The Relational Symmetry Paradigm

Jere Northrop

Abstract

The Relational Symmetry Paradigm is a new way of thinking that is necessary if we are to solve the problems of climate change and extreme wealth inequality in a timely manner. The presumption is that the essence of reality is the concept of relation, and that the fundamental units of existence in the universe are conscious entities, just like you and I. There are only four fundamental types of relations, self relation, linear relation, relational relation, and interrelational relation. These can generate an approach to a hypothetical universal language that will comprise the mathematics required to unify general relativity and quantum mechanics within an extended maximum entropy principle, This will then generate new technologies to mitigate and reverse Climate Change, and a new political evolution that will make extreme wealth inequality obsolete.

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First published August 2021

This publication May 12, 2023

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Short Summary

As a tool the existing scientific paradigm is unquestionably the most impressive human achievement to date, but it does not seem to be able to solve our current existential problems of Climate Change and extreme wealth inequality. To rectify this we are proposing to expand the existing scientific paradigm's fundamental foundations by including consciousness, language, and creativity. The premise is that if we can think clearly enough, we can derive the basic structure of the universe from our own personal experience.

Begin with what we know best, and where we have the most direct experience, how you and I interact with each other through language. Where do we agree with each other. How can we abstract this into a symbolic structure that can be used to extend and evolve our existing natural and created languages to approach a Hypothetical Universal Language, a language that is symmetrically consistent and useful in terms of understanding electrons, galaxies, and each other.

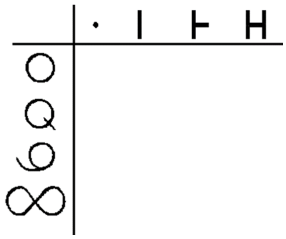
Start with the presumption that the essence of reality is best expressed with the concept of relation, and that the fundamental units of existence in the universe are conscious entities, just like you and I.

There are only four fundamental types of relations, self relation, linear relation, relational relation, and interrelational relation. We can symbolize these as;

Call this a Relational Symmetry. For example visualize this as point, line, surface, and volume, or time, distance, area, and space. The symbols themselves connote an interpretation of what the meaning might be for that symbol. Thus we see that they are symmetrical to a quaternion, a four component mathematical object that comprises a unity and three non commuting interactive relational entities.

But self relation can also be seen as making a distinction, a boundary, and this leads to a second form of Relational Symmetry which can be symbolized as;

These two Relational Symmetries, the first unbounded and the second bounded, are also symmetrical with each other and this relationship or combination can be symbolized as the Relational Symmetry Paradigm. It indicates various ways that the two Relational Symmetries could be interrelated.



In the following we will propose that these two relational symmetries represent males and females which comprise the fundamental units of conscious existence in the universe. Men and women have bodies that are comprised of organizations of other units of conscious existence in the universe. In physics men are symmetrical to electrons and women are symmetrical to protons. Their organizational bodies comprise mass, and the language that connects them is space – time.

We will show how the relational symmetries have been used to generate a language, Ododu, that is a reasonable approach to a Hypothetical Universal Language. The meaning of the signs and words in Ododu are derived from our own interactive experiences. This will include the activities of counting and measuring which have led to science, and so Ododu will include the number systems and division algebras for real, complex, quaternion, and octonion numbers with the following provisos. Infinities and infinitesimals will be excluded because they are pragmatically irrelevant. You also don't need absolute values, complex conjugation, time reversal, or antimatter to do physics. Time is not instantaneous in the now, is deterministic as memory in the past, and is probabilistic in the future.

Thus the Relational Symmetry Paradigm will present a roadmap as to how to unify general relativity and quantum mechanics within the framework of an expanded maximum entropy principle. We show how it has generated technologies that can mitigate and reverse Climate Change and how the application of these technologies has been slowed by the politics of extreme wealth inequality. In response to this we also show how extreme wealth inequality itself, and its derivatives of autocratic governance, racism, and sexism are antithetical to science, environmental sustainability, and our future survivability on this planet.

The Relational Symmetry Paradigm

Introduction

This proposal is a response to a number of problems that are facing us today. These stem from concerns that our rising human population may have already exceeded what our planet can sustainably support, and that this is driving derivative problems of Climate Change, global pandemics, and environmental pollution. While we have the scientific and technical knowledge to resolve these problems we are not implementing this knowledge because of a series of unresolved social problems.

This is not a call to make you aware of these problems, but rather to offer a possible solution to them. The rationale and context for the proposed solutions are described in the following two quotations.

Albert Einstein: A new type of thinking is essential if mankind is to survive and move toward higher levels.[1]

Buckminster Fuller: If you want to teach people a new way of thinking, don't bother trying to teach them. Instead, give them a tool, the use of which will lead to new ways of thinking[2].

As a tool the existing scientific paradigm is unquestionably the most impressive human achievement to date. It comprises a series of models that, taken together, provide us with an unprecedented ability to predict events in the world we live in, and construct technologies and machines that make our lives easier. However, these models are not always philosophically compatible or consistent with each other, and they do not adequately address the roots of our current problems.

For the last 53 years my primary focus has been on developing technologies to address global warming, environmental pollution, ecosystem preservation, and climate change, with these efforts culminating since 2008 in the TimberFish Technologies. However, the occurrence of CoVid and increasing respiratory issues resulted in an operational hiatus for the last three years. During this time I refocused on my parallel interests of philosophy and the foundations of science. During this effort I began to realize that our current environmental problems won't be solved by new technologies until we can resolve our political problems which are stemming from extreme wealth inequality.

This is what has led to the development of the Relational Symmetry Paradigm as a way of expanding and evolving science to deal with political issues by including consciousness, language, and creativity into its foundations. The process started by looking for patterns in recorded history and our own personal experiences that are consistent with science and mathematics. These patterns can be formulated as Relational Symmetries. When they are expressed symbolically they might provide the desired tool for a new way of thinking. However, to do this they will also have to fully explain the verified successes of modern science.

In the Relational Symmetry Paradigm a Relational Symmetry is defined as a one-three fourness symbolic formalism that is based on the assumption that understanding is relational, and that there are four fundamental types of relations; self relation, linear relation, relational relation, and interrelational relation.

Here are four signs that represent a Relational Symmetry.

Here are four additional signs that also represent a Relational Symmetry. They can be viewed as an evolution or reflection of the first four signs.

These eight signs are foundational presumptions and hence precede definition. Their meaning will evolve through example and use. An initial example as to how these map into our experience considers • | ⊢ H as representing a point, line, surface, and volume. Then O Q  ∞ maps into boundary, crossing a boundary, labelling or marking what you are doing (language), and then interrelating various things you have done in various ways.

We know that to be credible the Relational Symmetry Paradigm must show that the incorporation of consciousness and language into the foundations of science has to be consistent with all the experiential successes of physics, and that specifically means that this has to include both General Relativity and Quantum Mechanics, two models that are presently philosophically incompatible with each other. The argument here is that the • | ⊢ H formalism is symmetrical with the mathematical quaternion that is used extensively in quantum mechanics, and which is also compatible with a tensor formulation of general relativity. A potential

unification of Quantum Mechanics and General Relativity is proposed by casting space-time itself as a Relational Symmetry quaternion.

The Relational Symmetry Paradigm further assumes that thermodynamic entropy is identical to informational entropy so that the Maximum Entropy Principle is symmetrical in physical, chemical, and biological phenomena. Similarly, charge, spin, and mass – energy are viewed as symmetrical with sex, right and left handedness, and consciousness – language. The wave particle duality in physics is also viewed as being symmetrical to the mind body problem in philosophy, and both are isomorphic to and resolved by the primary Relational Symmetries shown above. In this way we see evidence for the new paradigm in our own personal experience, the natural world we live in, and the technologies that we have created. We don't have to understand the scientific complexities to effectively use these simple symbolic formalisms. Being aware of the symmetries and how they are manifested in our experiences is enough. It is easy and it works.

This document will describe the origin and evolution of the Relational Symmetries. It will show how they are manifested in straightforward principles that are simple and have been in our common knowledge for years. These include:

The Golden Rule; Do unto others as you would have others do unto you.

"We hold these truths to be self evident, that all people are created equal, that they are endowed by their Creator with certain inalienable Rights, that among these are Life, Liberty and the Pursuit of Happiness". This should also include a right to food, shelter, clothing, medical care, and education.

Ethical principles such as: Help others when possible and do no harm; All persons have intrinsic and unconditional worth; Tell the Truth; Justice is the fair, equitable, and appropriate distribution of resources.

All these resonate and are consistent with the Relational Symmetries.

In the following chapters these ideas will be presented in more detail. At present these are very preliminary draft documents, Some of them include a lot of work that has been done previously and which may contain what will turn out to be serious errors and misrepresentations. These will hopefully be corrected in the future as work continues. It is all being collected and published now to help support the continuance and reactivation of the TimberFish Technology through a resumption of operations at our existing facilities.

A brief summary of the following chapters is as follows:

Chapter 1. Origins. Looks at our personal experiences as to how they comprise archetypal elements. What is fundamental about how we wake up or start a routine, or how we engage in a conversation or dialogue.

Chapter 2. Relational Symmetries. What are some common observations that exhibit symmetries and how do they resemble a fundamental order that derives from Relational Systems Theory.

Chapter 3. The Ododu Language. Presents an approach to a hypothetical universal language that is constructed with Relational Symmetries.

Chapter 4. Derivation of Archetypal Meaning. Illustrates how the meaning of a symbolic linguistic element can be partially derived from its shape, sound, and linguistic context.

Chapter 5. Numbers and Mathematics. Shows how these emerge naturally from a language such as Ododu.

Chapter 6. The Relational Science Model. Incorporates consciousness, language, and creativity into the foundations of physics. Language is space – time, and thermodynamic entropy is identical to informational entropy. This provides a roadmap to unify general relativity and quantum mechanics. It also makes physics relevant as to how to change the politics that lead to extreme wealth inequality, and how this can impact how we can more effectively respond to climate change.

Chapter 7. Time and the Goldilocks Maximum Entropy Principle. Considers time as comprising now, past, and future and how this impacts a generalized decision procedure that is not explicitly mathematical but common to all of life.

Chapter 8. The Electron Proton Hypothesis. Posits that electrons and protons are conscious.

Chapter 9. Generated Technologies: These are sustainable technologies that have been developed concurrently with, and influenced by, the Relational Symmetry Paradigm.

a. TimberFish
b. Bion Technologies

Chapter 10. Informational Disease. Shows how linear thinking based on true or false propositional logics 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.

Notes and References.

This proposal will not try to change your beliefs or the way you think. That you have to do yourself. However, if you are concerned about the problems referenced above, and do not know what you can realistically do about resolving them, then you might want to consider the ideas presented here. These might be the tools that can indeed result in a new way of thinking.

Chapter 1.

Origins

The Relational Symmetry Paradigm has evolved over many years as a way to build an understanding of ourselves and the environment and universe that we inhabit. The goal is that this will be a tool that will help us effectively use both our own personal experience and the incredible wisdom and knowledge that has been accumulated by our global society over the course of human history. The sheer size and complexity of all this information makes it extremely difficult to categorize and learn so that it can be readily available for use in our everyday lives.

The Relational Symmetries comprise a structure and a process that may help us resolve this situation. First recognize that we are very complex entities and that we live in a very complex universe. So, to avoid making this tool also very complex, and hence difficult to understand and use effectively, choose a path of simplification and abstraction. Do this with the realization that while it will be an approximation of very complex phenomena it still could elucidate a few essential features that recur fractal-like throughout the perceived complexity we experience. This will make it easier to understand and use.

Begin with what we know best, and where we have the most direct experience – ourselves. This chapter will focus on this approach, with the further assumption that if these symbolic abstractions, the Relational Symmetries, are valid for me, that they will also be valid for you. Thus they will be invariant and unchanged for each of us. We will both agree that this is consistent with how we understand ourselves and our environment.

The process begins with what I call Startup. It occurs when I wake up, when I walk through a door to go into a room or to go outside of a building. It occurs when I change my focus of attention or start a conversation. To illustrate, consider what happens when I wake up.

I open my eyes or suddenly become aware that I am awake. Usually, it is familiar. I know where I am, that I am conscious, that I have a body, and that there is something outside of and beyond my body. I remember that this has occurred before, many times, in ways that are similar to what is happening now. I have many memories. I and my body have urges, need to move or go to the bathroom. I sense that there is still a lot of other things happening around me.

I also recognize that I have many routines and that I probably have already started doing one or more of these before I even thought of them. I may then realize that I have started to think, who am I, what do I need to do, is there something happening that I need to focus on right now.

All of this occurs in an ongoing moment, a now. It is not instantaneous. I recognize change. There is a connection to what just happened a few moments ago and what is likely to continue happening right now, and probably also in a near "future".

Some version of this occurs when I experience other instants of the Startup phenomenon, although they are usually more condensed than the wake up Startup.

I anticipate that you have similar experiences so let's consider what does, (or should?) occur when (or before) you and I have a conversation to find out if we agree on something. What is the context that surrounds this discussion that we might have with each other. What are the commonalities or symmetries that exist here, even when we normally aren't even aware of them.

Let's start by examining areas or subjects where we already do agree.

We both have a mind.

We both have a body.

We use language.

We live in a world that is external to our minds and bodies.

Expanding on this.

Our mind is a consciousness with;

Desires and needs.

It experiences emotions and feelings.

It remembers.

Our bodies have a physical structure that is made of matter;

Bodies can move, act.

They experience sensations, see things, hear things, touch and taste and smell things.

They also can make things, create things. change things.

We communicate and think with words that are part of a language.

The language comprises signs which may be represented by symbols or sounds.

The signs have definitions, how they are described relative to other signs.

They may be associated with images.

They can be combined to form and represent ideas.

Finally we exist and live within an external reality, something outside of our bodies, an environment, a world, a universe.

There are other things, outside of ourselves in this world.

Things can interact with other things, experience forces, move.

Things have characteristic properties, shapes, colors, size, textures.

They are all connected. They are connected to us.

The Relational Symmetry Paradigm is generated from universal relational symmetries that are extractable from the archetypal concepts that are presented above. These relational symmetries can be abstracted into simple tools, symbolic formalisms that will allow us to see comparable symmetries in all aspects of the universe, including those that are expressed in the existing operational paradigms of science, religion, and politics.

Because this new paradigm is used with and described by language, we can organize it in terms of the structure of language itself, that is, in terms of words that are nouns, verbs, modifiers, and relationals (words that are connectives, articles, prepositions, etc.). Here is a diagram that illustrates how the shared agreements and beliefs previously described, can be grouped and presented to illustrate the symmetries that constitute this new way of thinking.

	Noun	Verb	Modifier	Relational
Mind	Consciousness	Desire	Emotion	Memory
Matter	Body	Action	Sensation	Creation
Word	Symbol	Definition	Image	Idea
World	Thing	Interaction	Property	Connection

Generally I do not expect that there were any disagreements with this, with the possible exception of the last idea of connection. Connectivity may be understood in different ways. In one view we are all composed of matter, which is not conscious, but which does interact with, and hence is connected to, all of the other matter in the universe. This may occur via gravitational and electromagnetic forces. In another view we as conscious entities are connected to a superior consciousness, a God, which in turn is connected to all of the rest of the universe. In a third view we as conscious entities are connected to our immediate environment and to all the other conscious entities who have currently and historically communicated with us. In all of these views we are connected, but in different ways

The tool-like nature of the Relational Symmetry Paradigm is primarily designed to be a very simple way to help us think and understand. Once it becomes familiar it should provide a platform and protocol for the understanding and derivation of the models that are currently used in science, religion, and politics. By unifying the paradigms underlying these models this new way of thinking may provide insights that will enable us to resolve the major problems identified at the beginning of this document.

Chapter 2.

Relational Symmetries

Here is a description of how the Relational Symmetries comprise a very simple but sophisticated procedure that can make thinking and communicating easier. It is based on the assumption that understanding is relational, and that there are four fundamental types of relations; self relation, linear relation, relational relation, and interrelational relation. These reflect an archetypal fractal symmetry underlying both our own consciousness and the universe itself.

This symmetry comprises a one-three fourness structure and we can recognize it in many phenomena we normally think of as having four dimensions or characteristics. They include:

The view of the universe according to early Greek philosophers as comprising earth, fire, water, and air. Earth as a solid and the fluids (fire, water, and air).

Our normal view of space-time as comprising time measured with clocks, and space measured with rulers, (length, width, and height).

Color: white and three primary colors, (red, yellow, and blue). These can be reflected as black with (orange, green, and purple).

Music: The key of C, the white keys on a piano, can be represented as a combination of two four note chords with a key note followed by three resonating additional notes, C major seventh (C, E, G, and B), and D minor seventh (D, F, A, and C).

Grammar: the parts of speech are nouns which are connected with; verbs, modifiers, and relational words.

There are four types of numbers. The counting numbers (integers) that are then used to form fractions (rational numbers), transcendental or exponential numbers (real numbers), and numbers incorporating the square root of minus one (complex numbers).

The four forces of physics; where gravitation joins the electromagnetic, weak nuclear, and strong nuclear interactions to explain motion.

Chemistry where the photon as an energy packet with a wave particle duality interacts with three subatomic particles, the electron, proton, and neutron.

The scientific method where a hypothesis is formed, tested by experiment, the results are analyzed, and either a new modified hypothesis is then formed or the results are recorded as part of the evidence supporting the original hypothesis.

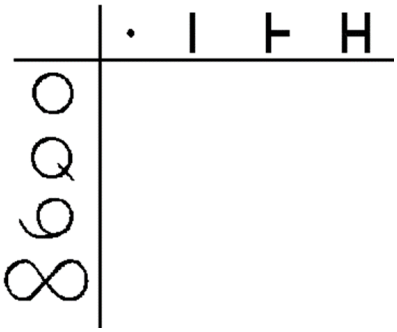
This is like a rational thinker using deductive, inductive, and abductive processes to understand a subject.

From these examples of phenomena with a one-three fourness structure we can construct specific symbolic formalisms which define the concept of Relational Symmetry. These formalisms are themselves examples of the Relational Symmetry structure that they represent.

Here are four signs that represent the initial symbolic formalism of a symmetrical relational structure.

These are reflected to generate a second symmetrical relational structure.

Finally these are combined to form the Relational Symmetry Paradigm.

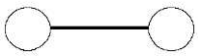


To develop an understanding of how to use the Relational Symmetries we start by considering these signs as undefined presumptions. We will build meaning for them through illustration and their use.

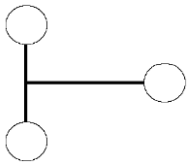
The first example of how to assign meaning to the Relational Symmetry formalisms comes from Relational Systems Theory, which was developed by Jon Ray Hamann in the late 1960s and early 1970s.[3] Let circles represent systems and lines represent relations. Then

- Self relation is a system related to itself,

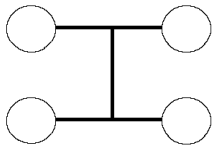
| Linear relation is a relation between two systems



⊢ Relational relation is a relation between a system and relation relating other systems to each other



H Inter-relational relation is a relation interrelating other relations between systems



Looking at just the relations in the Relational Systems formalism shows that they are isomorphic with the primary Relational Symmetry of ● | ⊢ H. The initial and primary meanings which can then be assigned to the first four initial signs are;

- self relation

| linear relation

⊢ relational relation

H interrelational relation

This becomes the first Relational Symmetry. It is crucial to understand that these are each independent concepts. Thus a linear relation is an entity in and of itself, and is not a line comprised of an indeterminable number of points. Similarly a

relational relation cannot be fully described as a combination of linear relations but must be viewed more as a surface, a fundamentally different concept. We can symbolically represent this concept with a diagram that comprises two lines that connect, or an indeterminant number of lines, but these are only illustrations.

A similar argument also applies to the interrelational relation. This represents a concept symmetrical to a space or volume which can be illustrated by three lines. However, it is an independent concept and not one that is composed of three or an indefinite number of lines or surfaces.

Presenting the self relational concept as a system also presents the opportunity and necessity for additional levels of symmetry. This requires that we make a distinction or boundary to specify what is part of a system and what is not. The boundary defines the self relational nature of the system, what distinguishes the system from the rest of the universe. This then generates the second level of relational symmetries that are in a one to one correspondence with the first level. Call these symbols the second relational symmetry. Symbols used to represent this second level symmetry are;

In the secondary Relational Symmetry the first symbol is represented as a distinction, a recognition that something is different from something else. The next symbol shows that things that are distinct from each other can also be related to each other by crossing a boundary. The third symbol shows that other boundaries or distinctions can be created, expressed symbolically, and related to the original distinguished things so that we call tell them apart. The last symbol shows that further relations can be made between previously distinguished things by creating additional relations between their symbolically distinguished symbols.

These examples of meaning are;

O Distinction, a boundary representing self relation as more than just a point. It specifies something that is distinct from the rest of the universe, an origin, a particle, a consciousness

Q Given the boundary the linear relation provides a crossing of the boundary. How something can go from one side to the other.

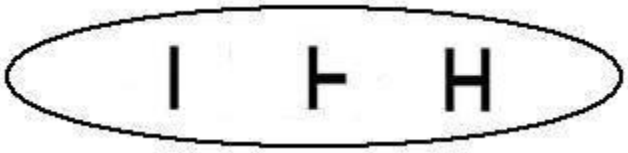
Once a boundary is crossed a mark or sign is needed to identify which side is which, inside or outside, left side or right side. This mark can be free or attached to designate a position. Two examples of inside are illustrated below.

Finally there is a need for a way to interconnect all of these symbolic constructs and their conjoined meanings with each other.

∞ Interrelation, integration, connections, combination.

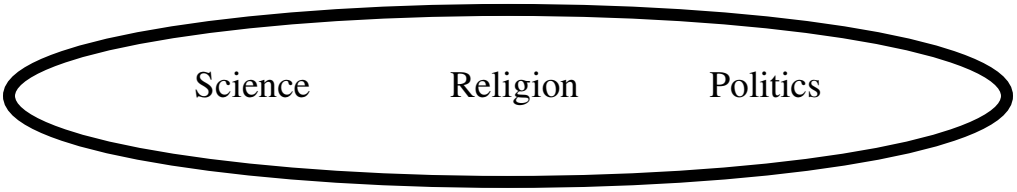
The interpretation of self relation as both a point and a boundary introduces additional symbolic formalisms that encompass how the Relational Symmetries themselves can be combined into units that represent the concepts of particles and organizations, both from a structural and a process perspective.

When the initial self relational sign, a point, is reflected as a circle, a boundary, it can be expanded to include the other initial three signs in the one-three fourness symmetry.

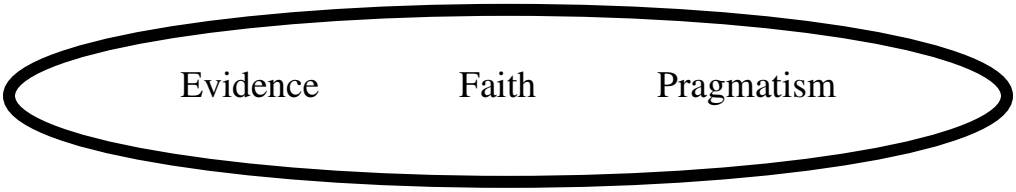


This generates a concept of particle or organization and this can be applied to our own beliefs and how they can be implemented in categorical, procedural, or governmental forms. For example, consider these symmetrical interpretations;

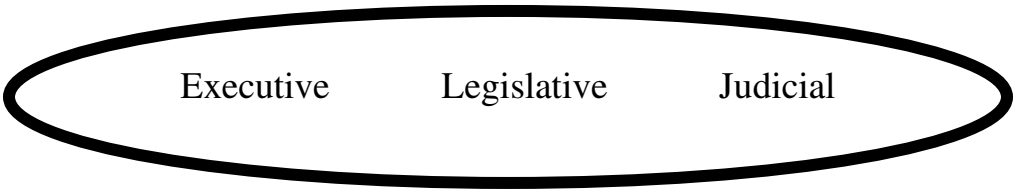
Our basic beliefs.



The methodologies we use for each of them.



How they have been institutionalized in the three branches of the US government



All these descriptions show how the Relational Symmetries comprise a very simple but sophisticated procedure that can make thinking and communicating easier. They are based on the assumption that understanding is relational, and that consideration of all four fundamental types of relations; self relation, linear relation, relational relation, and interrelational relation, are necessary to gain a full understanding of anything. This reflects an archetypal fractal symmetry that is a recurring pattern that underlies both our own consciousness and the universe itself.

As we proceed in generalizing the Relational Symmetry Paradigm, the process we will use will utilize the first Relational Symmetry, as follows.

Pick a subject. Look at it from the perspective of how it is comprised by and of the four fundamental types of relations.

What is the concept.

How is it manifested in our experience, expressed in what we do, performed in our movements and actions.

Create a description of this concept and what we are doing with it. This will usually involve writing but may include any form of symbolic expression such as

sculpture, music, poetry, drawing, painting, dance, theater, or other forms of personal or artistic expression.

Finally evaluate what we have done, how does this compare with other subjects and our engagement with them from this relational perspective. How does this become knitted into our very being, a part of who we are.

This process itself is an example of the first relational symmetry.

- Our subject. What is the concept.

