directions found in the space cannot be regarded as real because their geometry includes an imaginary component. Finally, the even interdispersal of null (imaginary) and real locations means that the two curvilinear boundaries of these separate collections are superposed at the same location as the singular unit circle.

#### **4. Eccentric, geometrically accurate subclassical structure**

The other option for arranging the imaginary locations (classical null states) of the subclassical plane is to group them in a single symmetrical location of the plane, as shown in Figure 1(b). In this arrangement, the geometry is true because the real directions and intersections in the space have been pushed out and collected. The parts to the null component of the structure are grouped in the centre. Now the null and real structures are not superposed in the common domain of Figure 1(a). Rather, they have separate boundaries defined by the inner and outer circumferences. For this space, the horizontal axis is centrally displaced by the centrally collected null state. The origin of the horizontal axis is also displaced in the horizontal direction. The plus and minus directions are tangential to the central null domain.

The structure of the complex plane in Figure 1(b) has six defining locations around its circumference. The structure is hexorthogonal. The important effect of separating the imaginary and real locations of the space, in Figure 1(b), is that the imaginary locations do not intercede between the real locations and directions that are displayed. Consequently, the directions and intersections shown are geometrically true and continuous; however, they are also eccentric and not orthogonally true for the overall structure. The orthogonally symmetrical relationship of  $x$  and  $iy$  has been destroyed. Thus the identities of the locations, as they reflect locations within the boundary of the complex plane, are not established in Pythagorean terms. Also, since the ortho structure of the space is limited and inherently tied to the level of dimensional complexity of two

directions in space that have developed, the means of interpolating additional locations and directions is not possible.

## **5. The potential of the ortho geometries**

The initial premise of IToE is that we can examine the manner in which space develops its dimensional complexity and potential. At each level in the development of this potential, unique structures are found, and they are not properly reflected by the two necessarily fixed ortho formats required for calculation under quantum and classical mechanics. The process of cross-dimensional development is one of evolution and cycle-of-accumulation for the orthogonality of space, and consequently the shape of space changes across these dimensional levels. No singular observational perspective can account for the dualism created between the two noncommon spaces found in a common domain once the process of development is complete for the boundary that applies.

The relationship of the observer in classical space to either of the subclassical structures represented in Figure 1 reflects the process of cross-dimensional development between the two spaces. Regardless of whether the subclassical structure under consideration is inherently concentric or eccentric for the placement of null states, a transformation that is properly described as a collapse must occur when the observer enters and observes the subclassical plane. The process of collapse preserves the distinction of dimensional development across the subclassical to the classical structures. This collapse represents an increase in the potential of the state to display real locations.

The subclassical geometry found in the half-silvered mirror experiment (described in Chapter 2.1) reflects the process of collapse for the concentric model of the subclassical plane. The potential of the state doubles from two nonimaginary ortho directions at 180 degrees (one forward and one backward in time) to four nonimaginary directions at 90 degrees. The hexorthogonal structure is not directly reflected in this action.

However, the hexorthogonal model also has a place in processes and structures found when the subclassical plane collapses to the classical. When the subclassical space under the model of IToE is based on the hexorthogonal, eccentric geometry, and collapse occurs to the classical level through observation, six nonimaginary directions (at the subclassical level) transform to four real directions (at the classical level). Note: the subclassical directions and locations in the eccentric geometry are not imaginary in the sense that they are geometrically true and continuous.

There are unique inferences for the potential contained in this conversion. Specifically, the number, arrangement, and angular displacements of the six ortho directions are categorically not defined in a classical perspective of orthogonality. There are too many defining directions in the hexorthogonal space.

## **6. Quark structure**

The potential contained in the hexorthogonal space is radically different from that contained in the cross-dimensional ortho geometries of 180 and 90 degrees. This has inference for any subclassical structure including any object, or collection of objects, that are composed based on this alternative geometry. The potential for these structures can take any appropriate form of property based on the manner in which the space is viewed. For example, it can be viewed as the potential for direction, location, or energy.

If the potential defined for direction, location, or energy changes in a given domain, then compensation (conservation) must occur. It follows that when the subclassical space in Figure 1(b) is opened to classical observation, the potential of six directions that emerges conflicts with the actual potential of four directions defined on the classical plane. On entry into the hexorthogonal space through observation, an increase in potential has occurred that is not classically justified. The potential for location that is observed can only be conserved if compensation occurs.

