The Philosophers Dream

How art and language can rigorously unify science, religion, and politics.

Abstract

We postulate that the universe is comprised of consciousness and language at the personal, universal, and subatomic levels of our experience. Evidence supporting this hypothesis is presented by considering a hypothetical universal language which is symmetrical to our current natural languages, and also to art, music, dance, poetry, etc. This generates a quaternion mathematics that combines with the Maximum Entropy Principle to explain conscious behavior at the subatomic (electrons and protons are conscious), personal, and universal (religious) levels. A language derived mathematical structure is presented that supports this argument.

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The essence of this thesis is that at its most foundational level, the universe is comprised of consciousness. This is based on an initial foundational presumption that our understanding of consciousness and language stems from who we are. Thus I am a conscious entity and this interaction with you comprises a language that we both use. Therefore you are also a conscious entity and you are interacting with me by reading the language in this document. Thus consciousness and language precede definition. We will talk about our personal experiences in terms of consciousness and language, not the other way around. This avoids the issue of having to define consciousness and how it might have emerged from a perceived independent and nonliving physical reality. The procedure is symmetrical with how the concepts of point and line are used in geometry in that they are undefined foundational presumptions from which geometry is constructed.

So the first evidence of our consciousness hypothesis that is immediately recognizable and experienceable by all of us, occurs at the level of our own human activity. You and I can directly interact and communicate with each other, and with many others similar to ourselves. This is a part of our own personal experience as conscious entities.

For many of us this recognition of external entities that are conscious extends to animals; our pets, farm animals, even small animals such as insects. It may include organizations of conscious entities such as families, communities, or governments, or organizations of animals such as flocks of birds. Such organizations often behave as if they were themselves conscious.

We also recognize that there are many other components of our personal experiences that do not appear to involve consciousness or conscious entities. To explain the existence of this perceived external reality we have frequently and historically posited the existence of a supreme being, a universal consciousness, that has created us and all of the external non conscious environment that we can detect and experience. Our existence, and the existence of our environment, is then interpreted as evidence supporting a belief in the existence of a creative universal consciousness.

Many people define this universal consciousness as God and they have created various religions which describe God and how God interacts with them and their universe. This often includes the belief that they can communicate with God through prayer, that God can “hear” their prayers, and that God will often answer them. Although God's answers may often be in ways that are not immediately understandable, there is still a belief that prayers often are, or will be, answered.

However, over the last 500 years or so science has emerged as a powerful alternative explanation for our personal experiences. This alternative does not involve religion or our direct interaction with other external conscious entities. This science posits that the universe exists as an external physical reality that is independent of consciousness, and that it functions in accordance with certain immutable natural laws. Consciousness may have emerged from this reality but the universe would still exist even if this never had happened.

While the origins of modern science go back for thousands of years, the relatively recent integration and evolution of these ideas, and their support by experiment and technological development, has led to a very successful explanation of, and control over, our external reality. This explanation extends far beyond what is attainable with the various religious explanations. Called the reductionist paradigm it is now the dominant worldview underlying modern society.

Unfortunately, it may also be the source of some of our most serious problems. Problems which we haven't been able to successfully resolve. These include Extreme Wealth Inequality, Increasing Autocratic Governance, Environmental Pollution, and Climate Change. While the reductionist paradigm did not directly cause all of these problems it has enabled them to an extent that they now threaten the very existence of our society or the habitability of the planet upon which we live.

This document proposes to resolve these issues by reintroducing consciousness back into science. This will be accomplished by presuming that electrons and protons are conscious, that organizations of conscious entities also exhibit conscious behavior, and that there is a universal consciousness that comprises all of the other conscious entities in the universe. We believe that this will still preserve all of the accomplishments that modern science has achieved. It will also eliminate the source of the current schism between science and religion.

The following will describe evidence that supports this hypothesis, and will propose additional experiments to further test its validity. These will include potential solutions and resolutions of the critical problems identified above.

The argument is that conscious entities can communicate with each other via language, which is broadly defined as including our natural languages as well as the emotional languages of art, music, dance, poetry, etc. So a first step will be to formalize a simple language structure that includes the essence of all of these other languages.

Since we are proposing the existence of a universal consciousness comprising all of the other conscious entities in the universe, let us also propose the existence of a Hypothetical Universal Language (HUL) that also comprises the essence of all the other languages that conscious entities use to communicate with each other. We want our simple language structure to approximate this HUL as much as possible. To this end we have created a candidate for this simple language structure which we call Ododu.