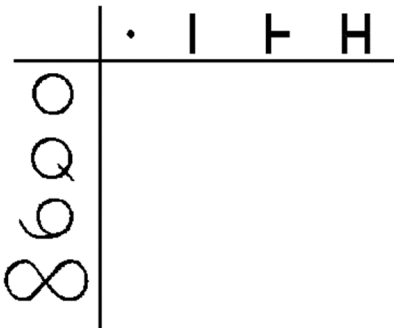
| How is this concept manifested in our experience

⊢ How can we describe this concept.

H Compare this concept, experience and description with other examples. What are the similarities and differences. What does this mean.

As we repeat this process these signs and the concepts they represent will be reflected, extended, and combined in many different ways. Eventually they will become helpful in understanding the complexities of our lives and the universe within which we live.

The Relational Paradigm itself is fractal-like in that the relational symmetries repeat in every aspect or element of ourselves as well as the universe. Thus it comprises multiple levels of representation. The most critical of these is how they coalesce into the new paradigm. This is most concisely represented as;



To illustrate how this is used look back at what we agreed upon in Chapter 1. We agreed that we have a Mind which resides in a Body that uses Language and exists in an external World.

The mind is a Consciousness that has Desires, Emotions, and Memories.

It is contained in a physical Body that can Act, Sense, and Create.

We use language comprising Signs, with Definitions, Images, and Concepts.

All this takes place in an external world made of Things experiencing Forces and having Properties, all of which are Connected.

All of this was represented in the diagram;

	Noun	Verb	Modifier	Relational
Mind	Consciousness	Desire	Emotion	Memory
Matter	Body	Action	Sensation	Creation
Word	Symbol	Definition	Image	Idea
World	Thing	Interaction	Property	Connection

As we consider these and other examples of our experience we will recognize a fractal like symmetry in virtually everything we encounter or experience. Large or small, connected or disparate, the patterns are the same. Eventually we will be able to develop a simple and easy to use familiarity with this fractal symmetry of the universe. With practice this will become almost instinctive, literally integrated into our very being. When this happens things will get more fun, more productive and satisfying. You will start to look at things from a new perspective.

Chapter 3.

The Ododu Language

1969. While I was doing a post doc at the University of California at Davis, I recognized that science, as wonderful and fun as it was, was not going to be able to answer the fundamental questions I was asking about my life. So I dropped out. It was the end of the 60s. It was what we did. I went to New York City and moved in with Lynn, the artist. We have been together ever since.

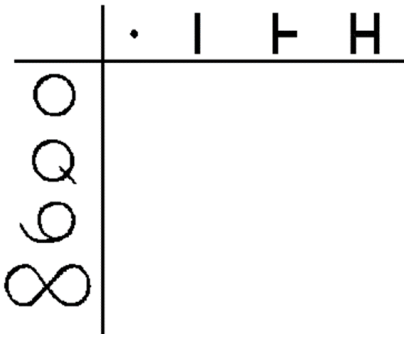
In the summer of 1970, while we were living in a one room cabin close to Algonquin Park in Ontario, I had an epiphany. I realized that language was missing from the foundations of physics and that this might be what I was looking for.

At the end of 1971 we moved to Western New York State. Lynn started working at Fischer Price Toys as a product designer. I started working with Jon Ray Hamann at the Center for Theoretical Biology at the State University of New York at Buffalo. There I learned about Relational Systems Theory and the Maximum Entropy Principle. In the early 1980s, while working as a process superintendent at a large advanced municipal wastewater treatment plant, I started designing languages. In 1989 my brother and I founded Bion Technologies Inc.

By 2002, after some 14 preliminary language versions, I settled on Ododu as the constructed language I would use as the tool for the new way of thinking. It comprised the structure that was presented earlier for the Relational Symmetry Paradigm (RSP), and actually was a model from which the RSP evolved.

In Ododu the four primary Relational Symmetries of  were defined as the vowels U, I, E, and A. The next four Relational Symmetries of

 were defined as the vowels O, Q, Y, and H. All of these were then combined in the Relational Symmetry diagram of



as

	U	I	E	A
O	D	P	R	B
Q	C	L	T	K
Y	S	G	F	X
H	N	M	W	Z

The consonants, D, P, R, B, C, L, T, K, S, G, F, X, N, M, W, and Z, were assigned to represents the fundamental, and now considered as archetypal, concepts presented in the earlier diagram. As shown below.

	U	I	E	A
O	Consciousness	Desire	Emotion	Memory
Q	Body	Action	Sensation	Creation
Y	Symbol	Definition	Image	Idea
H	Thing	Interaction	Property	Connection

We now define an alphabet comprising;

U, I, E, A, O, Q, Y, H, D, P, R, B, C, L, T, K, S, G, F, X, N, M, W, and Z.

Which can be organized as;

	U	I	E	A
O	D	P	R	B
Q	C	L	T	K
Y	S	G	F	X
H	N	M	W	Z

The completed alphabet, an illustration as to what each letter might mean when it is used in word construction, and a guide to pronunciation, are presented below.

Letter	Meaning	Pronunciation
U	Self Relation	long u
I	Linear Relation	long I
E	Relational Relation	long E
A	Interrelational Relation	long A
O	Distinction, Boundary	long O
Q	Cross	aw, awe
Y	Mark	eh, heh
H	Interaction, Operation	ah, hah
D	Consciousness	du, as in do
P	Will, want	pu
R	Emotion	ru
B	Memory, belief,	bu
C	Body	chu
L	Action	lu
T	Sensation	tu
K	Creation	ku

S	Symbol	su, sue
G	Meaning	gu
F	Picture	fu
X	Thought, idea	shu
N	Thing	nu
M	Interaction	mu
W	Characteristic	wu
Z	Connection, covariance	zu, as in zoo

Given the preceding derived and defined alphabet, a procedure has been developed to use the alphabet to construct words. This procedure is based on the fact that the vowels have been constructed as primarily relational concepts whereas the consonants have been constructed as universal archetypal concepts representing our experience with the universe. The vowels will be used to begin and end each word and these beginning and ending vowels will specify a grammar. Thus the grammar will consist of 64 uniquely determined pairs of the eight vowels of Ododu as follows.

UU	UI	UE	UA	UO	UQ	UY	UH
IU	II	IE	IA	IO	IQ	IY	IH
EU	EI	EE	EA	EO	EQ	EY	EH
AU	AI	AE	AA	AO	AQ	AY	AH
OU	OI	OE	OA	OO	OQ	OY	OH
QU	QI	QE	QA	QO	QQ	QY	QH
YU	YI	YE	YA	YO	YQ	YY	YH
HU	HI	HE	HA	HO	HQ	HY	HH

These 64 two vowel pairs will form the grammatical words of Ododu. We can represent these 64 words with the symbol VV where each V stands for any one of the eight vowels. In the first sections of the dictionaries words will be constructed by placing a consonant between the two vowels of the grammatical words. This can be represented as VJV where the two Vs stand for vowels and the J can be any one of the 16 consonants. The first vowel will determine the part of speech, noun, verb, modifier, etc. of the word. The last vowel determines how the word is used in a sentence. The meaning of the word is determined by the interior consonant, J, which is defined as the core of the word. In the future additional cores will be constructed by alternating consonants and vowels so that cores with only one letter will represent the most general concepts while cores with increasing numbers of letters will represent increasingly specific and detailed concepts. This process can be codified with a number of general rules as follows:

All words begin and end with vowels.

All consonants are preceded and followed by vowels.

The lead vowel in a word specifies the part of speech that the word is.

The middle consonants and vowels indicate the meaning or idea of the word. This is defined as the core of the word. The meaning of the core is derived from the meaning of its core consonants and vowels.

The last vowel specifies how the word is to be used in a dialogue or communication.

The first vowel followed by a consonant classifies the word as follows:

U noun

I active verb

E modifier, adjective or adverb

A relational; pronoun, connective, preposition, etc.

O noun representing idea or form

Q progressive verb, form ending in ing

Y number, name

H mathematical, interrelational

The last vowel indicates how the word is used in a sentence. All of this is described in detail at ODODU - Ododu Home

Key to the structure and evolution of Ododu is a Derivation of Archetypal Meaning. This is an expansion of the Relational Symmetry Diagram that shows how each symbolic structure that is represented by a letter is also represented by, and in some sense derived from, a symbolic form. The following chapter presents an edited version of the Derivation of Archetypal Meaning taken from its initial presentation in Ododu.

Chapter 4.

The Derivation of Archetypal Meaning in Ododu

The derivation of archetypal meaning in Ododu is based on the assumption that there are foundational morphemes and graphemes that cannot be converted or mapped into any other morphemes or graphemes. In terms of the graphemes this can be described by considering them as being topologically invariant. They cannot be changed into each other by any homeomorphism or process that establishes a relationship or mapping of the essential characteristics of one grapheme into another.

In ODODU each letter is assigned a fundamental archetypal meaning that comprises a foundational morpheme and this morpheme is then linked to a unique, and also foundational, grapheme. The contention is that this meaning, the morpheme, can be derived or deduced from the symbolic form of the grapheme. Thus the grapheme illustrates and exemplifies the meaning of the morpheme, and how that meaning might have evolved from the relational nature of the universe.

It is further assumed that these morphemes and graphemes can be ordered. There are some that are more primary, more foundational and elemental, than others. By establishing an order of these graphemes and their corresponding morphemes we can identify a first and most primitive grapheme, and then a series of following graphemes that are sequentially ordered with respect to the first grapheme and all previous graphemes in the sequence.

In Ododu there are four primary linked morpheme grapheme pairs, and four secondary morpheme grapheme pairs that are considered to be such primitives and they are represented by the eight vowels, U, I, E, A, O, Q, Y, and H. This assignment of vowels serves to identify a unique phoneme for each of the eight primary morpheme grapheme pairs.

The graphemes and morphemes for the 16 consonants are constructed in terms of the vowels and so their structure and meaning is related to that of the vowels. Since the consonants are also ordered they are constructed so that the morphemes and graphemes for each letter are related to the morphemes and graphemes of all the

preceding letters. This comprises a form of topological morphogenesis that can apply to the construction of meaning in language. Consequently the process of saying or writing the alphabet mimics a morphogenetic process wherein each stage or letter evolves from the immediately preceding letter.

The view that there are elemental language morphemes, graphemes, and phonemes is similar to that proposed by W. John Weilgart in his constructed language, aUI, the Language of Space (link). He presented a language with letters that comprised elements of meaning that he believed represented the most basic and universal categories found in all languages. He viewed these as being the ultimate linguistic semantic primitives, and thought that they could form the "periodic table" of the semantic elements of all human thought and expression. He also gave each morpheme a simple ideographic symbol.

However, he did not describe a protocol or procedure for choosing what the meanings were, why they were assigned to their specific ideographic symbol, and how they could be ordered. Consequently his definitions seem to be somewhat arbitrary and do not explain how and why the letters relate to the specific graphemes and phonemes that were chosen to represent them.

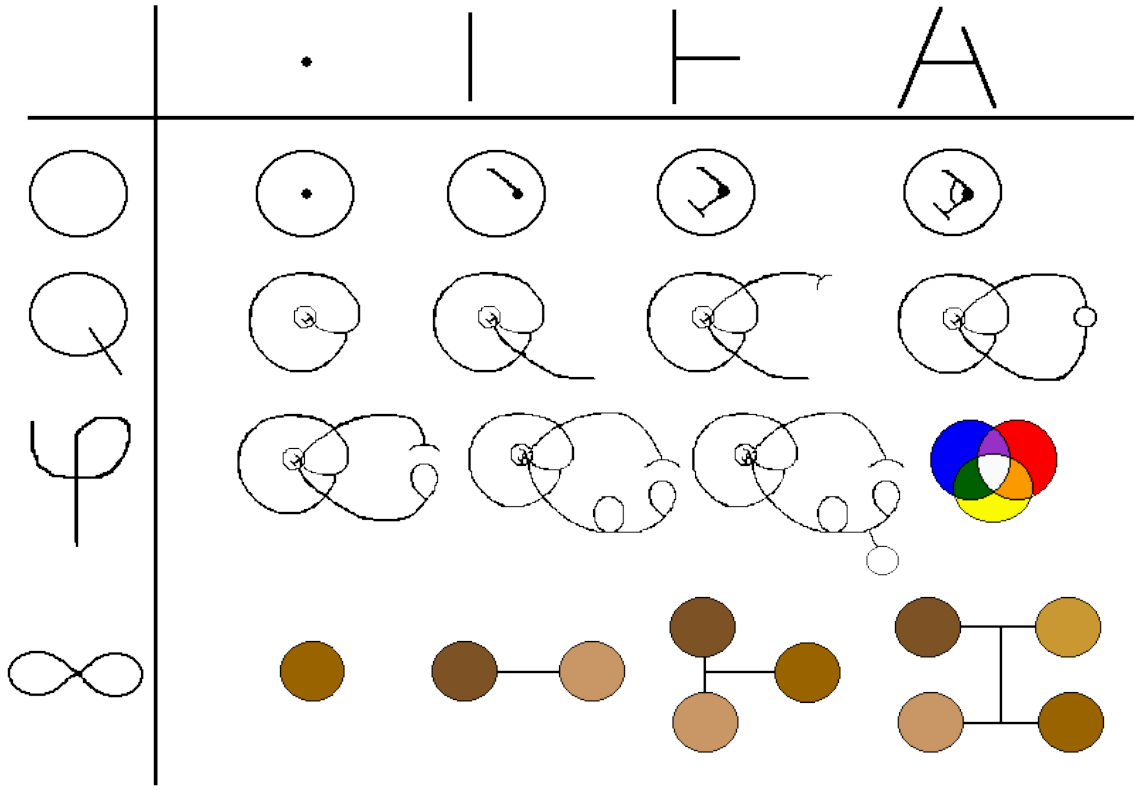
Ododu provides a rationale for the construction of these universal linguistic elements, and for the unique nature of each constituent grapheme and associated morpheme and phoneme. The construction also presents a natural ordering of these concepts and why the derivational process is sequential. This follows because we all live and exist in time, and that everything we do is ordered or sequenced by time.

Before beginning the derivation the ODODU alphabet we start with this diagrammatic presentation that illustrates the vowel and consonant relationships described above.

	U	I	E	A
O	D	P	R	B
Q	C	L	T	K
Y	S	G	F	X
H	N	M	W	Z

This shows that Ododu does not have a strictly linear alphabet. However, it can still be expressed in a linear fashion as; U, I, E, A, O, Q, Y, H, D, P, R, B, C, L, T, K, S, G, F, X, N, M, W, and Z. This follows from the morphogenetic character of the development process.

Graphemes that illustrate the letters of this alphabet can be presented pictorially as;



This representation of the alphabet simply replaces the letters with graphemes or pictographs. We have assumed that each letter represents a fundamental archetypal meaning that can be derived from a symbolic form. Such forms illustrate the individual meanings and how they might have evolved from the relational nature of the universe. The pictographic alphabet presented above is one such interpretation. Each of the 24 single letters is represented by a grapheme that is non homeomorphic or topologically invariant with respect to any other foundational grapheme. None of these foundational graphemes can be converted into any of the other foundational graphemes by manipulation of its shape or size. You will also notice that all eight of the actual vowel letters themselves have a resemblance to the graphemes they represent.

The following discussion expands on this construction and provides a derivational argument for the assignment of meaning to each letter of the alphabet.

The derivation of ODODU begins by using the four fundamental types of relation, self relation, linear relation, relational relation, and interrelational relation (see Relational Systems), as the first four letter/concepts in ODODU. The assumption is that these are the most fundamental morphemes and they represent, among other very general interpretations, the four dimensions of space and time as historically viewed by physics. They are assigned to the letters U, I, E, and A, and are designated as Primary Vowels. They are also pronounced as the long form of each vowel based on the hypothesis that the long form of a vowel is one of the most basic sounds we as humans can make. The graphemes associated with these four relational morphemes are also assumed to be the most fundamental archetypal forms that can be graphically produced, and consequently they actually represent the fundamental four dimensional space-time structure and form of the universe itself.

The four Secondary Vowels arise when a distinction is made in the four dimensional space time that separates each of us from the rest of the universe. This distinction or boundary allows for the generation of an additional series of fundamental morphemes and corresponding graphemes, that serve as reflections of the Primary Vowels. These reflections are represented by the letters O, Q, Y, and H.

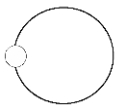
The foundational morphemes and graphemes that comprise the eight vowels are considered as preceding definition so they will be described and exemplified rather

than defined. Then the additional morphemes and graphemes that comprise the consonants can be defined in terms of them.

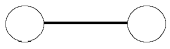
The rationale that is used in this presentation is derived from the work that Jon Ray Hamann has done with Relationalism and Relational Systems Theory (links). Relationalism postulates that there are only four possible types of relations and these constitute four Relational Orders. These comprise the concepts of Self Relation, Linear Relation, Relational Relation, and Intrerrelational Relation. Relational Systems Theory exemplifies these relational orders by describing everything in terms of Systems of arbitrary natures, and the possible relations that can be defined relative to such systems.

Relational Systems can be represented by using circles as systems and lines as relations as follows.

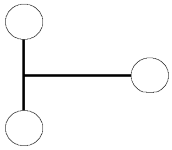
Self Relation: a system related to itself



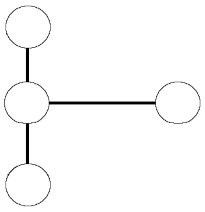
Linear Relation: a relation between or connecting two systems



Relational Relation: a relation relating a system with a relation

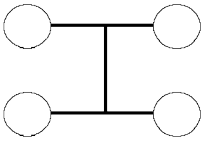


Note that the preceding grapheme is NOT the same as



In this diagram all relations are between systems and not between systems and relations. This illustrates the critical difference that Relationalism and Relational Systems Theory have when compared to the linear formalisms that only consider relations as occurring between systems.

Interrelational Relation: a relation interrelating two other relations



By eliminating the system from these pictographic descriptions we can arrive at a more foundational representation of the four Relational Orders as follows:

Self Relation:

•

Linear Relation:

|

Relational Relation:

Interrelational Relation:

The initiating presumption in the development of Ododu is that the last four graphemes that were used to illustrate the four types of relation or the four Relational Orders are in fact the most foundational and primitive graphemes that we can create. These four graphemes represent the four foundational morphemes that comprise the Primary Vowels and are the most fundamental explanation as to what these four initial morphemes mean.

The following exemplifies and describes these concepts in more detail.

The Zero Order Relation. Self Relation.

•

This is the first grapheme. It represents and illustrates the morpheme of self relation. It is the origin, a beginning, the first symbol. It is what results when we first touch a pen or pencil to a sheet of paper. No matter what we are going to write or draw, it starts with a point on a sheet of paper.

It is conceived in terms of a relation that is related to itself. In its simplest form its natural symbolic representation is a dot or a point. We represent this concept in ODODU with a capital letter U. Here a period would be a better choice than a U but the period on a modern keyboard is often hard to see and does not look like a letter. In fact a period is not usually considered to be a letter. So U is used as a substitute and this carries an additional benefit because U is a vowel with a long form pronunciation (phoneme). Because it is desirable, and perhaps essential, to use letters from the Roman Alphabet to represent the Ododu graphemes and morphemes there were some arbitrary assignments that had to be made. Since most of the other vowels have upper case letters that are arguably close to their assigned graphemes U became the leftover choice for a vowel representing a point. Also U did not obviously fit any of the other categories, and could be related to the U in Universe.

So U becomes self relation, the start of ourselves and the universe. It can also be viewed as a point in or of the universe, a perspective from which to view the rest of the universe. It possesses only location, no width no length, no height, no mass. It is just a point, but most importantly, a point in time.

The First Order Relation. Linear Relation

This is the concept of linear relation as represented by the letter I. It represents a line, but a line that is not comprised of points. It is a pure line, an entity all by itself. It can be conceived as a relation whose relating is undefined, it is unbounded, infinite in extent. It is the simplest grapheme we can draw after a point.

It does not inherently have to relate something to something else, although it can be used in combination with one or more points to illustrate a line segment. Its natural symbolic representation in Ododu is just a line. Usually we will consider it to be a straight line but this interpretation requires a context such as a plane or a volume to have any meaning. A line can also serve as a distance between two points.

The Second Order Relation. Relational Relation

This is the concept of Relational Relation. It is represented by the letter E and can be viewed as a relation related to another relation. Its natural symbolic representation in Ododu is a line, one end of which terminates somewhere in the middle of another line. The concept itself looks like the middle horizontal line ending at the vertical line in the letter E.

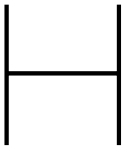
From a geometrical perspective E could be viewed as defining a surface or a plane,

and it is this conceptualization that qualifies it as the third most primary and fundamental morpheme and grapheme. The concept is that when a relation connects with another relation the result is not just two intersecting lines but a surface upon which we could draw many lines. The surface is not made up of points or lines itself, but it provides a form wherein lines and points can be located and described. It is a fundamentally different entity than a collection of points or lines. It is primary and not divisible into points or lines. We can draw lines on a surface, or locate points on a surface, but that does not explain the essence of a surface. It does not allow us to draw a surface on a point or a line.

This is the concept of a second order relation and why its grapheme is so different from viewing a surface as comprising an infinite number of lines.

The Third Order Relation. Interrelational Relation.

This is the last of the primary vowels and it represents the third order interrelational relation. This is often illustrated relationally as;



In Ododu this will be represented by the letter A.

This is the concept of an Interrelational Relation and it can be viewed as a relation connecting or relating other relations. Its natural symbolic representation is a line which connects two other lines, somewhere other than at their ends. It looks like the letter H or the letter A where the cross bar is the defining relation. The two lines

which the interrelational relation connects may or may not themselves intersect. In Ododu we choose the letter A because it can then naturally be represented with a long vowel sound or phoneme, a long A sound. H will be used as a reflection of A and will be the last Secondary Vowel. It will be pronounced with a short ah or hah phoneme.

A will be identified with the concepts of volume or space. As was the case for the E this will represent a fundamentally different concept than that of a point, a line, or a surface. It can provide a form for the expression of these prior concepts but they cannot provide a form for the expression of a space. Thus the pictograph above could represent a three dimensional Cartesian coordinate system comprising three mutually perpendicular coordinate axes. In this sense an A represents the concept of a three dimensional volume or space, but this has to be understood as a structure that also exists in time.

The Primary Vowels of U, I, E and A are the four fundamental Relational Orders and they provide for an interpretation of the framework of the universe that is consistent with the concepts of space and time as they are used in physics and in our everyday life. The simple graphemes that have been chosen for these morphemes are in this sense the most primitive and essential graphemes that we can draw. It is within this framework, and the drawings and pictorial representations of this framework, that all other graphemes and their corresponding morphemes will be constructed and represented.

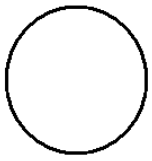
In later sections it will be argued that the pictorial nature of the four Primary Vowel graphemes is also representative of a quaternion as it is defined and used in mathematics. This stems from the one three nature of the graphemes; a form comprising a point, and three forms that are diagrammatically symbolized with one, two and three lines respectively. See the number and math section.

The next four Secondary Vowel letter/concepts are the vowels O, Q, Y, and H. The generation and representation of the graphemes and morphemes of these four vowels is very similar to the presentation of G. Spencer Brown in Laws of Form (1969). Laws of Form starts with the concept of a distinction which is drawn as a boundary with separate sides (boundary). The boundary can be crossed (cross) and the cross can be marked (mark) to differentiate the two sides of the boundary. These concepts are described in terms of expressions, and indications of equivalent expressions are

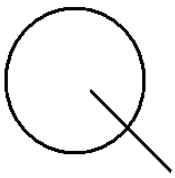
defined as equations (interactions).

These four concepts are very similar to the next series of primordial morpheme – grapheme pairs that constitute the Secondary Vowels of Ododu. G. Spencer Brown was unaware of Relationalism and Relational Systems Theory when he published Laws of Form and he did not have a sense of the need for the four Relational Orders to comprise a framework (space – time) within which the boundaries, crosses, marks and equations could take place. While he understood the elemental nature of the forms he created his presentation generated significant confusion because of the lack of a foundational framework for their comprehension. Despite this, his four forms represent accurate expressions of the Secondary Vowels of Ododu.

These are presented as follows;



The concept O is the concept of distinction. It can be viewed as a form of self relation in that it is the simplest from that can be constructed in the Primary Vowel space time framework. In this sense the O is an accurate representation of the concept itself in that we can picture it as a circle. However, since it now exists within the context of the Primary Vowels it also can be viewed as a closed surface or sphere in three dimensional space. Consequently O represents a boundary, a separation of two different things or places, an inside and an outside.



Q can now be seen as a cross. A line or relation which crosses the distinction or boundary. This could be an interaction between the inside and the outside, or an interaction between something inside with something else outside. It could be only a relation or relationship between two such things or places. It also could be a movement or transferal from one side to the other.

Once a boundary or a distinction is established it may not be obvious as to how to tell one side of the boundary from the other side, and so Y, the next letter concept, establishes the ability to mark or represent one or both of the distinguished things or spaces. The concept is one of tagging or labeling, marking something so that it can be distinguished from other things. Tag in comics

The final vowel, H, now represents the possible ways of interrelating all of the preceding concepts. It includes relating different bounded spaces or their crosses, marked states, or contents and provides for a view of a totally connected and interrelated universe.