The only place from which the compensating potential can come is the classical domain outside of the hexorthogonal space. Thus, this space will not be opened to observation of its parts unless the appropriate amount of potential is received to conserve the transformation. A force different from any found between objects of classical space will apply. Specifically, the force between the parts of the hexorthogonal structure will increase, rather than decrease, with distance as the space between them is spatially opened to the observation.

The more this space is opened, the more it will violate the integrity of the classical domain for any property that is measured, be it for the existence of location, direction, or energy. Once again the effect of reversal for property within a common domain is demonstrated. In this case, the effect is that a reversal of energy relationship occurs between the classically concentric and subclassically eccentric structures. For conservation of energy to occur between the two spaces as observational entry occurs, the force between objects is reversed to the classical and becomes inversely proportion to distance.

Empirical evidence for such a force is found in fundamental quark structure. There are a total of six varieties of quarks that form an identical geometric structure as found in Figure 1(b). The force defined by the unique hexorthogonal relationship of quarks is called the *long-range colour force*. As a quark and antiquark are drawn apart, the force between them appears to increase without limit.<sup>1</sup> There is currently no theory that can explain this phenomenon. The explanation is found by looking to the manner in which space develops its dimensional complexity, as described in the Impressionist Theory of Everything (IToE). The mechanism will categorically not be explainable under purely classical or quantum mechanical theory.

Note: For the relationship of the two concentric ortho geometries, one at the subclassical level (180 degrees) and one at the classical level (90 degrees), the increase in potential when the

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<sup>1</sup> Bloom , Feldman, 1982: p. 72.

subclassical structure is opened to classical observation can be viewed as the increase in the potential of the state to display alternative. In the most general case, the effect is that when a singularly defined quantum mechanical state is observationally opened, it displays dualism for its otherwise singular and superposed interior.

## **7. Concentric/eccentric structure and property**

The concentric (ortho-180) and eccentric (ortho-120) structures are alternative means of superposing the cross-dimensional dualism of real and null components found at the subclassical level. Together, these geometries are responsible for observational closure of both formats of subclassical space of the unit circle. The expanded plane, in which both real and imaginary structures are defined in the same space, allows groupings of the objects of the space that are not possible in a classical space where all orthogonal directions and structures are necessarily real and fixed. In all such examples of fundamental dualism, we must make a choice as to the perspective taken, and this choice is an entirely different form of choice from that which is familiar to us at the classical level. The choice is not between probabilistic alternatives, and it is not based in rationalism.

## **8. The two geometries and the Russell set**

Finally, because the ortho properties of the spaces between Figures 1(a) and (b) are different, the spaces are not the same. They are not members of themselves, even though they are contained in the same unit circle. This brings the defining terms of the Russell paradox into the discussion.

A set is a collection of objects that share some specific property. Having stated that, the Russell set is an unusual collection for sets of the same property. Specifically, the property that is shared is that the members do not share a common property. Thus, a very circular reference to property is found between a shared and nonshared characteristic. This is a difficult structure to understand from our classical bias. It is futile to look for purely classical containment of the space.

It is the absolute and fundamental generalization in the formalism of linguistics for the structure of paradox.

The two fundamental geometries, concentric and eccentric, within the complex unit circle meet the definition of the Russell set. These structures are both contained within the same unit circle. However their properties, as defined by their ortho structures, are fundamentally not common. Two spaces that are not members of themselves are contained in the same domain.

## 9. Conclusion

The two geometric descriptions of the subclassical space of the unit circle and the Russell set are congruent structures of paradox in their respective formalisms. This is strong evidence for the existence of a common principle at work across the formalisms of mathematics and linguistics as well as within each. A fundamental dualism and singularism of structure are represented in the formalisms of both linguistics and geometry, and the mechanism that allows this relationship is paradox. When the boundary of any singular structure is represented at its absolute limit, a fundamental dualism will always arise. This principle applies to representations formed under mathematics, geometry, and linguistics — in short, to all that we can observe.

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## REFERENCES

1. Bloom, Elliott and Feldman, Gary J. 1982. 'Quarkonium', Scientific American May 1982: 66-77.