All mathematical systems are defined and constructed in terms of some given language, so we should be able to extract how mathematics can be derived from Ododu. It turns out that the fundamental structure of Ododu itself is symmetrical to that of a specific mathematical object called a quaternion. This is significant because quaternions can be factored into complex numbers and spinors which, combined with quaternions, are the fundamental mathematical objects used to explain quantum mechanics.

We contend that if the mathematics that describes quantum mechanics is symmetrical to the languages that we use to interact with each other, then this mathematics is describing not only the interaction between you and I, but also the interaction between conscious entities at a subatomic level. The logical candidates for conscious entities at the subatomic level will be the electron, proton, and their combination (as an organized pair or marriage) as a neutron. The basis for this is that the half life for electrons and protons is in the millions of years or more. In contrast the half life for almost all of the other subatomic particles in the Standard Model of Quantum Mechanics is less than 10^{-6} seconds. It therefore makes sense to consider these short lived subatomic "particles" as units of the language that the electrons and protons use to communicate with each other. This interaction then leads to what we observe as the behavior of subatomic particles in quantum mechanics.

If electrons and protons are conscious (like you and I) what about consciousness at the universal level. If that comprises all of the other conscious entities wouldn't it also indicate that there could be communications between and among all levels of consciousness? That would then imply the existence of what we have described as a Hypothetical Universal Language.

A second argument for our thesis now emerges from the concept of entropy and how various expressions of entropy unify the decision making processes of conscious entities at each of the three levels discussed in this proposal.

In the early work on thermodynamics it became apparent that there were no perpetual motions in nature. Thus for every chemical or atomic reaction there was a fraction of the total energy of the interaction that would not be available for any future reactions, and this could be described mathematically as entropy.

It was later discovered that, in the development of information theory, an expression that was mathematically identical to the thermodynamic entropy expression could also describe a useful measure of information as used in communication analysis. This could then be used to optimize decision making based on the information that was available at the time of the decision. This procedure was called the Maximum Entropy Principle (MEP) and was recognized as a general procedure of reasoning in which you could mathematically compute an answer, a choice of a "best" decision based on the evidence available and the reliability of that evidence. However, this calculation becomes cumbersome and complex in all but the simplest of situations and this has severely limited its application in much of our everyday experience.

To resolve this we will show that a careful application of artistic and aesthetic judgements can be used to make decisions in a manner that is consistent with the MEP in those cases where a mathematical expression or solution cannot be usefully formulated or solved by the MEP. Call it the Goldilocks Maximum Entropy Procedure (GMEP) because it comprises a decision procedure derived from the 19th century English fairy tale of Goldilocks and the three bears, at least the friendly version of it. In this tale Goldilocks made decisions as to whether something was too small, too big, or about right (or too cold, too hot, or about right, etc.) based on how she felt about the situation, what worked for her.

This procedure can also be derived from the Pythagorean and Euclidian interpretations of geometry in which line segments or angles were "measured", not by using numbers, but by comparing them in terms of bigger, smaller, or equal to other line segments or angles. In either interpretation the GMEP looks at decisions in terms of emotional and aesthetic evaluations viewed in terms of too much, not enough, or about right. These instinctive or reflexive judgements take the place of the expected value functions that are calculated mathematically in the classical Maximum Entropy Procedure.

The GMEP comprises a restatement of the classical MEP in terms of a quaternion. Thus it will comprise an entropy term and three expected value functions. This will function in a manner similar to how we judge when something is too big, or too small, or about right (or similar three part formulations) based on our intuitive sense of fitness and aesthetics. This is a capability that we all have to varying extents, and which can be developed through practice and study to be increasingly effective.

We use this quaternion formulation of the GMEP as a part of how we use language to make decisions that lead to our actions. Quantum mechanics also uses a quaternion based mathematical language in conjunction with a law of entropy to describe the actions and interactions of subatomic and atomic behavior. This is consistent with the hypothesis that electrons and protons are conscious and that they make decisions using their “language” which leads to actions that we can observe as subatomic and atomic behavior.

The entropic capability is also reflected in the fact that, at the foundational level, virtually all religions contain moral and ethical standards that believers feel they should follow. These comprise empathy, compassion, forgiveness, the promotion of social justice, and contain principles like the golden rule as to how we should interact with each other. We all recognize that these are innate beliefs that we all should live by, and most of us do. Despite the observations that these fundamental principles are sometimes corrupted by external political or contextual influences, their existence at the foundational level in religion strongly supports the view that they are a fundamental feature of consciousness itself, and thus should exist at all levels of experience, subatomic (chemical), personal, and universal.

Thus we end up with a model that explains; what we observe and can predict scientifically, what we deeply believe religiously, and how we should act relative to each other politically and economically.