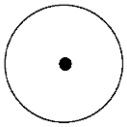
Once the Primary and Secondary Vowel groups have been constructed they are used to generate the consonants. This procedure comprises interrelating each one of the Primary Vowels with each of the Secondary Vowels. This process will be different than the pure non interactive association that characterizes the creation of the grammar. It will entail an actual interaction between each of the two vowels that comprise a Primary - Secondary Vowel pair. The nature of this interaction will be undefined here but in subsequent sections it will serve as a paradigm and a source for the essence and behavior of quaternions in mathematics and the principle of relativity as it applies to coordinate transformations in the four dimensional space – time of physics. Thus it will involve a description of how each Primary Vowel changes with respect to the changes in each Secondary Vowel relative to each specific interaction.

In the formation of the consonants this will result in a serially subsumptive procedure that closely resembles the beginning of morphogenesis in a fertilized egg in biology. As each consonant is formed it will be arranged in a series such that each consonant contains all of the graphemes of the prior consonants in the series. The morphemes that correspond to these graphemes will provide a relational basis for the construction of reality in a conscious entity. It applies to our own personal history as we grow from a baby into an adult, and, on a simpler scale, it mirrors the process that we subconsciously repeat each day when we wake up from sleep.

The following presents and describes the pictographic derivation of the consonants.

UDU

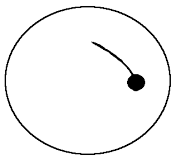
This is the concept of consciousness and it is represented by the pictograph;



Here a point, U, is contained within a boundary or distinction, O. Since our primary assumption is that the universe is comprised of conscious entities and their communicating languages this will represent a conscious entity, like you or I. This entity exists and it is distinguished from everything else in the universe. Thus UDU is consciousness, the fundamental particularized unit of existence in the universe. Each UDU represents a unique component and perspective of the universe and the universe itself is composed of such bounded conscious entities.

UPU

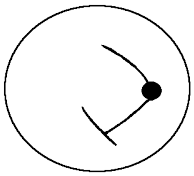
This is the concept of desire, need, and it is represented by the pictograph;



In UPU a conscious entity UDU experiences the most primal urge. It wants. It hungers. It desires. This is a driving force which acts on the UDU. It is represented as a linear relation. It bears directly on the consciousness.

URU

This is the concept of emotion, feeling, and it is represented by the pictograph;

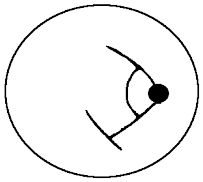


The presence of desire in the conscious entity generates an emotional response, a

feeling. The feeling is related to the desire. Hence the defining characteristic is the relational relation. The feeling is derivative from, and coexistent with, the desire or want.

UBU

This is the concept of choice, decision, belief, and it is represented by the pictograph;

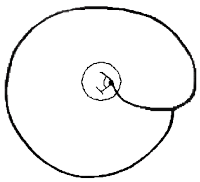


The interrelation between want and emotion generates choice, decision, memory. The consciousness entity is not static but must act to continue to exist and survive. This is resolved through the interrelation of desire and feeling.

The first four consonant words; UDU, UPU, URU, and UBU, represent a psychological or mind basis for the conscious entity. Given the primary assumption that consciousness is the defining characteristic of the universe, and of those of us who comprise the universe, then these are the initial archetypal concepts. Since they culminate in choice, the decision to act, there then needs to be a way for this to happen. Therefore the next group of four archetypal consonant words involve a derivation of how a conscious entity can act to implement choice. Thus;

UCU

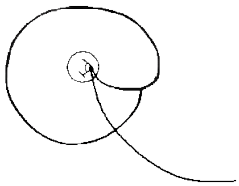
This is the concept of body and it is represented by the pictograph;



Here a cross is made originating from within the psychological conscious boundary and continuing into the rest of the universe outside the psychological boundary. But it is a self relational cross so it creates a new distinction via the act of the cross. This generates a body, an entity outside the psychological boundary but containing it. This allows the conscious entity to employ other aspects of the universe to effect the choices and decisions it makes. Having such a body allows it to act, therefore;

ULU

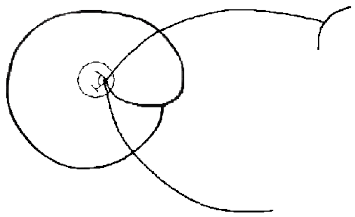
This is the concept of action, and it is represented by the pictograph;



By generating a liner relational cross (not the self relational cross which created the body itself) the conscious entity can now act in the universe. It can do something in response to the choices it makes at the psychological level. The linear relation extending outside the body allows action on, or interaction with, other elements of the universe.

UTU

This is the concept of sensation and it is represented by the pictograph;

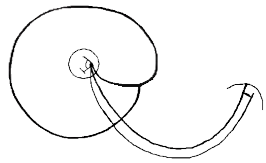


Once the body acts it is essential to get feedback as to the effect of the action. Therefore the body generates another cross, this time of a relational relation

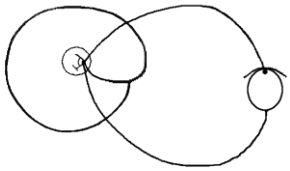
nature. This constitutes sensation. The detection of other things and events in the universe outside the body of the conscious entity. This detection ability will allow for the recognition of consequences of actions which the body itself has preformed. By correlating and interrelating these consequences with the actions performed we get;

UKU

This is the concept of creation and it is represented by the pictograph;



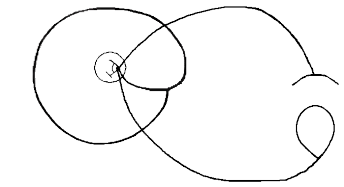
Alternatively, it could be represented by;



This is creativity. The body, under the direction of the psychological consciousness, can now create things in the universe outside of the body of the conscious entity. This is a process that utilizes the interrelation of sensation and action and this correlation allows us to make and use things to respond to our wants, feelings and choices. A primary result of this creative ability is the creation of signs and language. To illustrate this concept we derive;

USU

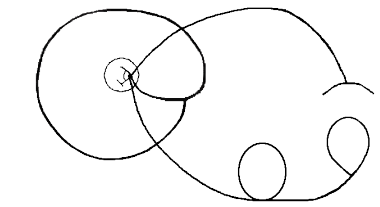
This is the concept of symbol and it is represented by the pictograph;



Here the conscious entity is designating and identifying some part of the universe as a symbol. Usually what is designated is external to the body of the conscious entity but it could designate its own body, or a part of its body, or some creation made by its body, as a symbol. Although the symbol is created by a process interrelating both sensation and action it is still detectable by the creating conscious entity, and this additional sensation is shown in the above grapheme. Once a symbol has been designated it is assigned a meaning via;

UGU

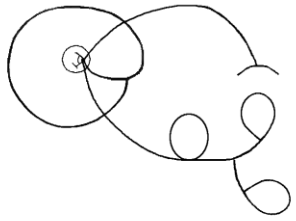
This is the concept of meaning. It describes the morpheme that is associated with the created symbol or grapheme. It is in turn represented by the additional pictograph;



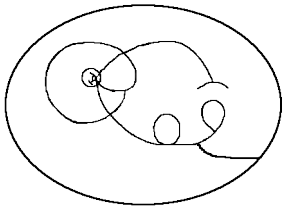
The meaning is specified or designated or identified by the conscious entity and then related to the symbol previously or simultaneously designated. Once this has occurred there is an image generated by the conscious entity that is related to the relating of symbol and meaning. This generates;

UFU

This is the concept of image. It is represented by the pictograph;



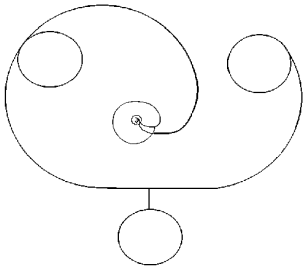
When an image is created in this manner it can persist in the universe external to the creating conscious entity. However, there is a type of image which includes the creating conscious entity and this is then considered to be a memory. It can be shown as;



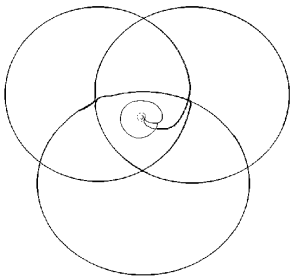
The interrelation of all of the symbols, meanings, and images by conscious entities is what generates language, and the thoughts, ideas, and concepts which comprise this interrelating. This is thinking. This is the creation and use of language. This is;

UXU

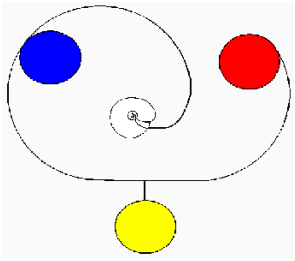
To represent UXU, thought and language, through the use of the pictographs would involve taking the letter symbols, the pictographs (graphemes), and the sentences we have used so far (morphemes), and placing them in the various bounded areas of additional pictographs, and then connecting them to other similarly constructed pictographs. We will illustrate this in the following manner. First lets take the initial UFU pictograph and not show the sensory perception of the sign. This can be redrawn as follows:



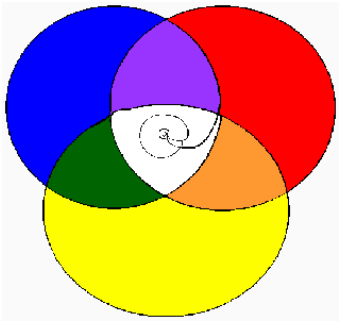
Now if we expand the three outer loops we get;



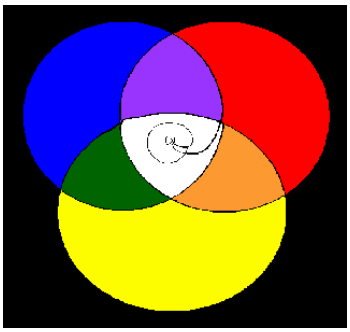
This gets a little confusing so lets go back and add some color to the rearranged UFU pictograph as follows:



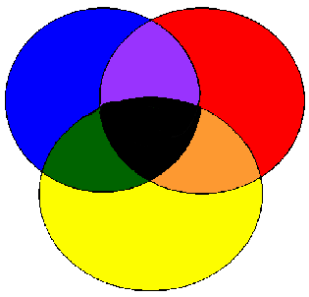
Now when we expand the outer loops it looks like:



Adding white and black this becomes:

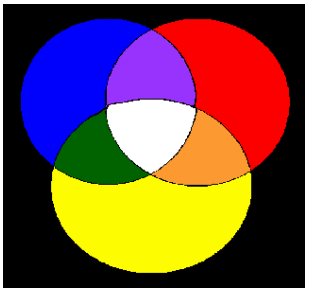


At this point we still can detect a conscious entity, an UDU, in the center which is generating all of this. However, if we invert the white and black to,



then we no longer can detect any creator or generating conscious entity for the

pictograph or its created image. Inverting the white and black again generates;



where we again cannot detect any creator for the image.

There are lots of interesting interpretations we can make of these pictographs. For now we will mention only a few and return in the future for a more detailed discussion.

The UXU pictographs look like Venn diagrams and this suggests a connection with set theory and basic logic as represented by an algebra of propositions. This fits in nicely with the contention that UXU represents thought and thinking. We also notice that there are two sets of four colors which can also be interpreted as consisting of a 1 to 3 pattern, much like the pattern we have deduced for our two sets of vowels. Thus we could say that the last UXU pictograph is composed of UIEA, represented as black, blue, yellow and red, and of OQYH which would be represented as white, green, purple and orange. We could also interpret this as relating to music where UIEA, the black, blue, yellow, and red quartet represents a C major seventh chord and OQYH, the white, green, purple, and orange quartet represents a D minor seventh chord. The two chords together comprise all the notes of an octave musical scale. This would consist of all the white keys on a piano for an octave in the key of C. This suggests that ODODU may be able to be "spoken" through musical tones alone and is not strictly dependent on our ability to speak with defined sound patterns which we identify as words. More on all of this in the future.

It would seem that this may be as far as we can go. There are no more increasingly

subsumptive pictographs to draw that aren't already included, at least conceptually, in UXU. But fortunately, we still have the real world to deal with.

When we started we assumed that the universe is comprised of conscious entities, like you and I, which communicate and interact with each other using language. We also assumed that relation was the fundamental reality that underlies all of this. So how can the physical world be compatible with these assumptions? How does it fit in.

So far, all of the concepts presented have been illustrated with pictographs which have been bounded. We have assumed an inside and an outside and there has always been something inside that is connected in some manner to consciousness. The assumption has been that such boundaries and what they contain are real and we have always been able to identify the connection to consciousness. But this may not always be the case. There may be some boundaries that we can detect, but for which we are not able to detect a connection to consciousness inside the boundary. We now define such boundaries as things.

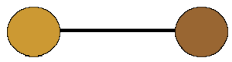
Suppose we consider the last two pictographs of UXU. If we were to put an axis through the center of the pictograph, perpendicular to the plane of the paper or screen, and rotate it we would see the color merging into various shades of brown. The exact shades of brown will be dependent on the proportions of the various primary and secondary colors, the red, yellow, blue, and purple, green, and orange, and the gray scale that results from mixing white and black. We can use this vast array of colors to represent and equally vast array of things. Things that have been created by an unknown or undetected conscious entity but which are nonetheless detectable by ourselves. We represent such things as;

UNU

This is a thing. We can detect it. It is real, but we cannot detect its creator or its role

as consciousness or language. We can see how we can interact things, or they can interact with each other, as;

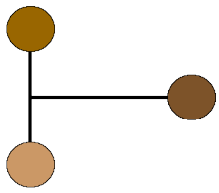
UMU



Such relationships between things can be interpreted as forces, interactions, communications, links, graphs, and many other examples of linear relations.

In a similar manner we can consider the concept of property or characteristic related to things and their interactions as;

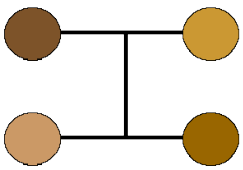
UWU



These characteristics can include properties of the linear interactions that are expressible as charge, sex, mass, color, etc.

The last possibility of ways to connect or interrelate things can then be represented as;

UZU



This is the final mode of connection. It is covariance, the interrelation of everything with everything else. It completes the structure and function of the universe and ourselves as a part or point in that universe.

Now we find that these four pictographs showing UNU, UMU, UWU, and UZU are the basic representations of Relational Systems Theory. We have returned to our starting point.

Chapter 5.

Numbers and Mathematics

We start with an examination of how the relational symmetries occur in our number systems and how these are used in certain areas of mathematics.

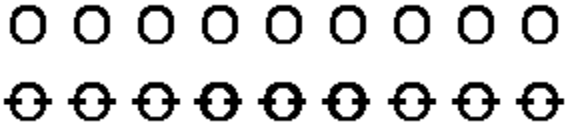
Mathematics first started with a sense of shape and counting. These were relationally expressed as both geometry, which maps into the Relational Symmetries as;

•	point
|	line
⊢	surface, plane
H	volume, solid

and number, which comprises; four types of numbers, the natural, rational, real, and complex numbers. These map into the Relational Symmetry as;

•	natural numbers	integers, counting numbers
|	rational numbers	fractions
⊢	real numbers	exponentials, transcendental numbers
H	complex numbers	include the square root of minus one

The introduction of the boundary relation allowed us to combine the geometric and numerical interpretations as;

becomes 

becomes 

becomes 

becomes

Again remember that this is only one of the representations of how the relational symmetries can combine with each other and that this does not represent the full range of how numbers and geometrical forms can be combined. In particular, it does not imply that lines in the sense of | are comprised of points even though we often consider them to be.

The symbols that are commonly used in how we represent and use numbers also show a relational symmetry;

●	.	a decimal point, (a way of separating an integer from a fraction)
	1	the counting number one, one line
	2	the counting number two, two lines
	3	the counting number three, three lines
	0	zero, a boundary between positive and negative numbers
	-1	negative one, minus one
	i	the square root of minus one
	( )	a matrix

It is important here to note that these concepts exist in our minds as linguistic constructs in our memories. They also exist formally in language.

Similarly, how numbers are related to each other also comprises additional symmetries. This can be seen in basic mathematics, which again shows a relational symmetry.

- Numbers or variables that represent numbers

 Operations that can act on numbers such as addition

 Relations that compare numbers or variables with each other, for example equivalence relations, =

 Equations or functions that combine numbers, operations, and relations

This symmetry is used in algebra or group theory.

Each type of number (called a number field) has its own type of algebra with a defining operation which embodies the essence of the conceptual basis for the number field;

 Addition

 Division

 Exponentiation

 Subtraction, which leads to the square root of minus one

The shape geometrical concept reappears when the second Relational Symmetry is applied starting with the concept of boundary. This can lead to a generation of set theory as a foundational way to derive the various number fields.

 This is a set, a boundary that separates some things from other things

 These are operations on the boundaries of sets. They comprise union and intersection

 Relations like equivalence relations apply here as well

 Equations and functions

Before beginning a discussion as to how the Relational Symmetries are compatible

with set theory it is important to note that numbers and mathematics are a part of language and do not represent a perceived physical reality in the sense that the descriptions and calculations of science do. This perception of the universe changes when consciousness and language are included in the domain of science.

The relevance here becomes apparent when we consider the foundations of set theory. This is important since set theory can be used to generate the algebras and groups that describe each of the four fundamental number fields. The application of the set theory derivation of numbers to the physical realities of distance, surface, volume, and space have made it extraordinarily useful in science. Thus it has emerged as a general foundation for all of mathematics. Set theory was originally formulated by Cantor in 1874 in conjunction with the work of Dedekind on real numbers to describe how infinities could be included in mathematics.

A set was defined as a mathematical object, sort of like the concept of a number, but generalized to comprise a boundary that would contain all of the numbers of a certain field. For example, sets could be defined to contain all of the counting numbers, the positive integers, or all of the rational numbers, the fractions. Thus a set containing all the real numbers would include all the integers, the fractions, the exponentials, the logarithms, and the transcendental numbers that had been discovered throughout history, This set then included an infinite number of infinite groups of numbers.

Despite this, set theory proved to be very useful. Thus the concept of set was generalized as a boundary that could include any collection of real or imagined entities, including other sets, apples, or numbers, or whatever. These were defined as elements or members of the set. A subset could then be defined to contain each element of the set. To complete this general language based definition of set theory certain properties of sets were defined and these included the operations of union and intersection.

The problem with all this is that it generated certain paradoxes and antinomies. The most famous of these was the Russell antinomy of “The set of all sets that are not members of themselves, is it a member of itself?”. Many of these problems were resolved by generating axiomatic formulations of set theory, and set theory is today viewed as the foundations of virtually all of mathematics. However, some problems remain as exemplified by the Godel incompleteness theorems, the persistence of infinities, and questions about boundaries that require descriptions of

classes or collections before sets can be rigorously defined.

To resolve these issues it is useful to recognize and identify common linguistic tendencies that can lead to problems when incorporated in the presentation of numbers and mathematics. For example;

A simple question that we would normally answer with a yes or no, can be compromised with an “I don’t know” or an “I forgot”. Binary choices which are derived exclusively from a linear relation often do not convey these aspects of what we are or should be saying. To resolve this look at such situations from the perspective of the relations comprising the relational symmetry. The $|$ sign is the binary choice, yes or no, true or false. From the $\vdash$ sign perspective “I don’t know” or “maybe” becomes a possibility that should always be considered when asked to respond to a question with a binary, $|$, yes or no answer. This is particularly relevant with respect any discussion of probabilities.

A similar situation concerns statements that are considered to be true or false. Take the statement that says “This statement is false.” If it is true, it is false, and if it is false, it is true. Such statements again need to be understood or considered from the $\vdash$ relational sign perspective as possibly being meaningless, uncertain, ambiguous, irrelevant, or unnecessary. Again, it is important to consider the $\vdash$ relation before committing to the binary, $|$, true or false response.

Because the Relational Paradigm Science Model has included consciousness and language as part of the universe to be described by science the existence of these types of linguistic statements creates a problem when science uses mathematics in its descriptions of the universe. Most pure mathematical systems rely on a propositional logic for an axiomatic presentation of their definitions, and this requires that statements about the definitions either be, demonstrably true or false, or presumptions that are assumed to be true or false.

Such restrictions lead to concepts and statements that have uncertain or indeterminant meaning, or even worse, they themselves may be meaningless. These include; infinity, infinitesimal, nothing, everything, and anything. Such concepts may serve a purpose for pure mathematics as an abstract self contained discipline, but they are not necessary for a mathematics that is pragmatically useful in applications. The inclusion of these types of concepts tends to produce

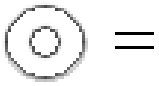
statements that are paradoxes or antimonies. To resolve this situation consider the following replacements;

Infinity.	sufficiently large
Infinitesimal	sufficiently small
Nothing	not a known thing
Everything	every known thing
Anything	any known thing

To explain, consider a series of things where each next member of the series is larger than the preceding member, the counting numbers for example. This series is often considered to be infinite in that it has no known end. For any positive integer that you can define there is always a larger one that can be generated by adding one to the number you just defined. Hence the concept of infinity seems to have meaning. Replace this with the concept of sufficiently large which occurs when you can't pragmatically distinguish one large thing or number from the next large thing or number in the series.

You also can replace the concept of nothing with no known thing, where known connotes the existence of evidence for the thing in question. Similarly, for everything and anything.

From this perspective it is important to make a preliminary presumption that a statement that defines a boundary that only contains itself is a meaningless statement. It is like the statement "This statement is false". This embodies the concept of cancelation and can be symbolically formalized with the diagram;



This diagram was initially formulated by George Spencer Brown in his "Laws of Form". The importance of this concept is that this "law of cancelation", resolves the Russell antimony of "The set of all sets that are not members of themselves, is it a member of itself?". This is meaningless. A set that contains itself doesn't exist.

This brings the Parmenidean question of "Does nothing exist?" into context with the concept of boundary. In particular, can there be a boundary between everything

and nothing. Consider the two diagrams;

and

Are these diagrams equivalent? Can there even be a set that contains nothing? Isn't that equivalent to saying that the universe is bounded and that there is nothing outside of the universe. To avoid all these problems we assume that all these statements are indeterminant at best, and, at worst, meaningless in the sense of "This statement is False".

So, with all this in mind, construct a non axiomatic description of set theory as follows. Define a set, X, as a boundary containing elements. An element can be anything, real or imagined, except for the boundary itself. The elements of X are other boundaries, each of which also contains one or more elements. The boundary of X is not an element of X. Each boundary in X is defined as a subset of X. On X are defined two binary operations, union and intersection. The Union of a subset, A, and a subset, B, defines a subset, C, of X that contains all of the elements that are in A and B. The intersection of subset, A, and subset, B, defines a subset, D, of X that contains only those elements that are in both A and B. The set X also contains a subset Y that contains all elements that are in any of the subsets of X. The set Y is called the universal subset of X. The set X also contains a subset N that does not contain any element that is already contained in any subset of X. This subset is called the empty subset of X.

The operations of union and intersection are examples of the Q relation. By

combing these relations with the O relation we can make comparisons and the results of these comparisons can be labelled with the  relation. Call these , equivalence relations and they include the concepts of equal, not equal, more than, less than, similar to, not similar to, and other comparable concepts. Combining all these relations via the  relation allows for the creation of functions and operations in set theory. Thus for a Set X as previously described, the self relational symmetries are

- Is an Element that is bounded by, and a member of

O One or more subsets of X, which are boundaries defined relative to X.

The other relational symmetries are;

| The binary operations of union and intersection applied to subsets.

⊢ Equivalence relations comparing subsets

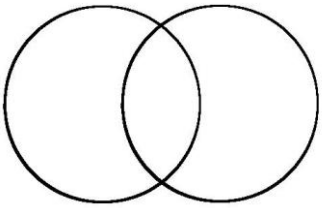
H A series of combinations of the above stating that;

The operations of union and intersection are commutative.

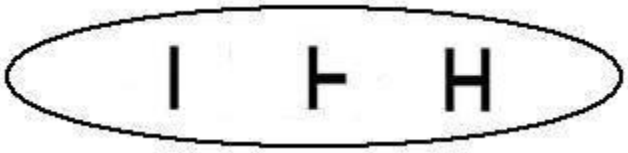
Each union of subsets of X is a member of X.

Each intersection of subsets of X is a member of X

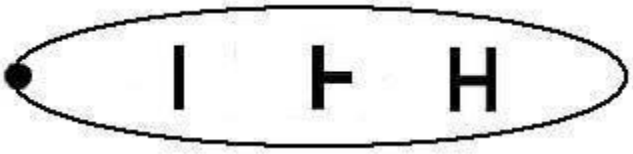
An accurate description of this can be visualized through the use of Venn diagrams which were developed by John Venn in 1880 as a way to represent the set theoretic ideas the Cantor had proposed in 1874. Shown below, each set is represented as a circle. The union of the two sets comprises both circles. The intersection of the two sets comprises only the middle area that exists in each circle.



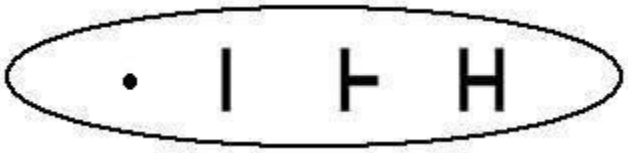
The set inclusions can also can be visualized as;



Which could also be represented as;



or



These definitions can in turn be used to generate the rings, integral domains, and fields of mathematics which define the four fundamental types or fields of numbers discussed earlier.