Ododu Math

The following description of Ododu Math outlines how the structure of the constructed language Ododu supports the Philosophers Dream by illustrating the symmetry of the language with the mathematics of theoretical physics. A description of Ododu is available at www.ododu.com. Additional information is available in the attached document “The Relational Symmetry Paradigm”.

Ododu is built in accordance with a Principle of General Relativity that contends that the structure of a universal language should model both the structure of our own consciousness as well as that of the universe itself. This includes a more specific principle of linguistic relativity, which holds that the structure of a specific language influences the ways that people who use that language think. Thus it utilizes a strong version of the Sapir-Whorf Hypothesis, which can be interpreted as, "The Language You Use Determines What You Can Think".

Ododu subsumes mathematics, but in two forms. The first comprises geometry and arithmetic, two ways of thinking that are derived from concepts that are directly relatable to how we deal with our actual everyday personal experiences, but which do not involve any direct interaction with conscious behavior. These forms are consistent with a belief that an external physical reality exists that is independent of consciousness. They do not require concepts of zero or negative numbers in their use and application.

The second form of mathematics derives not only from our experiences with a presumed independent physical reality, but also from our experiences with interacting with each other. Here the concepts of negative numbers and zero were found to be useful and relevant. Inclusion of them into the arithmetic led to the creation of algebra, and then to complex numbers, quaternions, matrices, set theory, and other forms of advanced mathematics.

These new forms of mathematics became a driving force in the evolution of modern science. For example, the Standard Model of Quantum Mechanics is described almost exclusively in terms of a language of spinors, complex numbers, and quaternions. A language that seems incomprehensible to most of us.

And this leads to problems. What exactly is a spinor, the square root of minus one, the set of all sets that are not members of itself (is it a member of itself?), and the Godel incompleteness theorem. All of these questions emerge because we try to understand them from the perspective that our universe exists as a physical reality that is independent of consciousness.

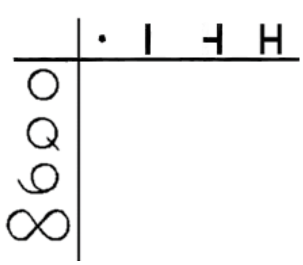
To resolve this we return to our new Ododu language, how it describes a new way of thinking, how it subsumes both forms of mathematics, and how this can resolve the problems of Climate Change, Extreme Wealth Inequality, and Autocratic Governments.

The premise is that thinking is the process of creating and using language. This includes the approximately 6,000 written and spoken languages that are still in use, but also comprises drawing, painting, sculpture, music, song, dance, and poetry. All of these forms are languages by which we communicate with each other, and all of them share a basic symmetry. They all contain elements which are connected, and this generates feelings and emotions. The symbolic representation of these interrelationships creates our ideas, thoughts, and beliefs. They are the basis of the decisions we make, and how we act and live.

In deriving numbers and mathematics from Ododu we will follow a similar procedure to that used in the Derivation of Archetypal Meaning.

See [Derivations - ODODU]

However, there is a significant difference in that instead of developing a formal symbolic description stemming from spoken languages this procedure will deal directly with a derivation using the Relational Symmetry Paradigm as represented by;



These are symbolic structures that can be interrelated in ways that are symmetrical to, and indeed are, precursors to the numbers and mathematics themselves.

In this process we will return to the early stages in human evolution in which art, language, philosophy, religion, and technology were basically combined into a single way of thinking and acting. The representation of this began when we first started drawing on stones and cave walls, on bark with charcoal, on animal skins with sticks and plant pigments, etc. This involved the use of created shapes and objects to represent various components of our experience. The first instantiation of what we now call semiotics or the theory of signs.

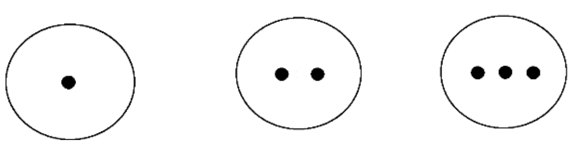
In the Derivation of Archetypal Meaning we combined the two fundamental relational symmetries of • I ⊣ H and O Q ↺O ∞ into a subsumptive evolutionary sequence that represented the fundamental archetypal concepts upon which Ododu is based.

In the development of numbers and mathematics from Ododu we first start with the artistic creation of the shapes that comprise the symbols of the relational symmetries, plus all kinds of other shapes that can serve as symbols. Thus we draw points and lines on surfaces. Combine these with enclosed or bounded shapes also on surfaces; circles, triangles, squares, irregular shapes, etc.. Then build objects that derive from the drawings; balls, pyramids, boxes, sculptures. All this comprises geometry, in which relationships and principles can be formalized by comparison and construction with rulers and compasses.