These symbolic formalisms exhibit symmetry with other symbolic formalisms that employ graphical representations that have previously been proposed by others. These include the existential graphs of Charles Sander Peirce. It is significant that

Peirce also cast doubt on the use of infinities when describing geometrical entities in terms of boundary, ie numerical, concepts. He saw this as conflicting with the understanding of lines, planes, or solids as continuous things. Hence representing them in terms of real numbers would reach a situation where the separation of two points that were arbitrarily close, that is, were indistinguishable in that their separation was sufficiently small, would merge them together. Either point would be adequate to describe a location in the line or plane or volume but this description would not be a point in the line or plane or volume itself.

It is relevant to note that Peirce's theory of signs and his focus on "Firstness", "Secondness", and "Thirdness" was a precursor to the one – three fourness structure of the Relational Symmetries. This initially emerged in Hamann's Relational Systems formalism and has now evolved into the Relational Symmetries and their combination into the Relational Symmetry Paradigm.

Other graphical or symbolic formalisms that are symmetric with the Relational Symmetries can be found in the Boundary Mathematics of William Bricken. He also saw that there were major problems with the axiomatic approaches and the embrace of concepts that included the contradictions and paradoxes that arise from the linear thinking of propositional logics.

Other examples include the diagrams from the "Laws of Form" of George Spence Brown as previously mentioned, and the symbolic diagrams of Bliss Symbols or those used in the visual basic programming language.

It is important to note that people have been using numbers and basic arithmetic for thousands of years and that this includes the concept of subtraction along with addition, division, and multiplication. However, subtraction carried with it conceptual problems involving the concepts of zero and negative numbers. You can build number systems for the counting numbers, the fractions, and the exponentials and transcendental numbers without using subtraction or the concepts of zero or negative numbers, but once you introduce subtraction it becomes expedient to include some form of recognition of zero and negative numbers as well. This did occur in various early versions of mathematics but only became formally included about 1,300 to 1,600 years ago when zero and negative one were explicitly defined as numbers.

This led to an additional problem of what to do with an equation such as $x^2 = -1$, or what is the square root of a negative number. The solution was to create the concept of an imaginary or complex number. This idea surfaced in the work of Gerolamo Cardano in 1545 and Rafael Bombelli in 1572. The term imaginary number was coined by Rene Descartes in 1673 and the notation of using i as the square root of minus one was introduced by Leonhard Euler in 1777. Thus $i^2 = -1$ became the key element for the definition of the complex number system which extends the real numbers so that any complex number is of the form a + bi where a and b are real numbers and I is the square root of minus one.

Now consider the quaternion. This is a mathematical object originally introduced by William Rowan Hamilton in 1843 and later assimilated by William Kingdom Clifford in 1878 – 1882 as one of the Clifford algebras.

A quaternion is a number with a form of;

$$a1 + bv + cj + dk$$

Where a, b, c, and d are real numbers and 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. Let * represent multiplication, then

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

and $$v * j = -k, \qquad j * k = -v, \qquad k * v = -j$$

but i, j, and k are not equal to each other.

A better visualization of this can be obtained from a matrix representation of the quaternion basis elements;

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

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

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

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

Using standard matrix multiplication shows;

$$\mathbf{v} * \mathbf{v} = -\mathbf{1} \qquad \begin{pmatrix} 0 & i \\ i & 0 \end{pmatrix} * \begin{pmatrix} 0 & i \\ i & 0 \end{pmatrix} = \begin{pmatrix} -1 & 0 \\ 0 & -1 \end{pmatrix}$$

$$\mathbf{j} * \mathbf{j} = -\mathbf{1} \qquad \begin{pmatrix} -i & 0 \\ 0 & i \end{pmatrix} * \begin{pmatrix} -i & 0 \\ 0 & i \end{pmatrix} = \begin{pmatrix} -1 & 0 \\ 0 & -1 \end{pmatrix}$$

$$\mathbf{k} * \mathbf{k} = -\mathbf{1} \qquad \begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix} * \begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix} = \begin{pmatrix} -1 & 0 \\ 0 & -1 \end{pmatrix}$$

$$\mathbf{v} \ * \ \mathbf{j} = -\mathbf{k} \qquad \begin{pmatrix} 0 & i \\ i & 0 \end{pmatrix} * \begin{pmatrix} -i & 0 \\ 0 & i \end{pmatrix} = \begin{pmatrix} 0 & -1 \\ 1 & 0 \end{pmatrix}$$

$$\mathbf{j} \ * \ \mathbf{k} = -\mathbf{v} \qquad \begin{pmatrix} -i & 0 \\ 0 & i \end{pmatrix} * \begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix} = \begin{pmatrix} 0 & -i \\ -i & 0 \end{pmatrix}$$

$$\mathbf{k} \ * \ \mathbf{v} = -\mathbf{j} \qquad \begin{pmatrix} 0 & 1 \\ -1 & 0 \end{pmatrix} * \begin{pmatrix} 0 & i \\ i & 0 \end{pmatrix} = \begin{pmatrix} i & 0 \\ 0 & -i \end{pmatrix}$$

The quaternion matrix representation discloses an interesting view of how the primary symbolic formalism itself impacts our understanding of the quaternion. The following argument shows how the symbolic formalism of the primary Relational Symmetry actually is isomorphic to a quaternion. Let

●	1	a point, an origin
	v	one vertical line
	j	one sidebar line and one right vertical line
	k	one left vertical line, one sidebar line, and one right vertical line

Define a binary operation * which combines any two primary symbols in a left-right linear fashion such that if they exactly superimpose they cancel back to a point but with a change of sign, and if they cross to form the third of the three primary symbols, but never completely superimpose on them, this also results in a change of sign. The ● acts as a unity. Thus

● * ● = ●

● * =

● *  = 

● * 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 - ⊢

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 still behaves as a quaternion, only the last three equations have a positive result. Thus the primary Relational Symmetry itself can have a left or right handed orientation and this duality will emerge relative to positive and negative charge and male and female organisms.

Chapter 6.

The Relational Science Model, Historical Development

Science creates models based on observation and evidence to predict and understand a perceived reality. Science forms hypotheses, tests them through observation and experimentation, and then accepts them, rejects them, or reformulates them for further analysis and testing. Belief is established via the evidence that this process provides.

The collection of models that comprises modern science describes phenomena that occur in certain specified areas of application. The models have precise definitions for what they consider and the areas or boundaries that specify where and how the models can be usefully applied. Some of these models are enormously powerful and have generated technologies that we all use regularly.

Currently there are two main types of scientific models. The first type are the natural sciences which comprise general models for physics, chemistry, and biology. Natural science also includes the derivative applied sciences of engineering, medicine, agriculture, and electronics and computers. All of these models assume that the universe exists as a physical reality that is independent from any connection to consciousness or conscious entities.

The second type of scientific model deals with the social sciences whose subjects include areas of study like economics, psychology, and sociology. These models are applied to conscious entities, specifically people, that use language and exist in a physical universe. However, the fundamental principles of these models are not viewed as being an essential component of the universe as a whole. Instead, they are considered as applying only to a part of the universe, and that they may possibly be derived from the natural sciences in the future.

The natural sciences differ from the social sciences primarily in terms of methodology and area of application. Natural science uses scientific procedures based on the formation of hypotheses for which there is supporting evidence. Such hypotheses may be testable with reproducible experimentation, or they may be supported through observations that can be validated by others. These procedures are applied to a universe that is viewed as existing independently from

consciousness or conscious entities. It is believed by some that natural science can eventually explain consciousness through the use of its scientific methodologies.

The social sciences in contrast deal primarily with phenomena that are involved with conscious entities and the activities of conscious entities. The universe of natural science, and the scientific methodologies which the natural sciences use, are included wherever they may be relevant or useful. However, other perceptions of the universe and other methods of inquiry are also used if and where they also help make confirmable or useful predictions.

Despite the successes of all the models from both the natural and the social sciences, they do not explain all of our experience. For example they can describe, but cannot explain, the fundamental nature of our consciousness and the consequent impact that this has on our own behavior and emotions.

The Relational Science Model proposes to unify the natural and social sciences, and also establish a relational symmetry with religion. The critically essential and most daunting and challenging aspect of this task is to satisfactorily explain how the inclusion of consciousness and language can still explain all of the experimentally validated achievements of the natural sciences in a new paradigm. So we begin by looking at how the existing paradigm originated and how it has evolved since then.

Our current natural science had its formal origins in the thinking of the early Greek philosophers starting with Thales, Anaximander, and Heraclitus and progressing to the atomistic hypothesis of Leucippus and Democritus in the mid fifth century BC. The later proposed that all matter is composed of tiny particles, called atoms. These particles exist in a space described by Pythagoras and later Euclid, as a geometry comprising length, width, and height, or distance, area, and volume or solid.

Over the next two thousand years these ideas evolved, eventually coalescing in the 16^{th} and 17^{th} centuries into a more detailed model based on the work of Galileo, Kepler, Newton, Leibniz, Descartes, and others. This model comprised a formal scientific method, a mathematical calculus, and a Cartesian coordinate system that allowed for the combination of Euclidean geometry and algebra. Motion was described as to how the location of matter within the coordinates of a Cartesian Coordinate System changed with time. Matter was still perceived as being comprised of atoms or particles.

Additional features emerged in the 18th and 19th centuries concerning the structure and organization of the chemical elements, Maxwell's electromagnetic theory, and the existence of the electron, and radioactivity. These discoveries merged with the Newtonian framework of motion comprising forces acting on masses within a Euclidean geometry as described by a Cartesian coordinate system. By the beginning of the 20th century this had set the stage for a model of atomic structure that comprised a positively charged core with orbiting negatively charged electrons.

Also during the 18th and 19th centuries the various models of living biological phenomena such as botany, zoology, bacteriology, genetics, evolution, and biochemistry were starting to get connected to physics and chemistry. By the early 20th century this had resulted in a sort of comprehensive model of the natural sciences that was based on atomically organized matter existing in a universe describable with time and a three dimensional Cartesian coordinate system. This Classical Science model is still useful today and provides for a working understanding of how things actually work in our everyday experience.

However, this situation changed in the rest of the 20th century with the development of General Relativity and Quantum Mechanics. These two models dramatically altered the way that natural science looked at the universe. The fundamental assumptions, that space could be adequately described with a Cartesian coordinate system, and that atoms and the known subatomic particles were inviolate, they could not be created or destroyed, were changed. Although the new assumptions, and the models that derived from them, were extremely difficult to understand, the models that emerged from them proved to be much more powerful than the various models that comprised the Classical Science. Most of the earlier models were explained and often extended by the two new models which quickly subsumed the earlier work.

But problems remained. Despite the successes of General Relativity and Quantum Mechanics these two models remain philosophically incompatible, and neither of them can resolve the issues of consciousness and language. The Relational Paradigm Science Model is proposed as a way of resolving these problems. To understand how this can occur, it is necessary to look at the foundational presumptions that underly the two dominant models of modern physics, General Relativity and Quantum Mechanics.

In General Relativity Einstein rejected the notion that the motion of objects that had mass could be adequately explained in terms of a universal frame of reference in which the changes of three spatial coordinates of a Cartesian Coordinate system could be measured with respect to changes in time. He argued that the description of such motion had to be independent of the choice of the frame of reference and would be valid only if it was consistently transformable from one frame of reference to another independent of the choice of coordinate system.

The geometry of Euclid in which relationships (eg. measurements made with rulers and clocks) are made relative to fixed straight lines (sequences of real numbers) was thus replaced with a differential geometry in which relationships are described relative to each other and not to some fixed external standard. Thus motion was viewed as a path or geodesic in the geometry and this has been viewed as seeing space as "curved" and not linear. Since energy is classically defined in terms of the motion of mass, going to a differential geometry resulted in a recasting of the equivalence principle between inertial and gravitational mass. Thus the representation of mass as energy, the famous $E = mc^2$ equation, became a property of the space-time geometry itself.

The description of differential geometry led to the use of tensors as a means of describing the relative changes of each variable in a space with respect to other variables in that space, and how that can be compared with descriptions in other spaces. (Spaces being defined in terms of the number of independent variables required to describe phenomena with respect to who is doing the description.)

Using General Relativity certain predictions were made that were not consistent with Classical Science but which were nonetheless verified by observation and experiment. But General Relativity did not deal with electric charge and how charges are combined in atoms. It also did not explain the observations that atoms could be interacted in ways that showed that they are comprised of additional component parts, the sub atomic particles.

To explain these phenomena a second line of thinking that was being developed in the same time period as relativity. This started in 1900 when Max Planck proposed that electromagnetic energy could only be emitted in quantized form. Einstein then expanded this idea in 1905 by showing how the photoelectric effect could be explained if light occurred in packets. The concept of quantizing energy levels led to Niels Bohr's model of the atom in 1913 which stimulated further work by

Schrodinger, Heisenberg, Pauli, Dirac, and others, into what is called Quantum Mechanics.

Over time this has developed into our most successful theory, the Standard Model. It describes the chemical, electrical, and radioactive phenomena that occur on an atomic and subatomic scale. This description explains an extensive amount of everyday phenomena and leads to our current technologies in electronics (such as cell phones and computers) and the chemical, material, and nuclear sciences.

The Standard Model presents a more complex view of the atom than the one that comprised the photon, electron, proton, and neutron of the Classical Science. In the Standard Model the atoms are still viewed as containing electrons and photons, but these are now seen as being members of groups of additional subatomic particles such as quarks, leptons, and bosons. The nuclei of atoms also contains positively charged protons and neutrons but these are themselves composed of quarks. Negatively charged electrons are now viewed as surrounding the nuclei in orbitals which have to be described in terms of probabilities and complex numbers.

Different numbers of electrons can occupy the orbitals but have to do so in a manner that was consistent with a property called spin. Thus an electron could be viewed as rotating and its spin is described in terms of its “intrinsic angular momentum” which could be right handed or left handed. This determines the number and types of electrons that can be in any given orbital.

The subatomic particles are classified as either matter particles, the quarks and leptons, or transfer particles, the bosons. The transfer particles only exist when mediating the interactions of the matter particles via one of three fundamental forces or interactions, the electromagnetic, weak nuclear, and strong nuclear interaction.

This view of Quantum Mechanics did not include the fourth fundamental interaction in physics which was the gravitational interaction that is described in General Relativity. As of now this still has not been successfully integrated into the Quantum Mechanical Standard Model.

The General Relativity description of space-time is not required in the Standard Model which in general works successfully with the Euclidean Cartesian Coordinate geometry of the Classical Science, or its modification as described in

special relativity where time as a fourth dimension is defined as time multiplied by the speed of light.

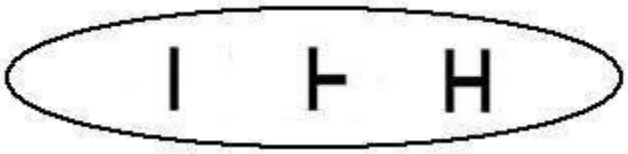
To show how the Relational Science Model can apply to both General Relativity and Quantum Mechanics, (as well as provide a basis for the inclusion of the social sciences and religion), it is important to recognize that the relational symmetries occur in the foundations of our number systems and in many areas of mathematics. In particular, it is essential to know that the notion of relational symmetry is manifested in the quaternion, a type of complex number that is crucial in modern physics.

General Relativity assumes that the universe is continuous and deterministic, and that matter is perceived as local configurations of a continuous field. Quantum Mechanics views the universe as discrete and probabilistic, and that matter is perceived in terms of individual particles that are separate from each other. The perceived incompatibilities of these two models arises because they are each defined on different parts of the universe. Neither of them consider the universe as a whole because they do not include consciousness and language.

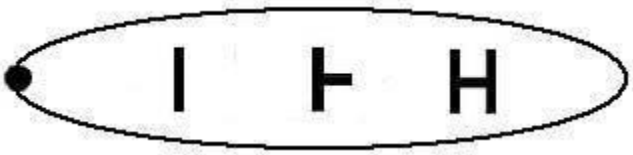
The Relational Symmetry Paradigm explains this incompatibility because both primary Relational Symmetries are linguistic reflections of each other as perceived by conscious entities. Consequently, they both are compatible and consistent elements in an explanation of the basic structure and functioning of the whole universe. In the • | ⊢ H symmetry the • specifies a unique point or perspective of a continuous infinite universe.

But in the O Q   symmetry the point as a creative consciousness exists as O a self relational distinction that establishes a boundary between itself and the rest of the universe. This creates the perspective of a particle with a boundary O separating a point • from the rest of the universe. This in turn generates the concept of a boundary for the universe itself, that is relative to every point consciousness in the universe. Such a concept creates the idea of a unique location in the universe for each conscious entity. It also can be described in terms of the concept of particles within the universe as comprising boundaries separating locations and processes in space and time from the rest of the universe.

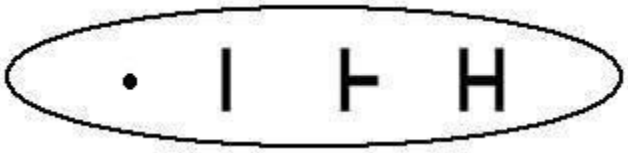
These particles can be visualized as;



Which could also be represented as;

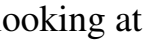


or



Each of these diagrams shows a different interpretation of how the self relational nature of both the point • and the boundary O can be used in the Relational Symmetry diagrams. It also illustrates why we have the idea that there are several fundamentally different conceptions of particles in the universe. This is symmetrical to how we earlier looked at our own organizations from both a structural and procedural perspective.

These ideas are reflected in how Quantum Mechanics now proposes that there are three fundamental types of particles. The first of these are the fundamental and non divisible particles themselves; the up and down quarks, the electron, and (possibly) the neutrinos. The second type of particles are those that are composed of stable combinations of the first type. These only exist because of a third type of particle, the transfer particles which are called bosons. These particles are only detectable for very short periods of time in situations where other particles are interacting with each other in very high energy situations or in radioactive decay.

A new way of looking at this considers that the  formalism is symmetrical with the mathematical quaternion that is used extensively in quantum mechanics, and which can also be compatibly combined with the tensor formulation of general relativity. A potential unification of the Quantum Mechanics and General Relativity models can then be achieved by casting space-time itself as a Relational Symmetry quaternion in which particles are perceived in terms of the  Relational Symmetry that is a reflection of the quaternion space time geometry.

The development of this hypothesis starts with the work of Mendel Sachs who took a suggestion made by Einstein, but never followed up by him, to include quaternions in General Relativity. Sachs work is described in detail in two books; "General Relativity and Matter; A Spinor Field Theory from Fermis to Light-Years", and "Quantum Mechanics from General Relativity; An Approximation for a Theory of Inertia".[4]

This approach kept the Riemann curvature tensor formulation as the differential geometry of space-time but combined it with the algebra of the quaternion spinor formulation instead of the algebra of the real number field. Since the real number algebra is commutative under multiplication, whereas the quaternion algebra is non commutative for three of the quaternion basis elements, use of the quaternion algebra expanded the metric tensor from ten independent variables to sixteen independent variables. This allowed Sachs to include many quantum mechanical interactions in his formulation of General Relativity. However, this still did not explain all of the interactions of the Standard Model of Quantum Mechanics.

The Relational Symmetries approach suggests that this could be taken one step further by assuming that the geometry of space-time is itself a quaternion. Actually the assumption is that the space-time geometry of the universe is symmetrically relational, as foundationally described by the archetypal relational diagrams, and that this can be mathematically applied to space-time through the quaternion representation.

Note: I actually had the opportunity to discuss this application with Mendel Sachs. He felt that using a quaternion geometry instead of a quaternion algebra should not change the conclusions of his work. Either approach should be valid. The modification of the algebra of the tensor representation should not change how the quaternion impacts the calculations. However, it does impact how we understand

the universe. Algebra is a creation of language that describes ideas, it is not something that we can directly experience. Geometry is also a creation of language but it describes aspects of our experience that we can actually sense and measure.

One of the immediate consequences of describing space time with quaternions is that all equations of motion become wave equations. In Quantum Mechanics a wave function can be linked to the square of a complex number. This was introduced in 1926 by Max Born as a probability amplitude which served as an interpretation of the values of a wave function. Since any equation of motion in a four dimensional quaternion geometry must, by definition, be expressed by complex numbers, probability amplitudes are a natural interpretation of any measurement of motion.

Using the quaternion representation for the space-time geometry does not appreciably alter Sachs presentation for General Relativity. However, it does have an impact on how we view the Standard Model of Quantum Mechanics. Examination of the Standard Model Lagrangian shows that spinor and quaternion representations are used extensively to describe the quantum behavior of the subatomic interactions of the Standard Model. This is shown through the inclusion of the Pauli matrices (1927) which provided the mathematics needed for the Pauli exclusion principle that determines how electrons exist in atomic orbitals, and the Dirac equation (1929) that integrates quantum mechanics with the special theory of relativity . The Pauli matrices are;

$$\sigma_1 = \sigma_{\mathrm{x}} = \begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}$$
$$\sigma_2 = \sigma_{\mathrm{y}} = \begin{pmatrix} 0 & -i \\ i & 0 \end{pmatrix}$$
$$\sigma_3 = \sigma_{\mathrm{z}} = \begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix}$$

Multiplying these by *i* , the square root of minus one, generates the three non unitary basis elements of the quaternion. The key element here was that Pauli used the matrix mechanics notation that had been developed by Werner Heisenberg, Max Born, and Pascual Jordan in 1925. This grew out of the initial work by William Rowan Hamilton and Arthur Cayley on matrices and quaternions in 1853 – 1854.

The introduction of the notation of these matrices and the general spinor formulations that comprise them had an enormous impact on the development of Quantum Mechanics. It was similar to the impact that Newton's and Liebniz's notation of the calculus had on the development of Newtonian physics. The incorporation of this spinor notation in the Dirac equation allowed for a reformulation of the Bohr model of the atom and the incorporation of the quantum structure with the theory of electromagnetic interaction. This platform then evolved into Quantum Electrodynamics as the foundation for the Standard Model that emerged some 30 years later.

Part of this subsequent evolution included the work of Glashow, Weinberg, and Salam in the early to mid 1960s that integrated the weak nuclear interaction into Quantum Electrodynamics as the electroweak force. The mathematics became represented by the SU(2) x U(1) notation which essentially comprised the quaternion and complex number notations with Lie group representations.

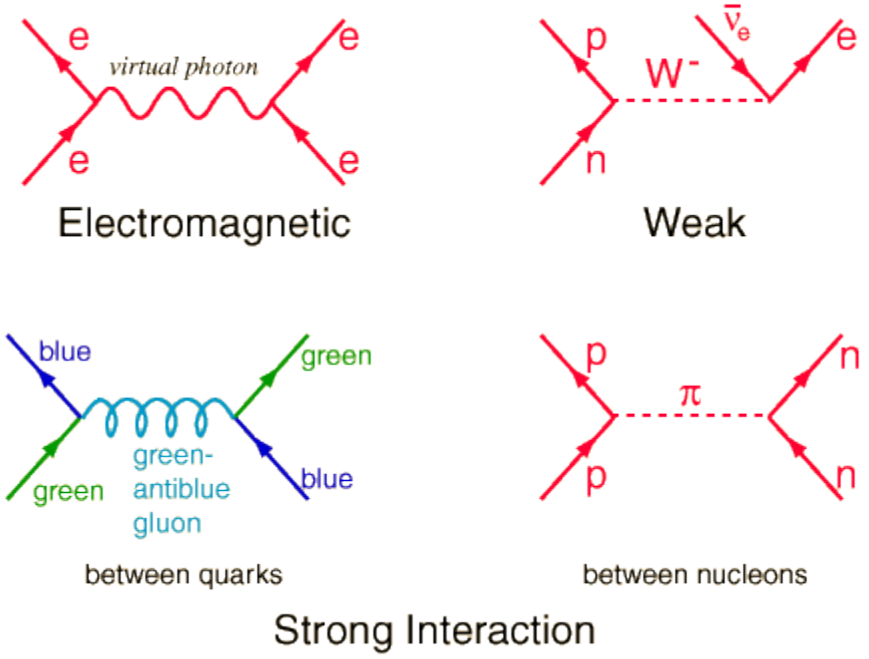
Also during this time period a generalization of the Pauli matrices to 3 by 3 complex matrices (the Gell-Mann matrices) was used by Murray Gell-Mann and others to include quantum chromodynamics in the emerging Standard Model to explain the strong nuclear interaction in terms of gluon interactions that hold the nuclei of atoms together. This resulted in the mathematics growing to be SU(3) x SU(2) x U(1).

A final piece of this puzzle comprised the theoretical prediction of a Higgs field/particle in 1964 that was finally detected as the Higgs boson in 2012. Thus the Standard Model as formulated in the mid 1970s has remained as the best description of atomic and subatomic behavior that we have.

Mass is represented as occurring in two forms, a rest mass which is manifested in quarks and leptons, and a relativistic (energy) mass as manifested in photons and gluons. In the Standard Model both photons and gluons are shown as having no particle mass but they both are "energy packets" that exchange energy between and among other stable particles which do have a particle mass. The W, Z, and Higgs bosons also act as exchange particles even though they have particle masses.

The basic stable particles are the electron, the up quark, and the down quark, all of which are charged; and the electron neutrino, the muon neutrino, and the tau neutrino, all of which are uncharged. The other particles are high energy combinations that are unstable.