No numbers were needed for the development of geometry but they did emerge at roughly the same time in our history.

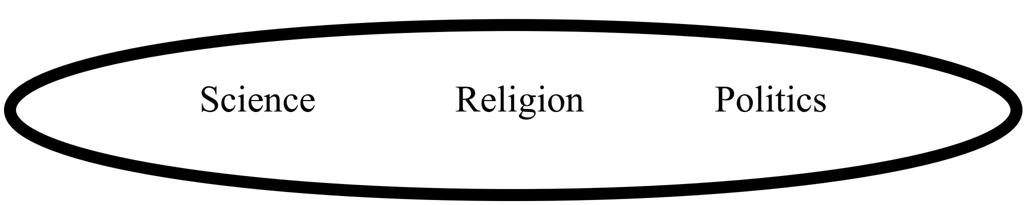
Numbers represent an abstraction that arises from combining the respective signs of these two relational symmetries in various ways that turn out to be even simpler than the subsumptive evolutionary procedure used in the Derivation of Archetypal Meaning.

Start by generating the counting numbers by combining the first sign of the first relational symmetry, the ●, with the first sign of the second relational symmetry, the O. For example;



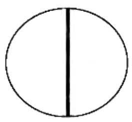
These can be defined as symbols which map into the symbols we all currently use as representing the numbers 1, 2, 3. The process can be continued for as many dots as you want to count, that is, to establish counting numbers for.

Any discrete symbol or sign can be used within the circle to represent a thing or symbol that you want to count. Thus the symbol

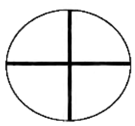


Could be defined as representing three words, Science, Religion, Politics, or it could represent the 23 letters comprising those words.

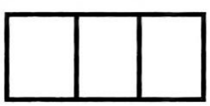
To develop a second class of numbers, the fractions, we combine the second sign of the first relational symmetry, the | , with the O of the second relational symmetry. Thus



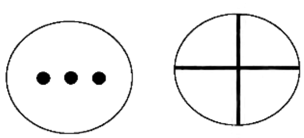
can be defined as dividing something into two parts, for example, two halves of a pie. Similarly,



can be defined as dividing something into quarters, four parts. For ease of illustration the boundary does not have to be a circle. For example to illustrate dividing something into three parts, thirds, use a rectangular boundary,

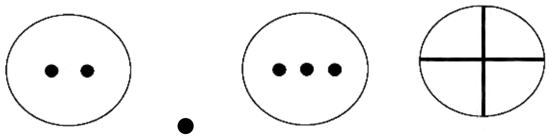


To indicate which part of the fraction you would want to consider just place the symbol for a counting number before the fraction symbol. For example;

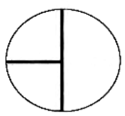


would represent three quarters. This would be the same as ¾ or 0.75 in our current notation.

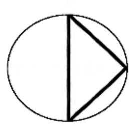
By adding a point ● to represent the boundary between counting numbers and a fractional part of another counting number, a basis point representation can be generated that is like what we currently use for a decimal representation of a rational number. Thus;

 would represent two and three quarters or 2.75 in our current decimal representation.

This process can be continued to represent the third type of primary number, the incommensurate or transcendental numbers such as pi or the square root of 2. Do this by combining the third sign of the first relational symmetry, the ⊣ , with the O of the second relational symmetry. Thus

 can be defined as the relationship between the circumference of a circle with its diameter. This number cannot be represented exactly with a basis point representation (like our decimal numbers) but it can be approximated to a satisfactory degree (your choice of accuracy). Thus define a unit length for the radius and use geometric constructions of polygons to determine larger and smaller, outside containing and inside contained, structures for which you can make accurate calculations of perimeter length as a function of the radius. As the number of sides of the polygon increase the average of the outside – inside perimeter lengths divided by the diameter will approach pi.

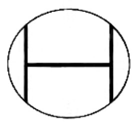
A similar procedure can be used to calculate the hypotenuse of a unit square in terms of the side of the square.



Pick a number, x, between one as a lower bound and two as an upper bound. Thus $1 < x < 2$. Square x, x^2, and compare the result with two. If x^2 is larger than two reset your upper bound to x, and repeat with a new pick, y, that is between x and one. Now $1 < y < x$. If the square of your initial pick, x, is smaller than two but larger than one, reset your lower bound with x and pick a new number y such that $x < y < 2$. Repeat this process until your approximation is satisfactorily close for your purposes.