A way of visualizing the Standard Model and the interactions that occur in Quantum Physics comprises the Feynman diagrams. These diagrams were developed in 1948 by Richard Feynman and promoted extensively by Freeman Dyson. (ref Am Sci article) An example of these diagrams that illustrates a way of visualizing the electromagnetic, weak nuclear and strong nuclear interactions is;



This diagram is from the Hyperphysics website[5]

The Feynman diagrams are basically symmetrical with Relational Symmetry diagrams but they use the Minkowski extension of the Cartesian coordinate system that was developed for special relativity. This used a space time metric of $c^2t^2 + x^2 + y^2 + z^2$. Consider the possibility that these diagrams are related to events that occur in a General Relativity quaternion space-time geometry and that the diagrams themselves may be depictions of "energy packets" that also include charge and spin. Thus the diagrams of interactions that appear to involve multiple particles relate to concepts of expanded energy packets whose boundaries end once the interaction is completed with the appearance of stable particles.

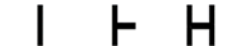
The Feynman diagrams are not precise descriptions of an external physical reality but are instead symbolic formalisms that act as a guide as to how to perform mathematical calculations that can successfully predict observed results that occur

in high energy physics experiments. Thus they serve to help us understand what the processes might be that underlie Quantum Mechanics.

It is generally recognized that the Standard Model is not complete (for example it does not explain the dark matter that supposedly makes up about 95 percent of the inferred universe), and it is still not compatible with General Relativity.

The Relational Symmetry Paradigm proposes to resolve this by letting the geometry for both General Relativity and Quantum Mechanics to be represented as symmetrical to a larger linguistic quaternion geometry. At present the quaternion representations used in the Standard Model are not the same as the quaternions that can be used to describe General Relativity in that they each have different types of connections to our experience.

By using the quaternion geometry, the inclusion of the quaternion and spinor representations in the Standard Model Lagrangian can be viewed as leading to a view that spin and charge, as well as an energy mass field, are integral parts of the relational geometric linguistic nature of the universe, as manifested in the particle concept.

If  represents the quaternion space time then attach the following representations of  as,

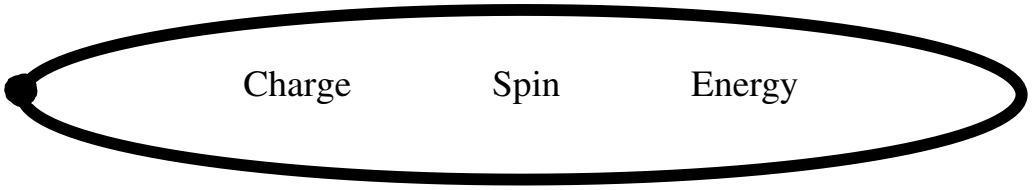
 a boundary which defines a particle

 charge, electromagnetic interaction

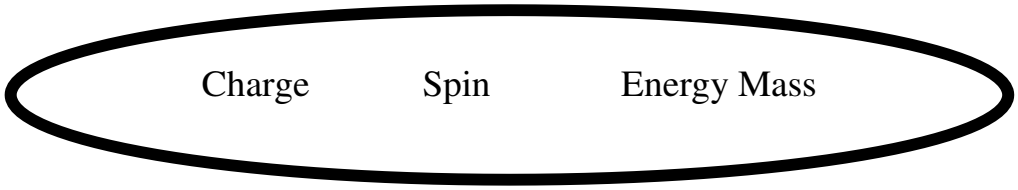
 spin, weak nuclear interaction

 energy mass (field), strong nuclear interaction

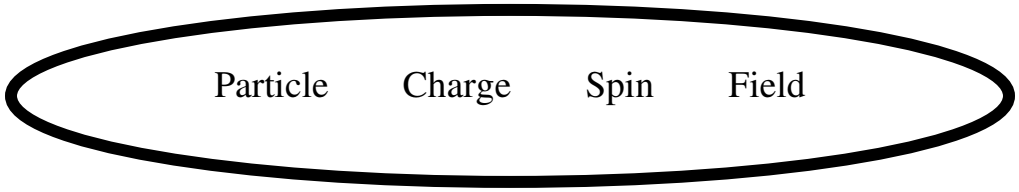
Particles can be shown in a variety of configurations as;


Charge Spin Energy

or


Charge Spin Energy Mass

or


Particle Charge Spin Field

Chapter 7.

Time and the Goldilocks Maximum Entropy Principle

It is interesting to note that the mathematical equations used to describe both General Relativity and Quantum Mechanics are generally agnostic with respect to time. They often work as well for negative values of time as they do for positive values of time. We all know that this is not the case for our personal experience which only deals with positive time and that results in our experiences being non reversible.

Part of this difficulty stems from the inability of physics to provide a physical meaning to the concept of *i,* the square root of minus one. Thus applications of complex numbers and quaternions are often structured in terms of complex conjugates so that the solutions of equations can be obtained from the real parts and the complex parts can be ignored. (This is the rational for the use of Hilbert spaces in Quantum Mechanics.) From the Relational perspective *i* is viewed as a mathematical function of the concept of memory. Consciousness exists in the present. The future is a representation of linguistic predictions and the past exists as memories. By equating *i* as a function of memory its presence in the quaternion equations becomes understandable and provides an additional tool for application.

When we talk about general relativity and quantum mechanics we will assume that they include particles like you and I and that we all exist in a space time that has a quaternion structure. When we actually use the basis elements of this quaternion structure in conjunction with measurements we actually make, then we make certain additional characterizations as to how zero, negative one, and positive one are used in the basis elements in any resulting calculations. Thus we will interpret that time exists in this space-time in three forms, the present, the past, and in the projected future. We will use negative ones in the basis elements to represent the present, what is happening now. This will include what we remember of the past, what happened before the present. We consider this to be determined. The descriptions are consequently deterministic.

But this is not the case for the future. Here we will use positive values of one in the basis elements. They will represent what we think might happen in the future. This reflects the fact that we don't know what will actually happen in the future and that it might be different from what we expect to happen. In all this we will not use the

symbol i to represent the square root of minus one. Instead we will assume that complex numbers should be represented by 2 by 2 matrices and that quaternions should be represented by 4 by 4 matrices, and that only values of zero, minus one, and plus one can be used. Here is what these matrices look like and how their squares are equal to minus one in the respective matrix form.

0	-1	0	0		0	-1	0	0		-1	0	0	0
1	0	0	0	multiplied	1	0	0	0	is equal	0	-1	0	0
0	0	0	-1	by	0	0	0	-1	to	0	0	-1	0
0	0	1	0		0	0	1	0		0	0	0	-1

0	0	0	1		0	0	0	1		-1	0	0	0
0	0	1	0	multiplied	0	0	1	0	is equal	0	-1	0	0
0	-1	0	0	by	0	-1	0	0	to	0	0	-1	0
-1	0	0	0		-1	0	0	0		0	0	0	-1

0	0	-1	0		0	0	-1	0		-1	0	0	0
0	0	0	1	multiplied	0	0	0	1	is equal	0	-1	0	0
1	0	0	0	by	1	0	0	0	to	0	0	-1	0
0	-1	0	0		0	-1	0	0		0	0	0	-1

0	1			multiplied		0	1		is equal		-1	0		
-1	0			by		-1	0		to		0	-1		

In this format quaternions and complex numbers are expressed in a form that allows for the interpretation of time as comprising the present, past, and future in calculations. Thus motion in a straight line involves complex numbers with the distance basis being one

1	0
0	1

and the time basis being

0	1
-1	0

This results in all equations of motion being wave equations.

With respect to this interpretation of the basis elements of a quaternion, the future is represented by positive ones. But because the future is indeterminant these numbers will be probabilistic and will be represented by a probability distribution of possible values. When we make calculations we can calculate the probability distribution by using the Maximum Entropy Principle based on what we know of the present and the remembered past. Then we can use a function of the distribution for calculations based on measurements made for space and time. The result of all this is that time is now no longer reversible. It only goes forward. The calculations still work but with this as an additional constraint.

The involvement of ourselves in space-time also changes our view of continuity. We are particles of consciousness and hence are quantized. We interact via language which is also quantized into words. Hence space-time must itself be quantized. However, we can still think of it as continuous by increasing the number of quanta until we can't distinguish them from each other. Our ability to make measurements always has a limit of resolution. If we can't tell the difference between two adjacent measurements then we might as well consider them to be the same.

The necessity of using quaternions for space-time was a first step in making general relativity compatible with quantum mechanics. The use of quaternions introduced constraints as to how our numerical measurements actually had to interact with other numerical measurements. It turns out that order matters. Nature is not commutative. Putting all this into a grammatical context so that we can use it to think resulted in the necessity of non associativity in addition to no commutativity.

Thus we end up with four number systems as comprising our mathematical language for describing science, as well as ourselves. These include the real numbers which comprise the counting numbers (integers), fractions (rational numbers) and exponentials (including roots, logarithms, and transcendental numbers like pi or the golden mean). These numbers are single valued and are mathematically commutative and associative. Second are the complex numbers which are not single valued but are commutative and associative. Next are the quaternions which are not single valued, nor commutative, but are associative. This

is followed by the octonions which are not singled valued, commutative, or associative.

To fully understand how time is incorporated into the Relational Science Model we add entropy, and in particular, the Maximum Entropy Principle, to the interpretations of the universe. We also assume that thermodynamic entropy is equivalent to informational entropy.

The basis for this assumption has evolved from the historical evolution of the concept of entropy. In physics the 2nd Law of Thermodynamics is essentially a statement about entropy. This can be experimentally measured thermodynamically and can be defined in statistical mechanics and quantum mechanics in terms of energy distributions, microstates, and probabilities. However, entropy only exists in chemical reactions that occur in positive time. In fact, it was the necessity to define an entropy term for each chemical reaction to account for the observations that chemical reactions cannot be reversed without adding additional energy. There are no perpetual motion machines in nature. Time as we experience it is positive. Memories are negative time.

Entropy and thermodynamics emerged from the early work on developing vacuum and air pumps by von Guericke, Hooke, and Boyle in the 1650s which was then extended to steam engines in the early 1700s. A formal understanding of these processes started emerging in the early 1800s by Carnot. This led to a formal definition of thermodynamics by Kelvin in 1854 and the creation of the second law of thermodynamics which defined entropy by Clausius in the following decade. In 1872 – 1875 Boltzmann formalized this with the equation $S = k \log W$, where W stood for the permutations of microstates in an ideal gas. This was then extended by Gibbs in 1878 to the Gibbs entropy equation $S = -k_B \Sigma_j p(j) \ln p(j)$, where k_B is Boltzmann's constant and the p(j) represent probabilities.

Thus the key concept in understanding entropy is that of probabilities and how that has evolved in terms of consciousness and language. To illustrate how this occurred consider its historical development.

In 1713 a work by James (Jacques) Bernoulli presented the first formal definition of probability which he called the "Principle of Insufficient Reason". This stated that given a situation containing a number of possible cases, none of whom we know to be more or less likely than any other, then the probability of an event

dependent on some of these cases would be the total number of cases favorable to this event divided by the total number of possible cases.

Bernoulli also extended this understanding to situations which could be well described but in which not all of the possible cases would be equally likely. He did this by relating probability to experimentally observed frequencies. Thus in his famous theorem he showed that over a large number of repetitions an observed ratio of events will not differ from its probability by more than an arbitrarily small amount. This was the first time that a formal principle had been presented for specific applications of the concepts of probability, and that marked the beginning of probability theory as a branch of mathematics.

Probability theory began to approach the problem of inference with the work of Thomas Bayes (1763). His results made it possible to estimate the probability of one event given knowledge of the probability of a related event.

All of this work was then collected and extended by Laplace (1749 - 1827) into an extensive treatment of mathematical probability theory. He expanded the work of Bernoulli and Bayes into a generalized procedure. This made it possible to estimate future probabilities of causally related events given the occurrence of certain initial events and the a priori probabilities of these initial events. The only problem with applying this result (known as Bayes' theorem) is that, unless Bernoulli's Principle of Insufficient Reason holds and all the a priori probabilities are equal, there is no way to estimate the a priori probabilities.

After Laplace probability theory itself stagnated while its applications continued to grow. Part of this can be attributed to a significant change in the understanding of the nature of probability. Instead of a ratio of favored over possible it began to be viewed as a frequency function. Thus a probability was determined relative to a given experiment and was defined as a limiting value of a very large number of repetitions of this experiment.

This view gradually began to change and then a series of critical discoveries were made.

The first of these was published in 1946 by Richard T. Cox. He showed that the basic mathematical nature of probabilities was independent of any reality other than the existence of language. Cox demonstrated that for a given linguistically stated hypothesis and a carefully defined set of inferences based on that hypothesis, a unique mathematical function could be defined which was identical to probability as used in the basic equations of probability theory. This meant that probability theory itself was derivable solely from language and a requirement that the theory be internally consistent. It did not have to rely on experiment or a relation to observable frequency functions in an external world.

At about the same time a paper by Claude Shannon in 1948 extended the concept of entropy, which had previously been primarily associated with thermodynamics, into information theory. He showed that for a given probability distribution there exists a function which is a unique and unambiguous measure of the amount of uncertainty associated with that probability distribution. Since this function had the same mathematical expression as the formula used in statistical mechanics for entropy, it was called the entropy of the probability distribution.

Then in 1957 Edwin T. Jaynes published the Maximum Entropy Principle (MEP). He used Shannon's entropy function, in conjunction with Cox's proof as to the linguistic nature of probability, to propose a general principle of plausible inference. This states that given certain information the best choice of a probability distribution based on that information will be the one which maximizes its entropy.

While Jaynes derived the maximum entropy principle primarily for statistical mechanics he did recognize that it was indeed a general principle of inference. Thus it will hold regardless of what type of situation is to be described by the probability distribution. Because it provided a "best" way to pick a priori probabilities it therefore solved the major problem which had hindered application of Bayes fundamental theorem as recognized and stated by Laplace. Consequently the maximum entropy principle became a model for rational decision making.

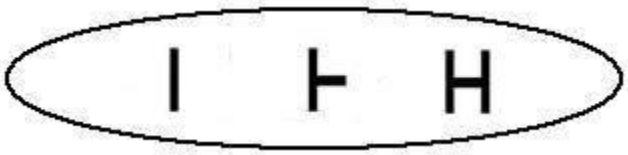
Because it was considered to be a truly generalized method of logical inference it was assumed that it was equally valid in both physics and information theory. Thus it was viewed as a way to make a “best” decision based on the available information that can be represented in terms of inferences based on one or more

hypotheses. This can be viewed as a way of considering the available information so that each piece of evidence is balanced with respect to all the other pieces of evidence so that they collectively optimize their impact on the basic entropy function. Note that if there is no relevant evidence available then the entropy function will treat all possible inferences equally.

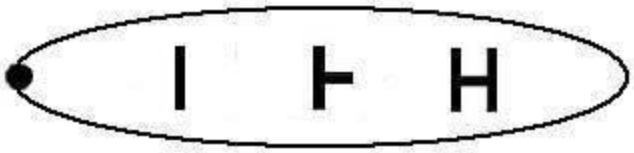
Shortly after Jaynes published the maximum entropy principle L. Bianchi and J.R. Hamann realized that it was of foundational importance in the origin and definition of life itself. They claimed that in order to build a consistent theory of living systems it was necessary to include the maximum entropy principle (MEP) in the foundations of a hierarchical system of organization stemming from a series of personal presumptions.

The Relational Symmetry Paradigm proposes that understanding the structure of the MEP can be useful in situations where it is not possible to formally define a system in terms of inferences based on hypotheses. Consider a state variable X that represents a Relational Symmetry, for example • | ⊢ H . The probabilities that any given sign in this symbolic formalism will be relationally symmetrical with the other three signs cannot be calculated in the way that the MEP can be numerically calculated because we do not have a precise understanding of the signs of the Relational Symmetries in terms of inferences and hypotheses. However, the Maximum Entropy solution can be sensed as a process by a living conscious organism in a manner that is comparable to how entropy exists in any given chemical reaction.

This provides an understanding of how the nature of particles (seen as boundaries) in a quaternion space time can also comprise charge, spin, and mass. The particles were recognized as forms of the original Relational Symmetries that were expanded by considering the boundary nature of self relation. This was visualized as;



Which could also be represented as



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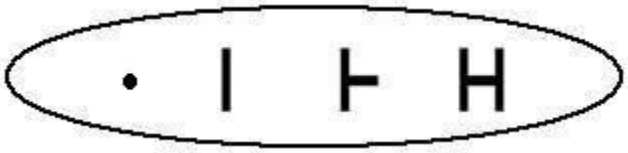


In each of those diagrams of the various particles, the original symbolic elements can be combined in different Maximum Entropy configurations that represent how a particle or a consciousness can exist within and of the universe. This symmetry applies regardless of whether the MEP can be numerically calculated and it combines both the structure and the process aspects of our reality.

Classically the Maximum Entropy Principle (MEP) is a generalized method of logical inference which is defined on a system in terms of inferences based on hypotheses.

The procedure is to pick a system that can be described in terms of a state variable, call it X, which can take on a series of numerical values. Thus X represents a hypothesis that the state variable exists, that it can be exhaustively described in terms of a fixed number of inferences, and that these inferences can be associated with specific numerical values. Assign a probability to each of these possible values, p(j), such that p(j) descries the probability that the j^{th} value will occur. This then becomes a number associated with the linguistic statement that the j^{th} inference will occur given the linguistic hypothesis presented by the state variable X.

(For example, consider a die, a cube with six faces and a number from one through six on each face with no repetitions. The p(j) represent the probabilities that when the die is thrown, the j^{th} face will be on top.)

If there is no additional information then the entropy S of the general situation is represented by;

$$S = - \Sigma_j \, p(j) \ln p(j)$$

Where there are n possible inferences based on the hypothesis of X.

Usually this term is constrained by the condition that the sum of all n probabilities must equal one.

If there is additional information available such that one or more expected value functions, F(u,j), can be defined on X then these provide additional constraints for a calculation of the best probability distribution for p(j). Here u is an index for the number of such expected value functions that are available such that;

$$< F_u > \quad = \quad \sum_j p(j)F(u,j)$$

Can be summed over all possible values of j, and $< F_u >$ is the expected value for the F(u,j) function.

Given m available expected value functions the MEP can be calculated using the method of Lagrange multipliers to determine the "best" probability distribution for p(j), where best is usually interpreted in terms of maximizing our uncertainty for any situation or decision. The basic equation is;

$$S = [-p(j) \ln p(j) + \lambda^*(p(j) - 1) + \Sigma_u(\lambda_u p(j)F(u,j) - < F_u >)]$$

Where S is the constrained entropy, λ represents a Lagrange multiplier, and there are n different p(j) probabilities and m different $<F_u>$ expected value functions. Setting S equal to zero and differentiating with respect to p(j) gives;

$$-1 - \ln p(j) + \lambda^* + (\Sigma_u \lambda_u F(u,j)$$

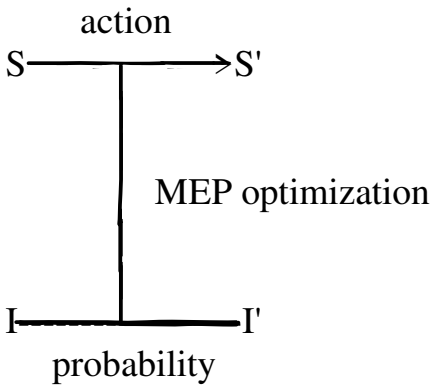
Setting $\lambda_0 = \lambda^* - 1$ gives

$$P(j) = e \exp \lambda_0 + e \exp (\Sigma_u \lambda_u F(u,j)$$

An alternative way to view this situation is to use numerical techniques to iteratively select values for p(j) and λ_u such that S will be a maximum.

One of the first applications of the relational systems theory of Jon Ray Hamann was a generalized decision model. In this model a system, S, is going to act and thereby achieve a new state, S'. The system S contains I, information about past and present conditions, and I', projections of possible futures. These are related to each other by value judgements and/or assignments of probabilities. These

evaluations or probabilities are in turn related to the action changing S into S' by a decision or optimization procedure



In this discussion I represents some state variable X which is expressed in terms of a probability distribution p(j) and various quantifiable functions. I' represents the expected value functions determined by projections made relative to available information. The MEP then determines the "best" or least biased decision based on this information. It should be noted that the calculation of p(j) can become very difficult for even moderately complex situations and this limits the area of applicability for the MEP.

The Relational Symmetry Paradigm proposes that understanding the structure of the MEP can be useful in situations where it is not possible to formally define a system in terms of inferences based on hypotheses. Consider a description of a state variable X that represents a Relational Symmetry, for example ⋅ | ⊢ H . Let the ● relation represent the entropy term, and the other three relational forms represent three expected value functions. Thus

● represents $\Sigma_j [-p(j) \ln p(j)]$

| represents $< F_1 > - \Sigma_j [\lambda_1 p(j) F_1(|, j)]$

⊢ represents $< F_2 > - \Sigma_j [\lambda_2 p(j) F_2(\vdash, j)]$

H represents $< F_3 > - \Sigma_j [\lambda_3 p(j) F_3(H, j)]$

Then require that $\Sigma_j [p(j)] = 1$

If we could define functions for the $\mid, \vdash, H$ relations that are expressible with numbers we could solve this equation by choosing values for $\lambda_1, \lambda_2, \lambda_3,$ and the p(j) such that the sum of the four $\cdot \mid \vdash H$ constraints is a maximum. This would balance our Maximum Entropy equation. The p(j) would then be the probability that any given sign in this symbolic formalism will be relationally symmetrical with the other three signs.

However, when we cannot define functions for the relational terms that are representable with numbers we can still make balanced (aesthetic or artistic) judgements about our description. These would not be calculated in the way that the MEP can be calculated given precise inferences based on a hypothesis, because we do not have a precise understanding of the signs of the Relational Symmetries in terms of inferences and hypotheses. However, the Maximum Entropy solution can be sensed by a living conscious organism in a manner that is comparable to how entropy exists in any given chemical reaction. Note that this formulation of the MEP constrained by three expected value functions is symmetrical with the one three fourness of the quaternion. This suggests that there are additional ways that conscious entities understand and evaluate information in creative and decision making processes.

Nature does not use numbers to calculate a chemical reaction entropy. However, we consider it, and calculate it if we can, whenever we examine a real world chemical event. But whether we can do the calculation or not, the reaction occurs and the entropy change of the reaction also occurs. Since we are composed of chemical elements undergoing chemical reactions all the time we have a connection to, and sense of, the entropy component of the reactions. If we have an awareness of this connection we can sense when it is in balance. This is commonly called intuition. That is what the Relational Symmetry Paradigm is all about. It allows us to make a “best” decision or judgement based on who we are and what we know.

This is similar to the guidance that the Feynman diagrams confer to physicists doing Quantum Mechanical calculations. The diagrams do not directly reflect a physical reality but they are useful in helping us make calculations and predictions as to how to how that reality might behave in certain situations. The Relational Symmetry Paradigm serves a comparable function for us when we try to

understand ourselves and the universe in the situations where the known paradigms of science, religion, and politics break down.

We as conscious entities frequently encounter situations where a calculation of the MEP is not possible or practical. This occurs throughout biology where we do not fully understand the linguistic or semiotic nature of any given living system. Despite not knowing these details we still believe that it is valid to apply this symmetrical extension of the MEP to the way that all living systems are structured and make decisions. Any action taken by a living system is the result of a decision made in terms of a language or semiotic system used by the living system. Consequently the physical entropy changes of the resulting action are compatible with, and representable by the MEP used to make the decision, as long as the information available for that decision is a valid representation of the situation.

What this means is that each individual organism makes decisions that lead to actions that obey the MEP and consequently obey the physical Laws of Thermodynamics. This is true even if we cannot calculate this due to the complexity of the organism and situation, or our unfamiliarity with the language of the organism itself.

The “languages" that comprise our normal experience include a cellular semiotic code of DNA, RNA, and protein synthesis, a neurological cybernetic language involving dendrites and neurotransmitters or computer programing languages, and natural languages used by humans, and some higher vertebrates and invertebrates. This results in three trophic layers of biological organization, all of which involve the MEP as to how the individual organisms act, how the populations of organisms act within a given layer, and how the multitrophic layers themselves interact with each other. As you can see the complexity is enormous and each action we, or any other living organism, takes is almost always indeterminate from a computational perspective.

Fortunately, nature does not do the math in the same way that we do the math. The entropy is just an integral part of the geometry of the universe and all actions and motions are consistent with some sort of linguistic representation associated with the conscious entity that initiated the action or motion. There are no numerical calculations that the physical world does to cause this.

An interpretation of what this might mean involves the concept of quantum entanglement in physics. This proposes that objects that have been interacted with each other and then separated could still share some condition or state. Einstein

famously opposed this idea and called it “spooky action at a distance”. Despite his objections there is experimental evidence that seems to support such entanglement.

The Relational Science Model would suggest that this mystifying phenomena may be understandable in terms of the language used to frame the hypotheses and define the experimental apparatus used to verify it. Evidence supporting this view has recently emerged from work that provides an explanation of quantum entanglement in terms of the maximum entropy principle (MEP).

Finally, adding some understanding and formal representation of entropy and the Maximum Entropy Principle makes it possible to fully integrate biology, psychology, and sociology with physics and chemistry. The key issue is that although nature does not do math the way that we do the math, the way conscious entities make decisions is still compatible with the MEP. The formal expression of the MEP is just an incomplete and simplistic representation of an aesthetic and artistic process that is the essence of the Relational Symmetry Paradigm and is the actual manifestation of the relational symmetries in our lives.