Other transcendental numbers can be calculated in similar fashions. Note that neither zero nor negative numbers are required to calculate satisfactory results for pi or the square root of two.

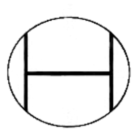
The final type of primary number can be created by combining the fourth sign of the first relational symmetry, the H, with the O of the second relational symmetry.



This represents a major change in how we understand the concept of number. The previous three types of number, which we now define as the arithmetic numbers, could be used for measuring and counting things that we perceived as existing in an external reality that was devoid of consciousness.

We could use these numbers by combining them with a procedure for calculation comprising the four arithmetic (not algebraic) operations of addition, division, multiplication, and subtraction. These four arithmetic operations are themselves an application of the first relational symmetry, the • I ⊣ H. As such they can be applied to numbers but only when the numbers represent real elements of our experience and not just ideas. Concepts such as zero and negative numbers were not involved in the arithmetic development because it was difficult to conceive of just what they represented in that external reality. For example, you cannot subtract 5 things from three things because you don't have five things in a three things boundary. You can't remove (subtract) five cows from a pen which only contains three cows.

This changes with the introduction of



because now you have a way of interrelating the first relational symmetry relations with each other within the O of the second relational symmetry. This leads to concepts such as reflection, opposite, cancel, equals, and debt. Ideas which do have meaning in our personal experiences because they refer to those personal experiences we have with each other and not some perceived independent external reality. Consequently, these signs attach meaning to ideas such as zero and negative numbers.

The incorporation of zero and negative numbers led to the development of algebra which extended and gave structure to the arithmetic operations of addition, division, multiplication, and subtraction. This then redefined the initial number types so that the counting numbers became the field of integers, the fractions became the field of the rational numbers, and the arithmetic real numbers became the field of the algebraic real numbers. Hereafter the algebraic real numbers will simply be called the real numbers.

The inclusion of zero as a number also allowed for a simplification in the basis point representation for the integers, the rational numbers, and the real numbers. Now a zero could be added to a number to specify how numbers could be grouped to condense notation with digits. For example, you can count in a four fixed basis point system by using the digits 0, 1, 2, and 3. You start counting with one and continue as follows; 1, 2, 3, 10, 11, 12, 13, 20, 21, … Where 10 is four, 11 is five, 20, is eight, etc.

Application of this zero placeholder system results in the basic mathematics that we use today which uses a ten basis point representation or decimal point representation. Thus we use the digits 0, 1, 2, 3, 4, 5, 6, 7, 8, and 9. Ten is represented as 10, one hundred is represented as 100, etc.

In this decimal representation 0 is used as a placeholder to specify a grouping for a given number. These are identified as tens, hundreds, thousands, and on to include millions, billions, trillions, etc. This also leads to an exponential representation using powers of ten as multipliers for an initial digit with a decimal point fractional component, the scientific notation.

This use of zero as a placeholder has been complicated by other uses of the word zero. These include using it to; represent a boundary between the positive and negative numbers, represent a limit for fractions as the denominator becomes large, represent an origin for a coordinate system, or represent it as a number on an equal footing with the other decimal digits – which it is not because you cannot divide by zero but you can divide by any other decimal digit or number.

All these uses of zero sort of relate to each other and so this ambiguity of what zero really means has not significantly impacted our everyday use of the zero sign and concept. However, this situation becomes significantly worse when you write an algebraic expression like $x^2 = -1$. There is no obvious personal experience that we have that relates to what this might mean. Historically, this was resolved by simply defining a new "special" number for it. Thus i became mathematically defined as being the square root of minus one and this became the basic construct for the fourth number system, the complex numbers. These are defined as comprising a form of a + bi where a and b are real numbers and i is the square root of minus one.

No specific personal experience was assigned to i but it did prove to be useful in describing wave phenomena. This resulted in the creation of the idea of the complex plane where one axis is complex and the other real. Again, there is no personal experience that such a plane exists. Like zero, this situation was tolerable but with the discovery of quaternions it became much more of a problem.

Thus we start with a complex number with a form of;

$$a + bi$$

Where a and b are real numbers and i is the square root of minus one. These numbers have a well defined algebra comprising addition, subtraction, multiplication, and division.

Then add a quaternion, which is a number with a form of;

$$a1 + bv + cj + dk$$

Where a, b, c, and d are real numbers, 1 is the unitary concept of one, and v, j, and k are non equivalent imaginary numbers each equal to the square root of minus one. In addition to being a well defined algebra comprising addition, subtraction, multiplication, and division, these numbers must also satisfy the following conditions. Let * represent multiplication, then

$$v * v = -1, \quad j * j = -1, \quad k * k = -1$$

$$v * j = k, \quad j * k = v, \quad k * v = j$$

$$v * j = -j * v = k$$

$$j * k = -k * j = v$$

$$k * v = -v * k = j$$

and $$v * j * k = -1$$

but v, j, and k are not equal to each other. This notation does not provide any clarity as to how the squares of v, j, and k can all be equal to minus one but v, j, and k are not equal to each other. It also does not indicate whether or not i is the same as v, or j, or k.

Fortunately, a matrix notation for algebra was discovered by Arthur Cayley shortly after William Rowan Hamilton discovered the quaternion in 1843 and this provided some clarity on these questions. A relevant example of the matrix notation and algebra is;

$$\begin{pmatrix} a & b \\ c & d \end{pmatrix} * \begin{pmatrix} w & x \\ y & z \end{pmatrix} = \begin{pmatrix} aw + by & ax + bz \\ cw + dy & cx + dz \end{pmatrix}$$

Using this notation make the following definitions;

$$\mathbf{1} \text{ is } \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$$

$$\mathbf{v} \text{ is } \begin{pmatrix} i & 0 \\ 0 & -i \end{pmatrix}$$

$$\mathbf{j} \text{ is } \begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix}$$

$$\mathbf{k} \text{ is } \begin{pmatrix} 0 & i \\ i & 0 \end{pmatrix}$$

Then the quaternion becomes;

$$\mathbf{a}\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix} + \mathbf{b}\begin{pmatrix} \mathbf{i} & 0 \\ 0 & -\mathbf{i} \end{pmatrix} + \mathbf{c}\begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix} + \mathbf{d}\begin{pmatrix} 0 & \mathbf{i} \\ \mathbf{i} & 0 \end{pmatrix}$$

This notation also shows that the structure of a complex number can be represented as;

$$\mathbf{a}\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix} + \mathbf{b}\begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix}$$

Or as;

$$\mathbf{a}\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix} + \mathbf{b}\begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix}$$

These expressions satisfy all of the requirements for complex numbers and quaternions given above.

The matrix notation allows us to express a complex number without having to use the symbol i for which we have no reasonable personal experience that illustrates its meaning. It also provides an illustration of how the quaternion basis elements of v, j, and k can all equal the square root of minus one without being equal to each other. However, it does raise the question as to what is the meaning of the matrix notation form itself, and it does not eliminate the inclusion of i in this expression for the quaternion.

The latter issue can be resolved by expanding the definition of the quaternion bases to four by four matrices using only one, minus one, and zero. Thus use the matrix notational form to define;

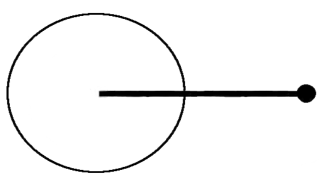
	1	0	0	0
One	0	1	0	0
	0	0	1	0
	0	0	0	1
	0	-1	0	0
v	1	0	0	0
	0	0	0	-1
	0	0	1	0
	0	0	0	1
j	0	0	1	0
	0	-1	0	0
	-1	0	0	0
	0	0	-1	0
k	0	0	0	1
	1	0	0	0
	0	-1	0	0

This four by four matrix notation meets all the requirements for a quaternion without using the term i for the square root of minus one.

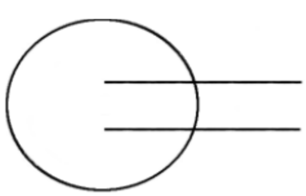
The question now becomes what is the meaning of the matrix bracket notation. To illustrate this we return to original procedure of combining the two primary relational symmetries and combine the first relational symmetry, • I ⊣ H, with the Q, which is the second sign of the second relational symmetry,

This describes how the four signs of the first relational symmetry can interact with each other in the presence of a boundary. The premise will be that any • I ⊣ H can interact with any other • I ⊣ H at a boundary which separates (distinguishes) the two signs involved, but the interaction must create another one of the four sign types. The allowed interactions are; an equivalence relation, a combination of the two signs which creates one of the allowed sign types, or a cancelation of parts of the two interacting sign types that creates one of the allowed sign types. This can occur at the boundary either before or after one of the interacting signs crosses the boundary.

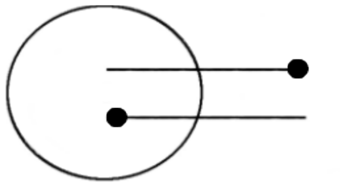
To illustrate consider how the first sign of the first relational symmetry, the •, can cross the boundary of the second sign of the second relational symmetry, the Q. This is the concept of the cross itself.