The driving force for how a universe of consciousness functions resides in an understanding that all change in the universe is the result of decisions made by the conscious entities that comprise the universe. We see this in science in the concept of entropy. It initially appeared in thermodynamics and was later expanded into information theory. Then it evolved into the Maximum Entropy Principle (MEP) which provides a way to mathematically calculate a “best” decision based on available evidence. Classically the MEP is a generalized method of logical inference which is defined on a system in terms of inferences based on hypotheses. It becomes difficult to calculate except for relatively simple situations that can be precisely defined. Thus it has not achieved widespread application.

We maintain that the Maximum Entropy Principle is just an incomplete and simplistic representation of an aesthetic and artistic process that is the essence of, and an actual manifestation of, relational symmetries in our lives. Historically art has been a means of expressing and communicating what we all recognize as beautiful and good. This has been a mainstay of religion and a characteristic inherent in all of us that we instinctively know what is the right thing to do (even when we don’t do it). However, art has almost always been outside of the analytical tradition that incorporates pragmatic or scientific procedures based on evidence and reproducibility. Artists generally do not do the math. But then, nature

also does not generally do the math, at least not like mathematicians and scientists do.

So if nature does not do the math like scientists do, how do we function as artists? How do we recognize the good and the right? How do we make the aesthetic and creative judgements we all make. The emotional sense that we know what feels good, what makes us happy, how we want to be treated and how we should treat others.

To describe this we introduce the Goldilocks Maximum Entropy Procedure (GMEP). This is derived from the 19th century English fairy tale of Goldilocks and the three bears, at least the friendly version of it. It also can 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. 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 procedure can work to some degree at all levels of effort. However, it can be greatly enhanced by dedication, study, focus, reflection, determination, and practice, practice, practice. The more you work at it the better your understanding will be. The quality and humanity of your decisions will improve, and so will the happiness and satisfaction of your life

I maintain that the Goldilocks Maximum Entropy Principle is just an incomplete and simplistic representation of an aesthetic and artistic process that is the essence of the Relational Symmetry Paradigm and is the actual manifestation of the relational symmetries in our lives.

To get a sense of how this can be applied look at artistic and aesthetic judgements or opinions.

Historically art has been a means of expressing and communicating what we all recognize as beautiful and good. This has been a mainstay of religion and a characteristic inherent in all of us that we instinctively know what is the right thing to do (even when we don't do it). Art has almost always been outside of the analytical tradition that incorporates pragmatic or scientific procedures based on

evidence and reproducibility. Such approaches rely on mathematics and the use of symbolic formalisms to quantify, measure, and record information.

In the early 1900s, art began to approach a use of symbolic formalisms as a means of expressing and communicating non quantifiable information. This can be seen in the following works;

Kazimir Malevich, Black Circle, 1924, self relation as point or system

Wassily Kandinsky, “Point and Line to Plane”, 1926,

Piet Mondrian, Tableau I, 1921, concept of distinction

Alexander Calder, mobiles, early 1930s, motion and time.

Over the last fifty years this has evolved a sophistication, both artistic and philosophical, that has been formative to the development of the Relational Symmetry Paradigm.

For me this influence can be best appreciated in the work of Lynn Northrop, my wife for more than 53 years. Her sculpture represents an aesthetic philosophical and creative connectivity that she expresses in birds of power. These birds are comprised of objects from many sources. They act like capacitors of emotion and understanding, integrating objects which have been touched by many hands and by nature and transforming them into works of wisdom, power, and beauty. The resulting sculptures can transmit, sometimes almost instantaneously, an understanding of connectivity which embraces all of us as observers, and consequently as participants, in a universal reality. They are the signs and seed crystals which represent, restore, and recreate the mystery and wonder of the universe and of ourselves.

These sculptures represent a direct and powerful form of the Relational Symmetry Paradigm. They embody an intuitive and emotional understanding of the relational symmetrical forms and how they all are interconnected with us and all of the different elements of the universe. This understanding embodies compassion and connections without the need for mathematics or formal modes of reasoning. It resonates within us all just as entropy resonates within all chemical reactions.

For a sample of Lynn’s work see Home | Lynn Northrop

Here is her description of her philosophy.

“It is part of the human experience to imbue objects with meaning and power. Throughout history many cultures have practiced rituals wherein certain objects are believed to be portals of communication with the Everything, a god, ancestors, or departed friends.

These objects are magical and often contain substances: bits of the corporal bodies of Saints (Catholic relics), bits of strong animals and strong plants (Nkisi figures from the Congo), mummified internal organs of powerful people (Egyptian Canopic Jars). These objects are believed to have the power to connect us to them and through them to the Other so that we may share some of their grace and/or power.

Some objects become powerful as symbols: A country's flag has the power to evoke strong feelings of patriotism: Wedding rings are a symbol of a bond of love shared.

Other objects, some quite ordinary, can become extraordinary and take on great meaning for individuals: souvenirs, Aunt Millie's teacup, Mom's locket - all have the power to transport us to another time and place and have significant emotional impact. Because these items were once used or worn and cherished by someone it feels as if they left a small amount of energy in the object that connects us to them.

I am interested in the power of objects. Specifically the power of objects that act as emotional conduits to other people, places, ideas, and history.

The Metropolitan Museum of Art has in its Greek and Roman wing, a hand mirror, that at one time, was exhibited standing upright in a case so that you could marvel at the intricate bas relief on its back. The case also held combs and small pots - all lovely and interesting, but it was not until you went to the back of the case that you could catch a somewhat obscured reflection of your own face in that mirror. Suddenly a connection is made to that woman thousands of years ago who looked in that same mirror and combed her hair.

There have always been amulets, good luck charms and love tokens that, when lost, raise havoc until found. We imbue these objects with the power to heal, connect, and protect us and their loss is felt incommensurate to their actual value.

Does a baseball player really hit better if he wears his "lucky shirt"? Why would someone pay thousands of dollars for Elvis's worn shoes or JFK's watch? Why do soldiers carry photos and trinkets into battle?

Some objects focus our scattered thoughts and this concentration allows us to do great things. Some objects help us connect to the Eternal web of life and give us hope and courage.

Seed Crystals

When I was young I made some rock candy. There were many messy attempts ending in failure before I eventually ended up with a few largish crystals on a string and a lot of small crystals stuck to the pot. The clean up effort was worth the success!

To make rock candy you heat a sugar solution to supersaturation then attach a single sugar crystal to a string or stick and suspend it in the center of the pot. As the solution cools crystals form around the "seed" crystal and you can watch it happen - like magic.

Much later in life I returned to that process when thinking about ideas and how they come into being - much like my sculpture. Often we have a lot of parts - maybe even all the parts we need - but it is just not coming together. the idea/project has to be put on the back burner to supersaturate. Then, days, weeks, months later out of nowhere, a seed crystal drops in and suddenly the whole is obvious! Like Newton’s apple.

The Seed Crystal series encapsulates that process - bits of nature preserved - waiting to drop into our supersaturated lives and remind us of our connection to nature and the whole.

The Birds

Birds have that one quality that man does not have and has always craved - the ability to fly. Flight is a metaphor for freedom and transcendence, and since I am interested in the power of objects, I choose powerful birds to convey this meaning.

Each bird is comprised of many disparate parts and each element has had a

previous life before becoming part of this bird. Parts can come from anywhere - dropped feathers and bones from the woods, shells and rusted metal bits washed up on the beach. I have inherited or been given many parts to include in my work and some I seek out specifically. A box of rusted straight razors from my husband's grandfather became feathers in more than one bird, while the D from a long gone drugstore sign showed up in a flea market and became the base for another. There are tools, machine parts, and household items, musical instruments, furniture parts, candlesticks and lawn mower parts. Each part seems to have a small amount of energy left in it from its former life. These tiny energies become amplified many times when combined, and together, through the connectedness of all, the finished piece has a powerful energy of its own."

Real art is inspirational. It speaks to us emotionally as to what is beautiful and good. It creates empathy and understanding, and is the guide for what is the best of human behavior. In the Relational Symmetry Paradigm real art is viewed as the non mathematical expression of the Goldilocks Maximum Entropy Principle. It is that inherent knowledge that we all have as to what is right.

Chapter 8.

The Electron Proton Hypothesis

For a long time I have argued that the problems and inconsistencies in modern physics are due to not including consciousness, language, and creativity in the foundations of physics, but I have never stated explicitly how to do that. This started to change in the last few months by including the presumptions that electrons are male conscious particles and protons are female conscious particles. To briefly review how we got here.

Start with how we represent our experiences by counting and measuring. We create the concept of space and symbolize it as measurable with rulers, length, width, and height (| ⊢ H). Similarly we create the concept of time as expressing change and measure this with clocks (●). Combine these ideas with the ideas that the universe is comprised of particles (atoms) having weight (mass) to generate Newtonian physics. Assigning a postulated electric charge (plus or minus) to the particles allowed Newtonian science to include electromagnetism. At the same time the development of the steam engine led to thermodynamics and the concept of entropy. These ideas were added to show how change actually occurred in how we measure and experience time. Change was recognized as being irreversible.

Special relativity began to change physics in 1905 by replacing the idea that a three dimensional space measurable with rulers could be viewed as changing with respect to time as measured with clocks. Instead, a four dimensional space – time was proposed in which time was converted into distance (measurable with rulers) by multiplying it with a velocity (the speed of light). Change in the resulting four dimensional description then had to be covariant with respect to observations made in different frames of reference that were in uniform motion with respect to each other.

This was later expanded to general relativity in 1916 by incorporating mass into the four dimensional space – time, which now changed in accordance with a tensor formulation. In all this real numbers were all that were necessary. Unfortunately, this did not satisfactorily include the observations of charge and atomic and subatomic behavior. Quantum mechanics then emerged in the 1920s as a very successful way to describe the atomic and subatomic behavior. However, to do this the real numbers had to be replaced with spinors which involved complex number

and quaternion mathematics. This was clearly incompatible with general relativity which only required real numbers.

In addition to being incompatible with each other neither general relativity nor quantum mechanics delt satisfactorily with thermodynamics because their equations worked equally well with both positive and negative values of time. This is an obvious contradiction with our personal experience which shows that time is irreversible. You can't go back.

We propose that all these inconsistencies arise because consciousness, language, and creativity were never formally incorporated into the foundational presumptions upon which physics was, and currently still is, based. Consequently, it doesn't matter if time can go both forward and backward, or that you need to use different types of mathematics to describe phenomena that are either very big or very small.

We resolve this by assuming that we are the universe. We are the fundamental particles. We interact via language which becomes the space – time of what is real. We know the present, we are living it. And we remember the past, we recorded it. So these are deterministic ideas. But the future is unknown, therefore probabilistic relative to the present and the past. We have also learned that the future, once we experience it, often is different from what we expected. Thus we know that we can change what happens in the future relative to what our present expectations are, and how they are influenced by what we remember from the past. We can create new experiences, not necessarily predicted or determined by the past or the present. We are creative. The universe is continually being created.

So how do we formally describe this. Start by looking at ourselves. I am a male consciousness, a fundamental quantized unit of existence in the universe. I can sense and act in this universe. I am also in communication with, and hence integrally connected to, a man's body, my body. This I perceive to be an organization of many other units of existence in the universe. Some or all of these may be as conscious as I am. This integral combination of consciousness and body organization that occurs via communication is what we define as a person. It is what allows us as conscious entities to sense and act in an external universe. Similarly, you are a person, and that means that you are either a male or female consciousness, that you are also integrally connected to, via a communication relationship, either a man's or a woman's body organization, your body, and that this allows you to sense and act in the universe.

You and I as people, conscious entities with bodies, communicate with each other via language. We also communicate with many other people who we know are like us, conscious entities with bodies. We also form organizations by communicating with each other and this allows us to combine and coordinate our actions to mutually benefit each other. As our organizations become larger and larger we often lose the personal communication and interaction we have on an individual level with each other. It becomes more of an interaction via communication with the organization as an entity, in and of itself. It becomes more like how we interact and communicate with our bodies.

We as persons can personally interact with each other and enter into relationships that can create new conscious entities with bodies, new persons. This occurs at two levels. At the body organizational level, a man's organizational body can form a new organization, an organizational pre-body, a sperm cell, with which he can no longer directly communicate as the consciousness part of his person. Similarly, a woman's organizational body can form a new organization, an organizational pre-body, an egg cell, with which she can no longer communicate as the consciousness part of her person. The sperm cell organization can then combine with the egg cell organization to form a new body organization, a fertilized egg, that is not consciously connected to, or is in communication with, either of the conscious entities that were involved with the organizational formation of the sperm and egg that combined to form a new organizational body.

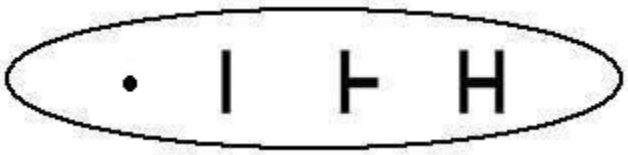
This new body organization can then become a person if it becomes integrally connected to a consciousness, via the establishment of a communication relationship with that consciousness. This is sort of similar to how we as conscious people can interact with and thereby influence the actions of the organizations we belong to as people. We could be anywhere in that organization and still have that influence. Thus a consciousness could start to influence a body organization it may be in, but not integrally connected to via a communication relationship. This consciousness cold have been in, but not controlling, either of the formative body parts that generated the combined organization.

However, a male consciousness may also be able to directly interact with a female consciousness to produce new conscious entities. This is an independent event which may or may not be connected to forming a new body organization. If this does occur concurrently with the formation of a new organizational body from their respective bodies, and if that new body becomes integrally connected to a

conscious entity, then the new conscious entities can become part of the new person. One of them may even establish the communication relationship that transforms the new organizational body into a person.

Normally a male consciousness is integrally connected to a man's body and a female consciousness is integrally connected to a woman's body, but that is not always the case. Sometimes a male consciousness may become the one that is integrally connected to a woman's body, and vice versa. Similarly, the consciousness that becomes integrally connected to a new organizational body may be one of the new conscious entities that may have been created by the interaction of the two consciousnesses of the two people involved. But again, that is not necessarily the case. For example, if you and I and others are forming a new organization we don't usually choose the youngest and least experienced member of the organization to be its facilitator, or leader, or executive. This may or may not apply to how a consciousness becomes linguistically connected to a body organization.

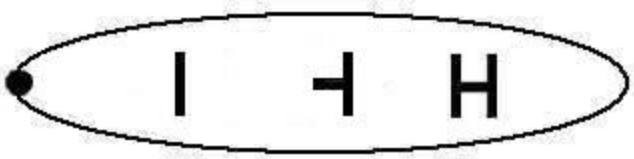
Now, how can we apply this. Science tells us that the universe comprises fundamental particles. The most stable of these, the ones that have very long life spans or half lives, are the electron and proton. So I will assume, that I, as a male consciousness, am a negatively charged electron (the negative part identifying me as male). I also assume that I have a body organization that is bounded, that is, distinguished from the rest of the universe, and that this organization represents the mass of the electron.



(1)

Here the I ⊢ H symbols represent the language space time of the male conscious entity. This is also the mass of the electron. Remember general relativity, mass is a property of space time.

Similarly, I assume, that female consciousnesses are protons (the positive charge denoting female). They also are bounded and their organizational language space time bodies represent their mass.

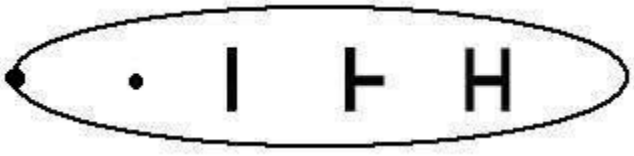


(2)

Protons are detected by physicists as having a mass that is much greater than the mass of an electron. This is due to the nature of women's bodies which have the internal organizational structure that can nurture a fertilized egg (containing a consciousness integrally connected to a developing organizational body) into a new born baby that we recognize as a person. This increased mass is represented by the consciousness point actually being a part of the boundary of the proton. Note also that the sex identification for women is represented by ⊣ which is the reversal of the ⊢ symbol used for males.

The combination of the point consciousness with the boundary defining the proton is what caused the relatively large increase in the mass of the proton compared with the mass of the electron. This may account for the perception in physics that protons are composed of quarks. The point consciousness being a part of the boundary of the proton is what allows this configuration of the internal language of the proton to be detected and manifested as the increased language space time (mass) of the quarks. This is contrasted with the electron which has no such combination of the conscious point with the defining boundary of the electron and hence has no such increased internal language space time mass. There are no quarks in an electron.

Men and women also combine in relationships that may be stable and participate in additional organizations. This is symmetrical to the creation of neutrons which are a combination of an electron and a proton.



(3)

Note here that the ⊣ symbol has reverted to its male form of ⊢ . The interpretation that we make is that the male consciousness point has become a partner with the female consciousness point by crossing (entering) the female boundary, but that in this process it has brought with it the male I ⊢ H

internal language space time mass structure. This is the female compensation for allowing the male to join her in her proton boundary. Thus she allows for a change in the ┤ component to revert to the male form of ├, but the defining boundary is still hers. From the physics viewpoint this would correspond to the female converting an up quark into a down quark. We view these events as the "marriage" or interrelation of men (electrons) and women (positrons), which may, or may not, create new particles to sustain an expanding universe.

Neutrons are very stable when they are part of the nucleus of an atom but much less stable when not in a nucleus. They, along with other electrons, protons, and neutrons, can also participate in additional organizations such as atoms, molecules, stones, cells, etc., us.

All of this generates a symmetrical mapping of our experiences and interactions as men and women into the behavior of electrons, protons, and neutrons as they interact to form atoms, molecules, and larger organizations. Thus any electron or proton in the universe, whether in my body, or your body, or in some sort of plant or animal, or rock or ocean or planet or star, or anywhere else, will exist and function in a manner that is symmetrical to how you and I exist and function.

This also implies that electrons and protons have one or more additional external organizational languages and that they use these to communicate and interact with each other. Our symmetry argument would indicate that their languages are quantized, as is ours, into words which can be connected to represent and describe ideas. This would include their understanding of space and time. Presumable this would be the same as our understanding of space and time.

The words (signs and symbols for us) which electrons and protons would use as the signs of their external organizational language would most likely comprise the exchange particles that have been detected in the experimental research of quantum mechanics. So far some 400 or so of these exchange particles have been detected or inferred. They include the quarks, neutrinos, bosons, muons and tau particles (but not the electrons) of the Standard Model. Their life spans or half lives are usually of the order of a millionth of a second or even a trillionth of that short time. This is contrasted with the life spans of electrons and protons which are in the millions to billions of years ranges.

We of course, have many more than 400 words in even our simplest of natural languages and so it is reasonable to suppose that electrons and protons also have

much more extensive languages available to them than what we have detected so far with quantum mechanics. Such words may deal with “ideas” (reflections of, or for, electrons and protons) that are different from “reals” (the actual exchange particles we can detect experimentally). This could relate to the perception of words that are interpreted as antimatter in physics.

For example, we might perceive positrons as positively charged electrons, but because the actual combination of a positron and an electron results in annihilation of both of them, the positron could be just a different linguistic concept of how to describe energy in terms of reflections of electrons.

This also provides a possible perspective as to why we might think that positrons are the fundamental female conscious entities (positively charged) to compliment the fundamental male conscious entities (negatively charged) electrons. But women are fundamentally different than men. They have different ideas about home, house, family, and children than men do. Men, as electrons, basically are not as concerned about these ideas, unless, they are interested in, and want to participate in, forming a marriage type relationship, a neutron, with women. At that point they tend to buy into the ideas that women have. So perhaps the additional ideas that characterize women’s internal space time bodies as protons are quarks. Science only detects (imagines) them in terms of additional mass (more space – time language ideas) that are added to the female consciousness to make it look like, and be detected as, a proton for the scientist. When a man then “marries” a woman to produce a neutron, she then rearranges her ideas to accommodate him by taking him in and converting an up quark idea into a down quark idea to make him feel more comfortable, and hence the neutron more stable.

So if I have a language that has a structure that successfully describes particles, space, and time in terms of real, complex, quaternion, and octonion numbers and mathematics, and if that language is symmetrical to the ones we have as people, then I could assume that this description is symmetrical to, and equally valid for, all the other electrons, protons, men, and women in the universe. This is not dependent on who or where they are. Anywhere in the universe, big or small, close or far away, it is all symmetrical. This is the Relational Symmetry Paradigm.

Mathematically we can look at it this way. The Standard Model uses the following format SU(3) x SU(2) x U(1). But SU(3) is just a generalization and extension of SU(2), one that uses the 3 by 3 Gell-Mann matrices the way that SU(2) uses the Pauli matrices. Here are the Gell-Mann matrices

$$\lambda_1 = \begin{bmatrix} 0 & 1 & 0 \\ 1 & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix} \qquad \lambda_2 = \begin{bmatrix} 0 & -i & 0 \\ i & 0 & 0 \\ 0 & 0 & 0 \end{bmatrix} \qquad \lambda_3 = \begin{bmatrix} 1 & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 0 \end{bmatrix}$$

$$\lambda_4 = \begin{bmatrix} 0 & 0 & 1 \\ 0 & 0 & 0 \\ 1 & 0 & 0 \end{bmatrix} \qquad \lambda_5 = \begin{bmatrix} 0 & 0 & -i \\ 0 & 0 & 0 \\ i & 0 & 0 \end{bmatrix} \qquad \lambda_6 = \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & 1 \\ 0 & 1 & 0 \end{bmatrix}$$

$$\lambda_7 = \begin{bmatrix} 0 & 0 & 0 \\ 0 & 0 & -i \\ 0 & i & 0 \end{bmatrix} \qquad \lambda_8 = \frac{1}{\sqrt{3}} \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & -2 \end{bmatrix},$$

Also, complex numbers, when expressed as 2 by 2 matrices using only 1, -1, and 0, are just factors of SU(2) when it is expressed as 4 by 4 matrices using only 1, -1, and 0.

We can compare this to the structure of Ododu as it is evolving to approach a Hypothetical Universal Language. The primary relational symmetry of • | ⊢ H and its reflection in O Q ◌ ∞ have been shown to be symmetrical with a quaternion. Using these relational symmetries in the Relational Symmetry Paradigm structure of

·		⊢	H
O			
Q			
◌			
∞			

generates a 4 by 4 array of archetypal concepts which form the core of the Ododu language. These can be viewed as being symmetrical to a quaternion based space time geometry. There is also a symmetry between these Ododu language constructs and the language which the Standard Model uses to describe a lot of atomic and subatomic behavior. Thus an octonion grammar combined with various uses of quaternions represented with 4 by 4 bases could be symmetrical with the Standard Model and provide a basis for its extension to other phenomena that it cannot currently describe.

We now presume that an interpretation of an electron proton consciousness implies that they actually use an electron proton language (represented in part by the transfer and other subatomic particles of the Standard Model) in their organizational behavior that builds atoms and molecules. We believe that this hypothetical electron proton language is in itself an approach to a hypothetical universal language and therefore will show strong symmetries with our human languages, and particularly with those that are themselves approaching the hypothetical universal language.

If our man woman language is in fact symmetrical with the electron proton language then they may already know something about us just as we already know something about them. We may even be able to seek to build a covariant communication between us, as men and women, with them, as electrons and protons. This also suggests that knowledge about how the Standard Model works at the atomic and subatomic level may be relevant as to how we can improve our own organizational structures and dynamics.

Finally, consider the following.

An electron is tending bar when a hydrogen sulfide molecule walks in, sits down, and says, I don't feel so good. Do you mind if I fart? The bartender says, Well, I guess not, but if you do I will have to charge you, and you might explode.

Now this is absurd. Electrons do not have a sense of humor and they don't tell jokes, particularly not when tending bar.

Or do they.

Maybe this electron is happily married and lives in a neutron with a proton. They are actively involved in a nitrogen atom organization that is also part of a protein. This protein is part of a neuron that is in turn part of the brain of, you guessed it, a bartender.

Now, when this electron bartender goes outside on a cold clear night, doesn't he, the electron, see the same night sky that we do?

Chapter 9.

Generated Technologies;

These are technologies that over the last 50 years have been developed and applied concurrently with the development of Ododu and the Relational Symmetry Paradigm. This constant interplay of the theoretical and applied has generated an evolutionary process that has had many stops and starts, many recyclings, and many mistakes. These get corrected, modified, repeated in new or changed form, and repeated again. It is the embodiment of the pragmatic methodology of inductive, deductive, and abductive reasoning fused with the experimental scientific search for supporting evidence. It is an ongoing process that continues to this day and will continue into the future. Hence the many mistakes that I am sure are contained in this document.

However, in this particular evolution and development, the entire effort has been in a constant interrelationship with an overriding artistic aesthetic. This has provided the inspiration and motivation as to why this is important and needed. It has also supplied the guidance, the constant course corrections, that are essential to make sure that the technologies do not go out of control and end up doing more harm than good. This is an element that has too often been lacking in how we have used technology in the past.

TimberFish Technologies

Executive Summary

TimberFish LLC. is a New York State corporation, incorporated on September 3, 2008, and doing business as TimberFish Technologies. It is an operating company that develops, markets, and implements environmental biotechnology to produce contaminant free, locally and sustainably produced fish and shrimp from currently unutilized resources such as clean food and beverage waste streams. These can be combined with a wide variety of nonagricultural plant materials that can be sustainably harvested from diversified ecosystems such as forests, and used to grow microbes, which are fed to invertebrates, which are fed to fish and shrimp. The resulting seafood is contaminant free, locally produced, and the process is ecologically sustainable, and economically competitive in todays' market.