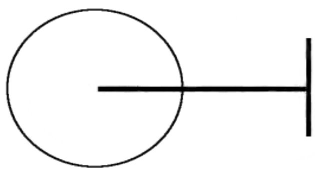
Combining the second sign of the first relational symmetry, the I with the second sign of the second relational symmetry gives a double or equivalence cross, going from inside to outside and then back from outside to inside. This is our concept of equals and is represented as;



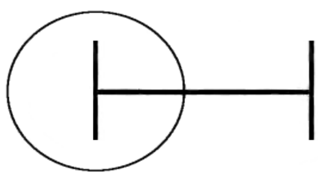
An alternative representation of this would be;

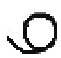


Combining the third sign of the first relational symmetry, the ⊣, with the second sign of the second relational symmetry, the Q generates the concept of combination. It is represented as;



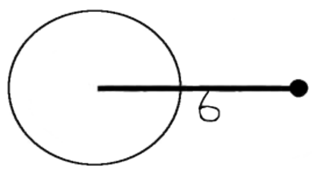
Finally, Combining the fourth sign of the first relational symmetry, the H, with the second sign of the second relational symmetry, the Q, generates the concept of cancellation, represented as;

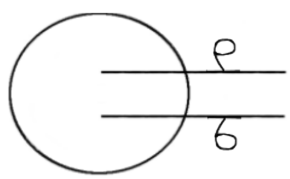


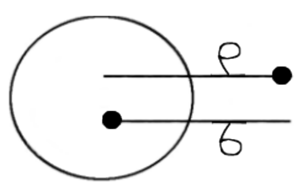
Before we can clearly understand how these interactions work we need a way to keep track of things, has one of the signs crossed the boundary or not during the interaction. This will incorporate a further interaction involving the • I ⊣ H signs of the first relational symmetry with the  of the second relational symmetry, O Q  ∞. The  can attach to any of the first relational signs to indicate that it exists in a second state of existence.

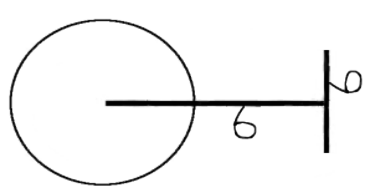
Thus it generates a duality within the first relational symmetry that we will identify relative to our personal experiences. The  sign will serve as a mark that distinguishes this duality in terms of marked and unmarked states. Subsequent interpretations of this duality, expressed as binary choices, can then be understood as specific applications of the general concept. These may include our creation of negative numbers as well as positive numbers, even numbers versus odd numbers, a negative charge for the electron as opposed to a positive charge for a proton, the notion that a statement is either true or false, that an interaction could be a combination or a cancelation, or a recognition of male as well as female organisms.

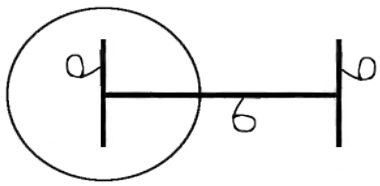
The following diagrams illustrate this identification symbolically, again with the two alternative representations of the | interaction.



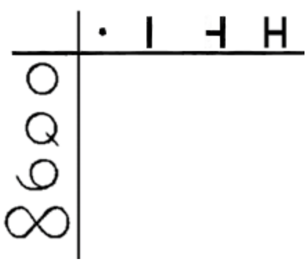


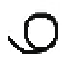






The final interrelations of the • I ⊣ H signs of the first relational symmetry with the ∞ of the second relational symmetry, O Q  ∞, incorporates all of the above and hence generates the numerical - mathematical interpretation of the full relational symmetry paradigm.



Here the duality of the symbolic formalization, which derived from the last  set of interactions, explains the historical pairings of the arithmetic operations of addition with subtraction, multiplication with division, and how that expands into the algebraic notation for the matrix representation. It explains why we define that two  signs can cancel each other in one form and combine with each other in the dual or opposite form. Thus two “negatives” can make a “positive” but two “positives” don’t make a “negative”. Similarly, a definitional cross (one mark) and a cancellation (three marks) both have odd numbers of marks, while an equality and a combination both have two marks. This leads to a view that the cross sign and the cancel sign are negative, while the equal sign and the combination sign are positive.

Thus the matrix notation itself signifies our personal linguistic experiences of creating and using number and mathematics.

This can all be applied in the following manner. Let

● 1 be a point, an origin

| v be one vertical line

┤ j be one sidebar line and one right vertical line

H k be one left vertical line, one sidebar line, and one right vertical line

Define a process in which the ∞ interrelates the equivalence relation aspect of the cross with a binary operation * interacting any two primary symbols in a left-right linear fashion. The ● acts as a unity and;

● * ● = ●

● * | = |

● * ┤ = ┤

● * H = H

-● * ● = -●

-● * | = - |

-● * ┤ = -┤

-● * H = - H

-● * -● = ●

| * | = -●

┤ * ┤ = - ●

H * H = - ●

| * ┤ = H The | combines with the ┤ before it crosses the boundary, hence there is no sign change.

┤ * H = | The ┤ crosses the boundary to combine with the H. This creates a sign change. It has to cross the boundary to interact with the H in a manner that creates a ┤ and not some other hybrid sign. Then the ┤ combines with the right vertical and cross bar of the H, cancelling them both and creating a second sign change. The two sign changes cancel each other and this leaves a |

H * | = ┤ The H crosses the boundary to combine with the | If it had not crossed the boundary and just combined with the | it would have created a ├ which would not have had the correct orientation to be a proper sign for this collection. So the H crosses the boundary to combine with the | and this creates a sign change. The left vertical of the H then interacts with the | and they cancel each other out, creating a second sign change and leaving a ┤

Thus since

┃ * ┫ = H and

H * H = - ●

then

┃ * ┫ * H = H * H = - ●

Which satisfies the quaternion requirement that v * j * k = - 1

The algebra that constitutes this procedure is exactly the algebra of the quaternion and this shows that a quaternion is isomorphically symmetrical to the symbolic formalism of the first Relational Symmetry. It is also important to note that if the

┫ sign is changed to ┣ the Relational Symmetry no longer behaves as a quaternion, because the last three equations have negative results and the criteria of v * j * k = -1 can no longer be met.

This is shown in a parallel presentation where the j sign is reversed. Thus if the

┫ sign is changed to ┣ then the following holds

● * ● = ●

● * ┃ = ┃

● * ┣ = ┣

● * H = H

-● * ● = -●

-● * ┃ = - ┃

-● * ┣ = - ┣

-● * H = - H

-● * -● = ●

| * | = -●

┣ * ┣ = -●

H * H = - ●

| * ┣ = - H The | crosses the ┣ which creates a sign change and then combines with it to yield a - H , no cancelation.

┣ * H = - | The ┣ combines with the H. Then the ┣ combines with the left vertical and cross bar of the H, cancelling them all and creating a sign change. This leaves a - |

H * | = - ┣ The H combines with the | and this results in the | combining with the right vertical of the H such that they both cancel and this creates a sign change, leaving a - ┣

Now

| * ├ = - H and since

H * H = - ● then

- H * H = + ● and so

| * ├ * H = - H * H = + ●

Thus v * j * k = +1 and the quaternion requirement of v * j * k = -1 is not met.

The Relational Symmetry Paradigm contains additional historical detail and references for the items mentioned above. This is a continually evolving document and the latest version is attached.

In the Relational Symmetry Paradigm Chapters 3 and 4 present detailed summaries and descriptions of the language Ododu. Chapter 5 shows how its structure can generate quaternions and the mathematics used in modern science. Chapter 7 describes the GMEP and the key role that art and aesthetics plays in how we use this in our everyday lives. Additional Chapters also show how this model can resolve many of our most critical current problems that the current reductionist paradigm hasn't been able to successfully resolve. These include the interrelated problems of Extreme Wealth Inequality, Autocratic Governance, and Climate Change. These relevant Chapters are:

Chapter 10. Informational Disease. Shows how linear thinking based on propositional logics in which all statements must be either true or false leads to misunderstandings and political and environmental problems.

Chapter 11. The Planetary Bookkeeper. Applies the Goldilocks Maximum Entropy Principle to show that extreme wealth inequality is not sustainable or conducive to our survival on this planet.

Chapter 9. Includes summaries for the TimberFish Technologies and the Bion Technologies. These are sustainable technologies that can mitigate and reverse Climate Change and environmental pollution. Over the last 50 plus years they were developed concurrently with the development of our consciousness thesis and that thinking has been incorporated into their design and implementation.

Finally, Ecological Intelligence will emerge from the integration of a working multi-trophic ecotechnology such as TimberFish with a form of automated semiosis that derives from the work of Charles Sanders Peirce on pragmatism and the theory of signs. It will comprise a system that can act like a telephone / telescope / microscope, and might allow us to communicate with at least some of the other intelligent conscious entities that comprise our universe. It will be a real life “Field of Dreams. If we build it, they will come.”