TimberFish can mitigate and reverse Climate Change by creating profitable businesses that locally produce contaminant free seafood from sustainably harvested forest material. This can economically incentivize large scale reforestation and new forest development. These new forests will sequester large quantities of carbon that currently exists in the atmosphere as carbon dioxide, thereby significantly reducing such atmospheric concentrations that are a prime contributor to Climate Change.

Large scale development and implementation of this technology could boost our economy by generating many new jobs in all areas of the country and the world. It will also generate new food chains that are local, safe, and secure. This production of contaminant free seafood will also be accompanied by the production of renewable energy, soil amendments and potting soils, and clean water that meets tertiary treatment reuse or discharge standards.

The TimberFish Technology provides a profitable platform for the local and sustainable production of food in a forest based circular economy. In a general embodiment the technology can use food wastes, which can be combined with the wood chips from forests, to serve as substrates for growing microbes, which are fed to invertebrates, which then are fed to fish. This resolves another problem in that currently about 40 percent of all food produced is wasted.

The technology can use many other sources of unutilized nutrients and other plant materials or derivatives, as long as they do not contain toxic substances. The TimberFish facilities could incorporate constructed wetlands to restore clean water

sources for reuse, groundwater recharge, and wetland habitats. They also could include cogeneration facilities to produce electricity from the high energy wood chip residuals produced by the TimberFish process. The economics of the total system incentivizes new forest development, reforestation, and deforestation avoidance. This could generate sufficient additional carbon sequestration capacity to significantly reduce atmospheric carbon dioxide concentrations.

TimberFish is licensing this technology. We can provide services comprising design, engineering, permitting, construction and project management, operation, branding, and marketing. We are committed to continuing research and development programs in conjunction with colleges, universities, and businesses to further support and expand this technology.

See www.timberfishtech.com

or our introductory video:

https://vimeo.com/254851511

The Process

The TimberFish Technology (TFT) combines elements from Recirculating Aquaculture Systems, Integrated Multi-Trophic Aquaculture, and Biological Municipal Wastewater Treatment. The resulting technology has been implemented in a complex and diversified ecosystem production facility that raises fish and other seafood utilizing plant material harvested from non- agricultural land and production residuals from the food and beverage industries as sole material inputs.

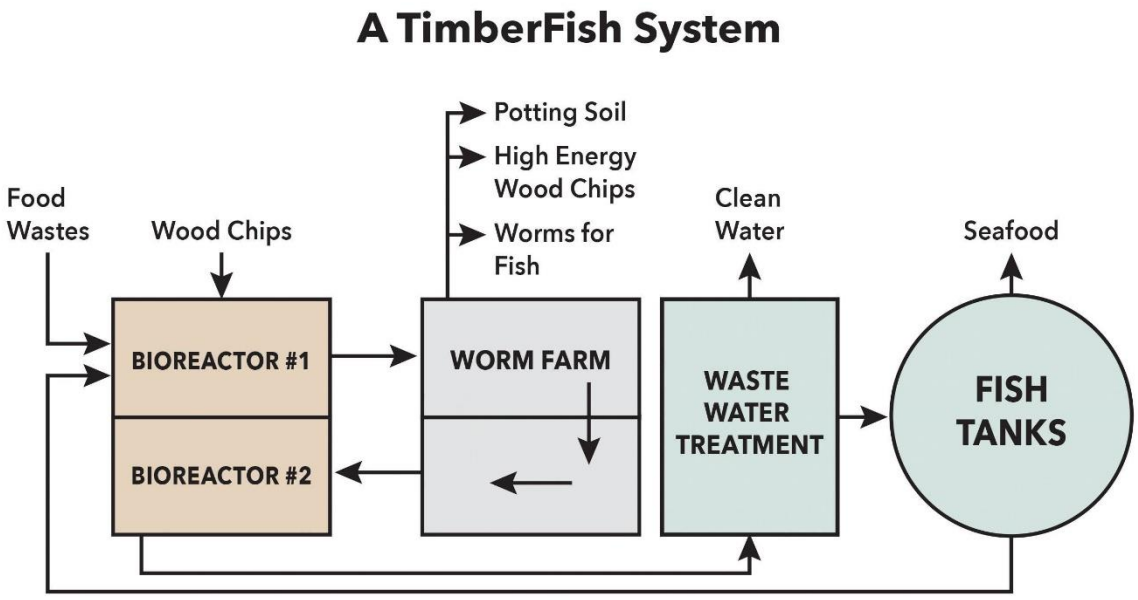
The TFT mimics the natural food-chain of fish and macro-invertebrates. It combines water purification and underutilized biomass to produce salable seafood and biofuels. The process is local, sustainable, environmentally friendly, removes solid and soluble pollutants from water; creates contaminant-free seafood; is not dependent on chemical use; and generates enhanced biofuels. TFT is economically attractive, providing a commercial driver for the global proliferation of environmental best practices including reforestation and deforestation avoidance.

The process comprises a series of interconnected internal recycle flows and sub environments that contain a large variety of organisms ranging from microbes, to

invertebrates, and fish. It works by combining plant material with nutrients contained in by-product waste streams. The microbes are grown in this mixture and then become food for the invertebrates that are also resident within the system. The structure of the system is such that it is easy to provide these invertebrates to the product fish or other seafood that also reside within the system for their consumption.

The TFT system is designed to contain an extremely large variety of microorganisms and many different species of invertebrates. All of these can reside in various physical sub environments ranging from suspended floc structures and single cell aggregates to fixed film layers that will reside on the matrices comprising wood chips, grain hulls, and other grain and fruit non fermented residues.

A general schematic of the process is as follows.



TimberFish and Climate Change

TimberFish proposes producing a significant fraction of the world's food from sustainably managed forested land. This could allow the conversion of some existing open forests, savannahs, grasslands, and croplands back into managed forests over the next 20 years. As these forests grow there should be an annual net removal of carbon dioxide from the atmosphere. Part of this removal could be used to produce food and part would be sequestered as carbon in the forest biomass. An additional benefit would arise since appropriate management of these forests would greatly reduce the occurrence of forest fires and this would help reduce atmospheric carbon dioxide concentrations.

The assumption here is that a commitment to the TimberFish Global Climate Change Plan would be made in 2020. This could then continue the existing development and rollout program leading to large scale global implementation of this technology in 2025.

By 2025 the TimberFish Technology could be applied to 51.9 million acres of existing forest, and fish production could have begun for that land. During each of the next 20 years, from 2026 through 2045, an additional 51.9 million acres per year of cropland, grassland, open forest, and savannah, could be converted into sustainably managed forest, and the TimberFish Technology would be implemented on this newly reforested land. (Note: only 2.5 million acres of cropland would be converted into forest in any given year.) The cost of this conversion to forest and subsequent food production could be substantially or entirely recovered through the sale of fish produced on the converted land.

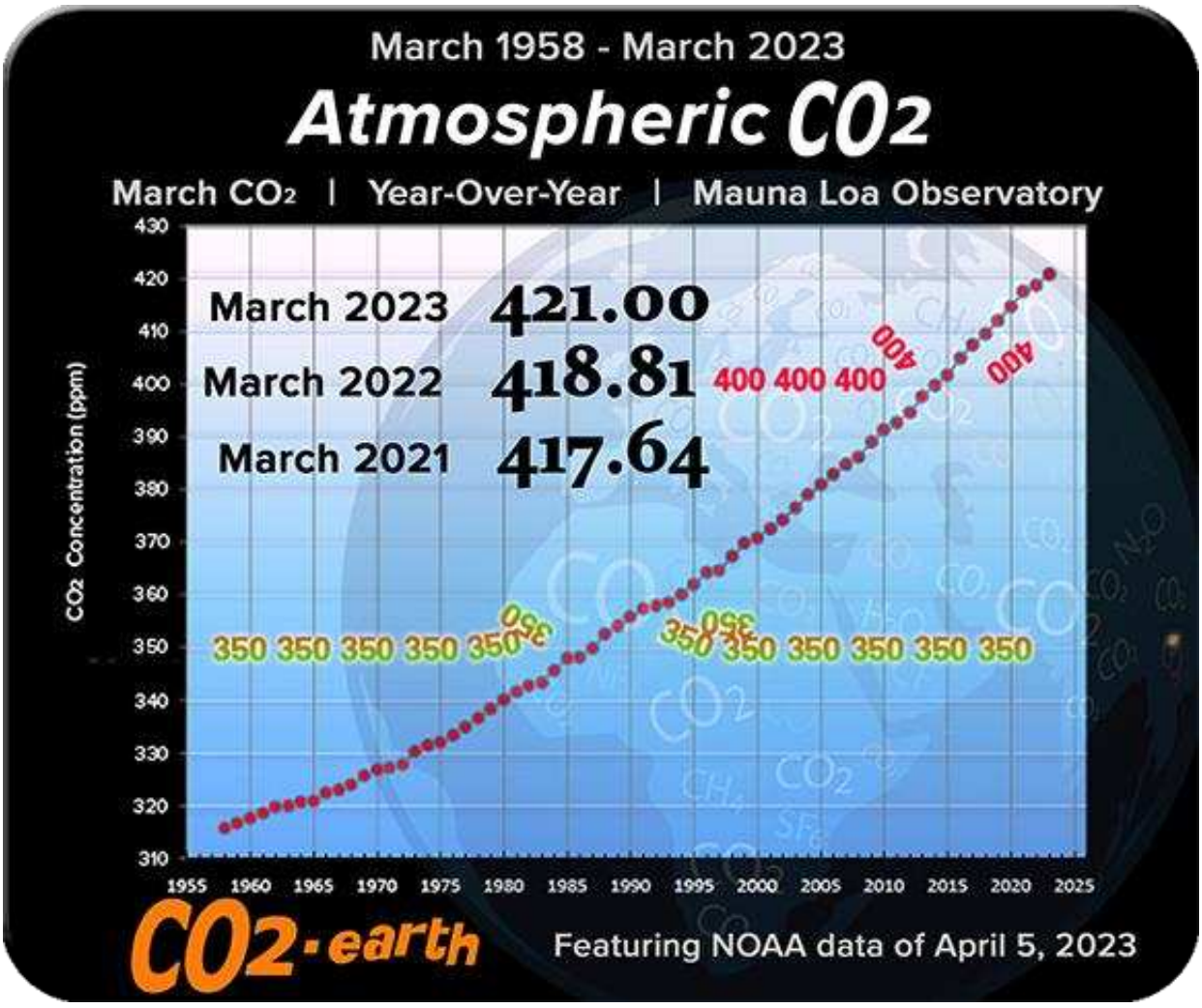
The United Nations Intergovernmental Panel on Climate Change has proposed a goal of limiting global greenhouse gas emissions to between 445 and 535 parts per million (ppm) by 2054. This could be done by replacing fossil fuel energy with renewable energy. If we then add the proposed TimberFish program it could be possible to actually reduce the maximum atmospheric carbon dioxide concentration experienced in the next 35 years to 440 ppm in 2036, and we would then return to 316 ppm in 2058. The last time the measured levels were that low was in 1959, the year records were first started in Hawaii. The accumulating benefits of this program would continue thereafter, and it would be possible to reduce atmospheric carbon dioxide concentrations to even lower levels if desired.

Since carbon dioxide accounts for the vast majority of the greenhouse gas emissions most attention was then directed to developing renewable energy

technologies that could replace the emissions of carbon dioxide that stems from the burning of fossil fuels in power plants and cement production plants. This led to the development of heavily subsidized technologies such as solar panels, wind turbines, and corn ethanol. However, while these technologies are important they have not yet directly reduced the key driver of climate change which is the steadily increasing concentration of carbon dioxide in the atmosphere (421 ppm in March, 2023). The problem is that these technologies do not in and of themselves remove carbon dioxide from the atmosphere and so far they haven't even slowed the rate of increase of atmospheric carbon dioxide concentrations. See Figure 1. From;

https://www.co2.earth/

Figure 1.



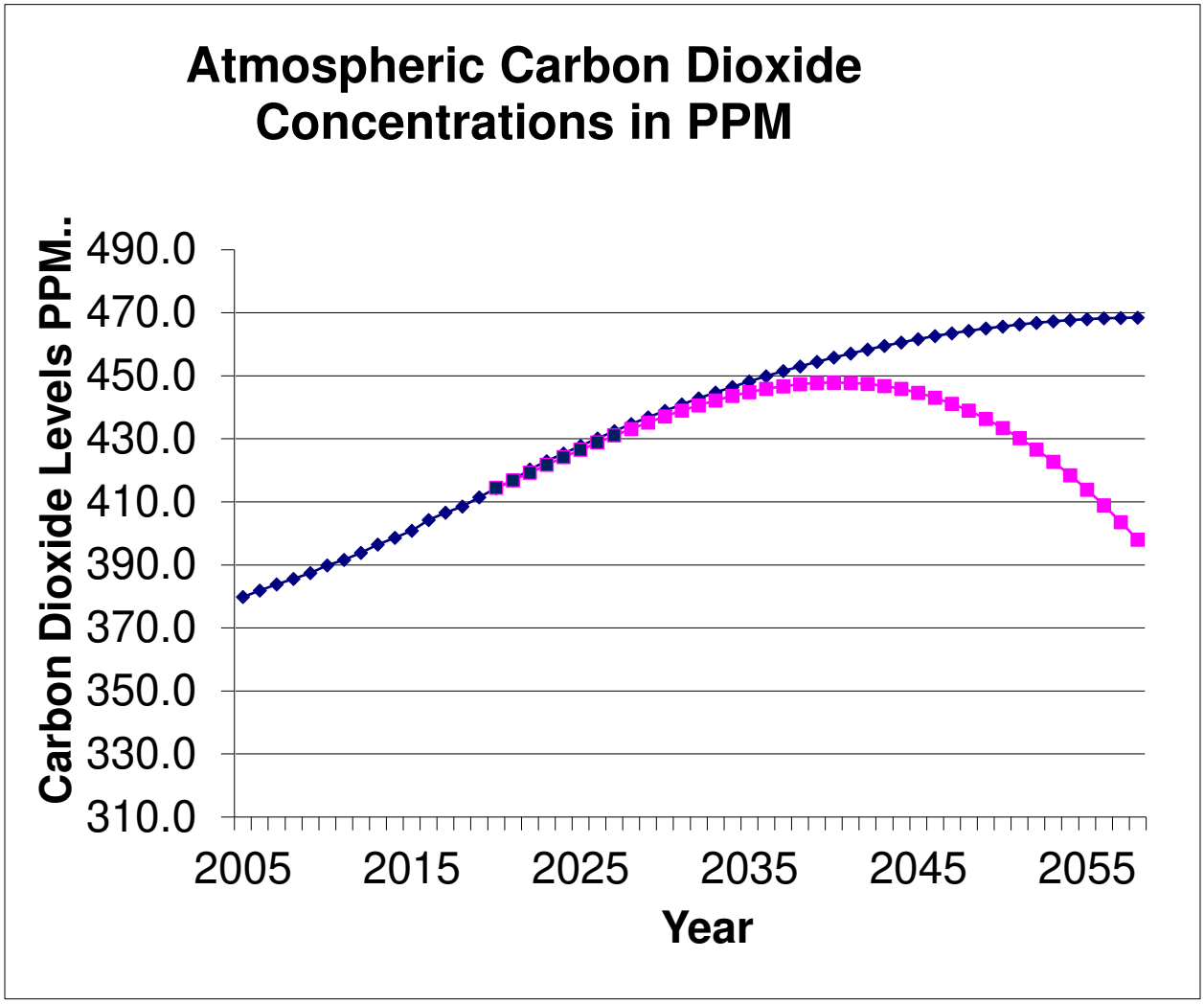
Here the data from 1995 through 2023 is the actual data collected at the Mauna Loa Observatory as shown above. As you can see, for the last ten years the rate of increase in atmospheric carbon dioxide concentration has remained almost linear at a rate of 2.40 ppm per year. This corresponds to an average emission of carbon from fossil fuel fired power plants and cement plants for the last ten years of 9.71 GtC/yr (giga tons of carbon per year). Lowering this emission rate by 0.150 GtC/yr would result in an atmospheric carbon dioxide concentration of 456.5 ppm by 2054. This would meet the UN IPCC goal proposed in 2007.

Reducing C emissions to atmosphere from fossil fuel power plants and cement production facilities by 0.15 GtC/yr is a very ambitious program. Given that our track record for the last ten years has shown at best a gradual increase in emissions it may be somewhat unrealistic to expect that a sudden reversal will occur. However, we are assuming that the current recognition of the climate change emergency may start to reduce this rate of increase by 2023.

Unfortunately, even with this optimistic scenario we will still have future steady state atmospheric carbon dioxide concentrations of 456 ppm, and no one knows what the long term impacts of this would be. A recent proposal to resolve this situation that is attracting a lot of attention is to plant one trillion trees. This could sequester a lot of carbon, but the there are questions as to how to pay for it, who would manage the forests and ensure that they remain as forests, and what would be the impact on agriculture.

Adding the TimberFish Technology to the current programs might be able to meet an annual reduction of 0.15 GtC/yr and this could resolve these issues and may even provide an economical pathway to returning to existing and even lower atmospheric carbon dioxide levels in the future. (pink line in Figure 2.)

Figure 2.



This would reduce the maximum atmospheric carbon dioxide concentration experienced in the next 30 years to 410 ppm in 2055. The accumulating benefits of this program would continue thereafter, and it would be possible to reduce atmospheric carbon dioxide concentrations to even lower levels if desired.

Any increase in the amount of new land converted back into managed forest would allow the carbon dioxide removal levels shown above to be met with the extra forests being used for seafood production. Alternatively, this additional production could be used to meet the goal of reducing emissions to atmosphere by 0.15 GtC/yr if conversion to renewable energy did not always meet this goal over the next 30 years.

We know that 52 million acres is a lot of land to convert to forest in a year. For example, the total land area in New York State is about 35 million acres. This raises a question as to whether or not this program is practical or even achievable. 52 million acres per year for 20 years is 1.04 billion acres.

But look at it this way. Our current human population is about seven billion people. Over the last 300 years we have lost over half of the world's forests. But, there are still almost 12 billion acres of pasture, shrublands, and savannahs that are suitable for reforestation and new forest development. We only need one billion acres of this available land for the TimberFish Program. On a per person basis this would amount to planting trees on one eighth of an acre (less than 6,000 square feet) sometime in the next 25 years. It is manageable.

The problem is that we may need that land to produce food and that is why the TimberFish Technology presents such an opportunity. This technology can produce lots of high protein healthy seafood from forested land without compromising the carbon sequestering capability of the forest, or its aesthetic, biodiversity, and habitat features.

A program to achieve this objective could call for the conversion of:

25 million acres of cropland, out of 3,705 million acres of cropland, or 0.67% of

total cropland, and

988 million acres of grassland, savannahs, shrublands and pasture out of 11,881 million acres of grasslands, savannahs, shrublands, and pasture, or 8.3% of total grasslands, savannahs, shrublands, and pasture,

Into new managed forest land.

To be successful this will have to be a global effort. Most of the land that will be required is contained in a few big countries with relatively low population densities. The Table below shows the top ten countries ranked in terms of their land area and including their population densities. This is where most of the land is that we will need to use for reforestation and new forestation.

Country	Land Area in millions of square miles	Population in millions of people	Density People per square mile
Russia	6.60	146	22
US	3.80	331	87
Canada	3.80	38	10
China	3.70	1,439	389
Brazil	3.30	212	64
Australia	2.90	26	9
India	1.24	1,380	1,113
Argentina	1.10	45	41
Kajakhstan	1.00	18	18
Algeria	0.92	44	48
DRC Congo	0.90	89	99

While countries with relatively low population densities have the locations where most of the new forests will be sited, it will also be essential to have the all the countries with high population densities involved in an integral manner with this effort. Growing and maintaining new forests is only part of the program. All of us, and particularly those of us who live in high density population centers, must alter our behavior so that our consumer demand is for products derived as much as possible from this forest based circular economy.

The logical existing organizations to actually implement this technology and programs are the large multinational corporations in the energy, food, and machinery sectors. They have the resources, the organization, the technological expertise, the marketing, and the distribution systems and infrastructure to further

develop and implement this new technology. They are also experienced in working with all countries throughout the world.

The big multinational fossil fuel companies are aware, as are most of us, that there will not be a long term market for fossil fuel derived energy and products. They facilitated the technology emergence that has created the world of today because we as individuals liked and demanded their products. We like automobiles and trucks, heat and air conditioning for our houses, electricity for lights, computers, cell phones, and appliances, supermarkets and shopping malls. So if we are to resolve Climate Change we all have a responsibility to alter our behavior.

By gradually deceasing the production and use of fossil fuels large corporations can replace their product lines to include the energy and food products that can be generated from a new forest based economy.

But again, we all need to do this together. We as individuals and consumers need to create the demand for these sustainable products. Only then can their work as corporations be combined with our efforts as individuals to successfully continue our human evolution in a safe and sustainable world environment.

The continued successful development of the TimberFish Technology could greatly assist the implementation of this initiative. Thus in the near future we will be exploring new initiatives, including new operating companies, joint ventures, partnerships, and technology licensing and sales.

TimberFish can provide services comprising design, engineering, permitting, construction and project management, operation, branding, and marketing. We will also establish and support continuing research and development in conjunction with colleges and universities to further vet and expand this technology.

During this process TimberFish will seek to develop relationships with companies and organizations that have both the markets and expertise to facilitate the large scale implementation that will be required if new forests are to be developed and sustainably managed. This could lead to a sequestering of massive additional quantities of carbon thereby reducing atmospheric carbon dioxide concentrations. All this can occur in addition to producing a whole new food chain of clean, sustainably and locally produced seafood. The goal is to catalyze a global application of this technology that is economically profitable and is not dependent on subsidies or regulation for its adoption.

To begin the implementation of this program TimberFish proposes the following projects.

The Projects

Project # 1: Expansion of the existing TimberFish system at the Five & 20 Spirits & Brewing facility in Westfield, NY.

This facility was initially constructed in 2016 and operated through 2019 treating the stillage and washwaters from Five & 20 and producing seafood. The existing system comprises a concrete tank that is 70 feet long, 20 feet wide, 8 feet deep, with an attached 70 foot by 20 foot concrete pad containing five 8 foot diameter fish tanks with associate chip filtration systems. It is contained in a fabric hoop house building.

The wastes from the Five & 20 Spirits & Brewing are collected in two 2,000 gallon stainless steel tanks and are then pumped into the system. This initial system was designed to produce up to 10,000 pounds of seafood per year but due to a significant increase in loading from the Five & 20 facility most of the initial fish tankage has been used for additional wastewater treatment.

This proposal will upgrade this facility so that it can provide appropriate environmental control and operation to produce up to 100,000 pounds of seafood per year. This will entail the construction of a new building, the installation of four new 25 foot diameter, 20,000 gallon fish rearing tanks and associated equipment, the addition of five new 8 foot diameter fish tanks, and the construction of permanent worm farms, fish processing facilities, and chip management systems. The existing bioreactors, blowers, pumps, and fish tanks will be retained and integrated into the new system.

The new building will enclose all the existing concrete structures used for bioreactors and seafood production. The new tanks and chip filters will be added adjacent to these existing systems. An additional five 8 foot diameter fish tanks will be included in the new system for staged fish growth for the larger production tanks.

The Phase 1 budget, including construction and O&M costs for two years will be $5 million. This will cover about $2.5 million for the building, tanks, and equipment, $1.5 million for salaries, and $1.0 million for G&A.

Project #2: Installation of a full scale operating facility producing 1.5 million pounds of seafood per year or more close to the existing system at Five & 20 Spirits & Brewing in Westfield, NY.

In this Project two new facilities and buildings will be added to the ones completed in Project #1. There will be two separate systems each housed in their own buildings. These systems will follow the design of the Project #1 system but the main fish raising components will comprise four 50 foot diameter, 120,000 gallon tanks. Each system will allow for production of 600,000 pounds of fish per year.

Each of these systems will have their own food waste and nutrient receiving systems, and will share raw and residual wood chip handling, potting soil production, and final effluent wastewater treatment facilities, but will otherwise be isolated from each other for biosecurity reasons. Water inputs will undergo a combination of ozonation and UV light disinfection prior to introduction into the systems.

A constructed wetland will be installed to receive discharge from these systems. Prior to discharge to the constructed wetland all effluents will meet our existing SPDES permit limits which conform to the strictest intermittent stream effluent discharge standards of the New York State Department of Environmental Conservation.

Areas around the constructed wetland will be converted into new forest. Access features for the sustainable harvesting of this forest will be constructed in a manner that maintains the aesthetic and ecological integrity of the forest. This will preserve the biodiversity of the forest itself as well as its animal habitat.

The projected budget for the separate fish production systems is about $7 million each. The chip harvesting and residual high energy chip residual management section and the constructed wetland and associated forests will add another $6 million, making the total Project budget about $20 million.

Once this system has been fully operational for a year a renewable energy component will be added. This will convert the high energy residual wood chips that are produced by the TimberFish process into electrical energy via a steam turbine connected to an electrical generator. All scrubber waters from the boiler that feeds the turbine will be recycled back through the TimberFish process. The resulting carbon dioxide gas emissions from the boiler should be clean and provide a substrate for the forests to grow new plant material.

Here is a general proposal for Mitigating Climate Change with TimberFish

Summary

Planting one trillion trees is an attractive approach to mitigating and reversing Climate Change because new tree growth removes carbon dioxide from the atmosphere and sequesters it in the tree biomass and forest soil. The problem slowing widespread adoption of this approach is, how to pay for it. Since the TimberFish process uses wood chips and nutrients to grow microbes which are fed to invertebrates, which are then fed to fish, it represents a potential solution to this problem. By utilizing the dead wood and a fraction of the new tree growth that occurs each year in a new developing forest this process could produce and sell enough seafood to make planting new forests a profitable business. This would occur because the increased value and market for green and dead wood as chips would provide an economic incentive to plant new forests.

How this would impact existing and new developing forests will be a function of temperature, rainfall, available sunlight, native tree species diversity, and various other local conditions. For applications in temperate to tropical climates the following ranges could be expected. Once a full forest canopy is established (about 4 to 10 years depending on the species and diversity of trees in the forest) 9,700 to 17,600 pounds of green and dead biomass, net respiration in the living trees, would be produced per acre per year.

If 3,000 to 7,000 pounds of this woody biomass was harvested and used to grow fish in a TimberFish system, there would still be 6,700 to 17,600 pounds of new forest biomass added each year to that previously sequestered in the forest. This would still allow for harvesting timber and pulpwood from the forests. Processing the harvested wood would annually generate; 36 to 86 pounds of fish, 88 to 204 pounds of potting soil with one percent nitrogen, and enough high energy residual wood chips to produce 1,200 to 2,000 KWH of electricity. This would replace energy currently produced from fossil fuel. The entire process would discharge a clean water effluent that would meet tertiary treatment water quality standards of 10 mg/l of Total Suspended Solids, 5 mg/l of Biochemical Oxygen Demand, 1.3 mg/l of Ammonia, and 1.0 mg/l of Total Phosphorus.

Proposal

Over the last 300 hundred years we have lost over half of the world's forests and wetlands, and, since the late 1950s, the amount of carbon dioxide in the atmosphere has increased by 30 percent. In addition, the planet's human population is projected to rise by another several billion people and this means that we will need more food for the future. However, the amount of land that is suitable for agriculture is close to being maximally utilized and the oceans are becoming increasingly contaminated.

The TimberFish Technology (TFT) represents a potential solution to these problems. It is a patented environmental biotechnology that produces contaminant free, locally and sustainably produced fish and shrimp from currently unutilized resources such as clean food and beverage waste streams and nonagricultural plant material such as wood chips from forests. The process combines the wood chips and nutrient sources in a bioreactor that grows a microbial biomass. This is fed to invertebrates such as worms or insects. The invertebrates are then fed to fish or larger invertebrates such as shrimp or mollusks. The process also produces soil amendments, tertiary treatment quality effluents, and high lignin residual wood chips that can be used for renewable energy production. There are no wastes or negative environmental impacts and the process produces more energy than it consumes.

This is a sustainable environmental biotechnology that is economically capable of combating climate change and environmental pollution in todays global economy. It comprises building an expanded and safe food chain through integrating currently unused resources with conventional and emerging food and agricultural practices. The technology can treat and recycle high strength solid and liquid organic wastes, wash waters, and wastewaters that do not contain toxic or harmful materials. These are currently generated by food and beverage producers and processors; restaurants and dining halls; and various agricultural operations that have production residuals. It combines these with a wide variety of nonagricultural plant materials that can be sustainably harvested from diversified ecosystems such as forests, woodlots, and grasslands.

From these materials TimberFish produces clean, locally produced seafood such as fish and shrimp, animal feeds and feed ingredients, potting soils and soil amendments, renewable energy substrates, clean water for reuse or permitted

discharge, and clean air with no odor or greenhouse gases other than carbon dioxide which is recaptured and reused by the plant material inputs.

Implementation of this technology will allow us to significantly expand our current agricultural production of food without disrupting existing agricultural industries. This will become increasingly important in countering the disastrous impact that Climate Change will have on the world's future food supply. This will be coupled with the additional benefit that the technology will also generate an economic incentive for large scale new forest development that can mitigate and reverse Climate Change.

The TFT will require large quantities of plant material that does not have to be processed or dried, and can include green wood, dead branches, bark, and leaves. Consequently, it will generate a large new market for dead and green wood chips that can be harvested from both existing and new forests and woodlands. This will significantly increase the value of forest plant material thereby creating an economic incentive for new forest development and additional harvesting of existing forests that does not interfere with or diminish the production of current forest products such as timber, pulpwood, and dried wood chips.

This will provide a strong economic driver for preserving our existing forests and for new forest development. It will incentivize maintaining new and existing forests with a variety of native tree species that preserves the natural biodiversity and biodynamic stability that were characteristic of the forests lost over the last 300 years. This program can include reforestation, afforestation, and similar efforts to capture carbon dioxide in rapidly growing new forests. By producing seafood from a fraction of the plant material generated each year in rapidly growing forests TimberFish can greatly reduce the cost of sequestering large quantities of carbon in new forest applications.

Once a new forest has established a photosynthetic canopy cover it can function like an existing forest and can sequester a given amount of carbon per acre per year net respiration. The rate of carbon accrual can vary as a function of the types and diversity of the trees in the forests. This will be dependent on the temperature, rainfall, available sunlight, and various other local conditions, but once established should remain approximately constant for the life of the forest. However, it will have an upper bound which is determined by the amount of light that falls on the forest and which can be usefully absorbed by the trees in that forest. Thus the annual rate of accrual for tropical and subtropical forests with 12 month growing

seasons can be up to 2.4 times as large as for a temperate or boreal forest with a growing season of five months or less.

The working canopy cover can be established very early in the life span of the forest if there are a lot of initial trees planted or seeded per acre. As these trees grow and become larger they will compete for the available light and many will die or be harvested. However, the light absorptive capacity of the forest will remain essentially constant due to the increased growth of the surviving trees.

The carbon that is accrued annually will be partitioned in pools comprising aboveground living biomass (trunks, branches, leaves and needles), aboveground dead biomass (dead wood, fallen branches, leaves, and needles), belowground living biomass (roots), belowground dead biomass (decaying roots from dead trees and other forms of deadwood that have been physically incorporated into soil), and the soil carbon comprising microbes and various organic molecules such as lignins, resins, and humus, that are in the forest soil and have been deposited or generated by the microbial degradation of recognizable plant structures.

The creation of new forest products will incentivize management practices that will optimize the allocation of carbon in the aboveground living tree pools. There is differential sequestering of carbon in the trunk diameter, stems and branches, and leaves and needles pools. The carbon distribution in each of these pools can be managed by whole tree harvesting, thinning, and pruning. These strategies can then maximize the retention of carbon removed from the atmosphere by the photosynthetic capture of carbon dioxide, net the respiration, and branch, leaves, and needles death, that occurs in each respective pool.

In the early years of a developing forest there will not be much carbon in the belowground dead biomass and the soil so that almost all of the carbon accrued through photosynthesis will be sequestered in the living biomass of the forest. As the forest matures the belowground soil dead biomass and soil carbon pools will increase, and they will start to be oxidized, principally by microbial action, back to carbon dioxide in the atmosphere. When this rate of oxidation of the sequestered carbon approaches the amount accrued by photosynthesis the forest will have reached a steady state carbon balance maturity and will no longer be sequestering significant additional carbon from the atmosphere. However, the ability to produce fish and energy will continue for the life of the forest. This can also be included in mature forests used for timber production. Here the tops of the trees harvested for timber can be used as inputs to the TimberFish system.

How this technology can be implemented for a given developing forest will be a function of local conditions. For applications in temperate to tropical climates the following ranges could be expected. Once a full forest canopy is established (about 4 to 10 years depending on the species and diversity of trees in the forest) 9,700 to 17,600 pounds of green biomass, net respiration in the living trees, would be produced per acre per year. If 3,000 to 7,000 pounds of this green woody biomass was harvested and used to grow fish, there would still be 6,700 to 17,600 pounds of new forest biomass added each year to that previously sequestered in the forest.

When an appropriate nutrient source is added, the carbon contained in the wood processed by the TimberFish system each year can result in the production of 36 to 86 pounds of fish, 88 to 204 pounds of potting soil with one percent nitrogen, and enough high energy residual wood chips to produce 1,200 to 2,000 KWH of electricity. This could replace energy currently being produced from fossil fuel. The process also would discharge a clean water effluent that would meet tertiary treatment water quality standards of 10 mg/l of Total Suspended Solids, 5 mg/l of Biochemical Oxygen Demand, 1.3 mg/l of Ammonia, and 1.0 mg/l of Total Phosphorus.

The new market for green wood chips and dead branches will create an economic driver for proper forest management and new forest creation. This driver will generate new demand for tree related products and will not interfere with or replace the existing demands for timber, pulpwood, biomass for energy production, or carbon credits. The increase demand will generate additional income from forest harvesting that can be allocated to the forest owner and the existing array of independent contractors that collect, cut, skid, and chip the wood

There are two additional benefits from this technology. The first is the impact it can have on reducing the occurrence and financial and environmental damage that occurs from forest fires. Past forest management practices, and higher temperatures as the planet warms, have recently contributed to a higher number of more costly and destructive forest fires. This has significantly increased the economic cost of forest fire property damage and has also increased the amount of carbon dioxide, soot and smoke that forest fires discharge into the atmosphere. Managing the forests by harvesting excess dead wood through collection, thinning, and pruning can greatly reduce the incidence and intensity of future forest fires. This will also help to mitigate and reduce Climate Change.

The other significant benefit of applying this technology is that it will create a major new source of seafood for our increasing population. The fish will be locally produced, contaminant free, and they can be profitably sold in todays market. Additional income can be generated from the sale of potting soils and excess energy, if not all of it is used to power the system. All of this provides an economic driver that is profitable in its own right, and which sequesters carbon as a no cost benefit of the technology.

Because the TimberFish system can use a variety of nutrient sources along with the plant material it provides additional environmental benefits when it uses waste streams from the food and beverage industries as sources of nitrogen and phosphorus. The same benefit can be obtained by incorporating nutrients from commercial and institutional sources of food wastes such as restaurants and cafeterias. This eliminates the environmental pollution and consequent treatment costs from these waste streams which then become sources of nutrients for TimberFish rather than potential pollutants.

In all of these systems, only half of the energy contained in the raw wood, the cellulosic fraction, can be effectively used for seafood production. The remaining residual wood chip will have an elevated energy content when compared with the raw wood because it will have a higher lignin to cellulose ratio. This can make for more efficient energy production from the wood chip residuals that will still comprise about 50 percent of the original weight of the harvested raw wood. The result is a significant new source of renewable energy.

There are many possible combinations of forest types and potential sources of nutrients (even fertilizer can be used). This makes the technology extremely flexible and adaptable to many different locations, climatic conditions, and local economies. It is truly a global technology.

TimberFish Intellectual Property as of 12-31-2022

TimberFish has five issued patents, and one pending published patent application as follows:

Issued:

United States Patent No. 9,764,977, “Process for the Treatment of Biological Materials and Wastewater”, issued on September 19, 2017. This patent was derived from application US 13/821,744, the remainder of which was filed as a continuation application US/15/682,140, see below.

United States Patent No. 9,681,644, "Process and Method for Optimizing Production of Food and Feed", issued on June 20, 2017. This patent was derived from application US 13/580,299, the remainder of which was filed as a continuation application US/15/599,954,see below.

United States Patent No. 10,448,620, entitled “Nutrient Capture System” issued on October 22, 2019. This patent was derived from United States Application No. 14/505,789 which was filed with the US Patent and Trademark Office (USPTO) on October 3, 2014. The application corresponds to a provisional application filed with the USPTO on October 3, 2013.

United States Patent No. 10,464,835, entitled “Process for the Treatment of Biological Materials and Wastewater” issued on November 5, 2019. This patent was derived from application US/15/682,140 which was filed with the US Patent and Trademark Office (USPTO) on August 21, 2017 as a continuation of US 13/821,744, which was filed with the US Patent and Trademark Office (USPTO) on March 8, 2013, and was an election of an international PCT patent application filed on September 12, 2011. The application corresponds to a provisional application filed with the USPTO on September 10, 2010. Part of US 13/821,744 was issued as patent No. 9,681,644, on September 19, 2017, see above.

United States Patent No. 10,524,490, entitled “Process and Method for Optimizing Production of Food and Feed” issued on January 7, 2020. This patent was derived from application US/15/599,954, which was filed with the US Patent and Trademark Office (USPTO) on May 19, 2017, as a continuation of US 13/580,299 which was filed on August 21, 2012. This was an election of an international PCT patent application filed on February 25, 2011, and corresponded to a provisional application filed with the USPTO on February 25, 2010. Part of US 13/580,299 was issued as patent No. 9,681,644, "Process and Method for Optimizing Production of Food and Feed", on June 20, 2017, see above.

Pending Published Application:

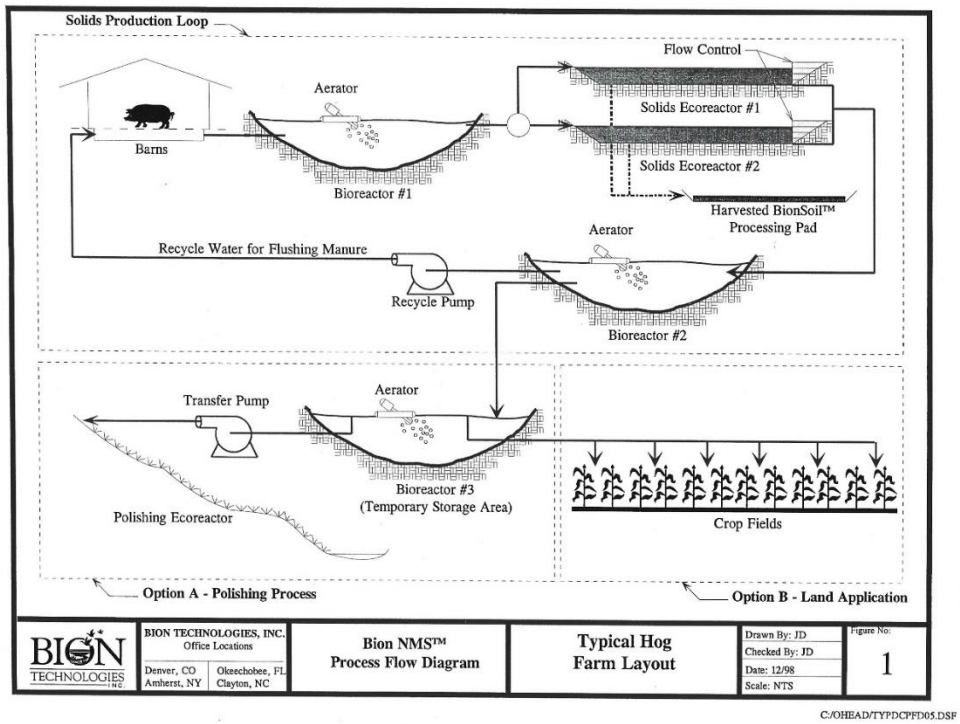
US 11/705,895 A patent application entitled “System for Producing Food and Feed”, US 11/705,895, was filed with the US Patent and Trademark Office (USPTO) on February 13, 2007.

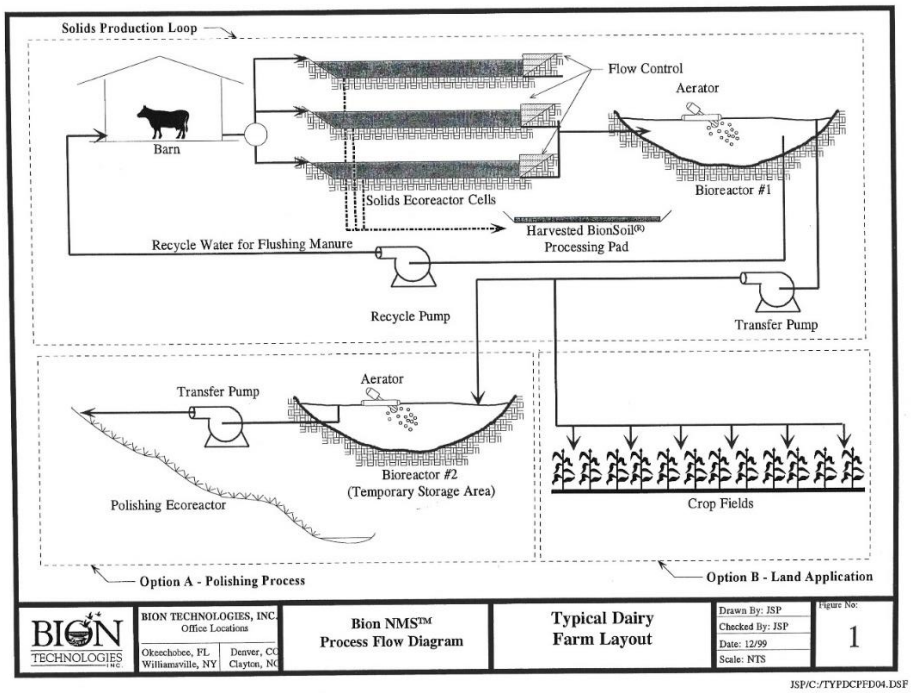
Additional applications are in progress. The company also maintains additional proprietary information as trade secrets. This includes design specifications, design methodologies, and operating protocols.

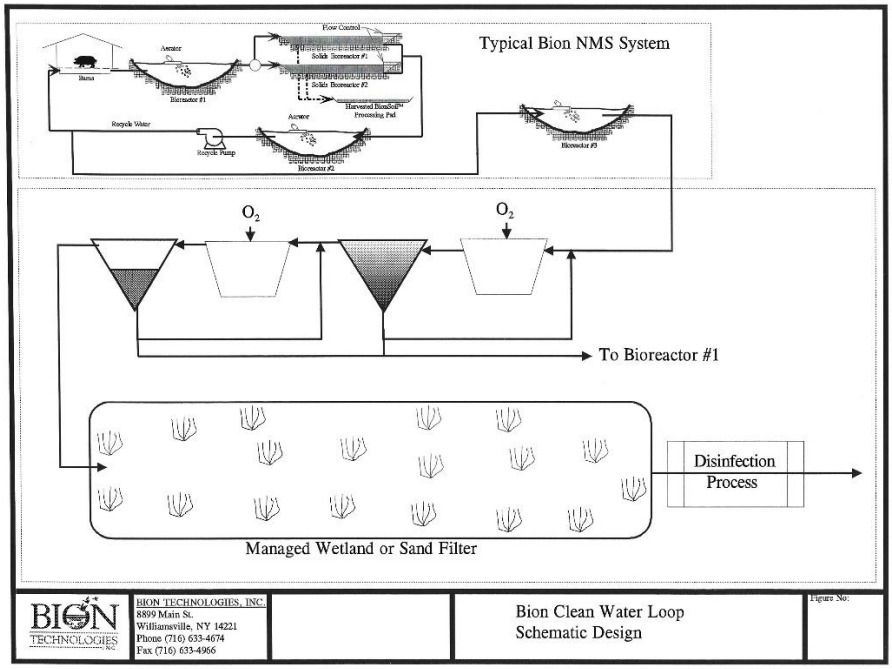
Bion Environmental Technologies

Prior to TimberFish I developed an environmental biotechnology, the Bion Technology, for nutrient and manure management for the large animal agriculture and food processing industries. This consisted of an integrated recycling system comprising microbial growth bioreactors, solids separation and processing ecoreactors, and polishing wetlands. The technology produces a valuable soil byproduct and clean water from manure and food processing wastes. It uses a process that combines low oxygen nitrification – denitrification with microbial nutrient capture to virtually eliminate the greenhouse gas emissions that are the source of ozone depletion in the atmosphere and the production of odors from anaerobic agricultural and manure management systems.

The systems were applied in a variety of configurations depending on the source and nature of the treated waste stream. The following diagrams show applications for hog and dairy farms and a clean water extension that could be used for either.




Solids Production Loop
Flow Control
Aerator
Barn
Bioreactor #1
Solids Ecoreactor Cells
Harvested BionSoil®
Processing Pad
Recycle Water for Flushing Manure
Recycle Pump
Transfer Pump
Transfer Pump
Aerator
Bioreactor #2
(Temporary Storage Area)
Polishing Ecoreactor
Crop Fields
Option A - Polishing Process
Option B - Land Application
BION TECHNOLOGIES, INC.
Office Locations
Okeechobee, FL
Williamsville, NY
Denver, CO
Clayton, NC
Bion NMS™
Process Flow Diagram
Typical Dairy
Farm Layout
Drawn By: JSP
Checked By: JSP
Date: 12/99
Scale: NTS
Figure No:
1
JSP/C:/TYPDCPFD04.DSF


Typical Bion NMS System
O2
O2
To Bioreactor #1
Disinfection
Process
Managed Wetland or Sand Filter
BION TECHNOLOGIES, INC.
8899 Main St.
Williamsville, NY 14221
Phone (716) 633-4674
Fax (716) 633-4966
Bion Clean Water Loop
Schematic Design
Figure No:

A description of how this technology can reduce atmospheric emissions of carbon dioxide and greenhouse gases from large animal agriculture can be found in the following two papers;

"Dairy Farm Atmospheric Emissions Control Using a Microaerobic Biological Nutrient Removal (BNR) Process." Proceedings of the American Society of Agricultural and Biological Engineering 2007 International Symposium on Air Quality and Waste Management for Agriculture. Authors: James W. Morris, Jere Northrop, George W. Bloom, Steve Pagano

Abstract. A whole farm air emissions and waste management model was applied to a 1,250 cow dairy in Central Texas. The model divided the entire farm's waste management system into eleven component units, from manure excretion through and including emissions from crop irrigation. The model used directly measured microaerobic biological nutrient removal process (BNR) emissions, and estimated emissions for all other components (determined by using literature values and process engineering fundamentals), to arrive at proposed voluntary maximum whole farm waste management system emission standards representing reductions up to 94% for ammonia, 58% for VOCs, methane 83%, hydrogen sulfide 82%, and oxides of nitrogen 44%. The proposed voluntary standards are as follows (all in Kg per cow annually): 8.2 ammonia, 1.5 VOCs, 59 methane, 1.8 hydrogen sulfide and 0.15 oxides of nitrogen.

and,

"Nutrient and Atmospheric Emissions Performance of a Microaerobic Biological Nutrient Removal Process (BNR) Treating Dairy Residuals." Proceedings of the 2005 Animal Waste Management Symposium, Research Triangle Park, NC, October 5-7, 2005. Authors James W. Morris, Jere Northrop, George W. Bloom, Steve Pagano

Abstract. A microaerobic biological nutrient removal process (BNR) was retrofitted to an existing anaerobic lagoon to manage both atmospheric emissions and nutrients discharged from a 1,250 cow dairy in Central Texas. The BNR waste management system was operated to maximize biological nutrient recovery and successfully removed 74% of the total nitrogen and 79% of the phosphorus load. Simultaneously, the system achieved substantial reductions of air emissions of up to 99% for ammonia, volatile organics (VOCs) by 98%, methane 94%, hydrogen sulfide 95% and oxides of nitrogen 93%.

Further descriptions of this technology can be found in the following patents by Jere Northrop that were assigned to Bion Environmental Technologies.

United States Patent No. 8,287,734 entitled “Method for treating nitrogen in waste streams” issued on October 16, 2012. Inventors Jere Northrop, James W. Morris. Assigned to Bion Technologies, Inc.

United States Patent No. 8,039,242 entitled “Low oxygen biologically mediated nutrient removal” issued on October 18, 2011. Inventors James W. Morris, Jere Northrop. Assigned to Bion Technologies, Inc.

United States Patent No. 7,879,589 entitled “Micro-electron acceptor phosphorus accumulating organisms” issued on February 1, 2011. Inventors James W. Morris, Jere Northrop. Assigned to Bion Technologies, Inc.

United States Patent No. 7,575,685 entitled “Low oxygen biologically mediated nutrient removal” issued on August 18, 2009. Inventors James W. Morris, Jere Northrop. Assigned to Bion Technologies, Inc.

United States Patent No. 7,431,839 entitled “Low oxygen biologically mediated nutrient removal” issued on October 7, 2008. Inventors James W. Morris, Jere Northrop. Assigned to Bion Technologies, Inc.

United States Patent No. 6,908,495 entitled “Low oxygen organic waste bioconversion system” issued on June 21, 2005. Inventors Jere Northrop, James W. Morris. Assigned to Bion Technologies, Inc.

United States Patent No. 6,689,274 entitled “Low oxygen organic waste bioconversion system” issued on February 10, 2004. Inventors Jere Northrop, James W. Morris. Assigned to Bion Technologies, Inc.

United States Patent No. 5,755,852 entitled “Bioconverted nutrient rich humus” issued on May 26, 1998. Inventor Jere Northrop. Assigned to Bion Technologies, Inc.

United States Patent No. 5,626,644 entitled “Storm water remediatory bioconversion system” issued on May 6, 1997. Inventor Jere Northrop. Assigned to Bion Technologies, Inc.

United States Patent No. 5,538,529 entitled “Bioconverted nutrient rich humus” issued on July 23, 1996. Inventor Jere Northrop. Assigned to Bion Technologies, Inc.

United States Patent No. 5,472,472 entitled “Animal waste bioconversion system” issued on July 23, 1996. Inventor Jere Northrop. Assigned to Bion Technologies, Inc.

United States Patent No. 5,078,882 entitled “Bioconversion reactor and system” issued on January 7, 1992. Inventor Jere Northrop. Assigned to Bion Technologies, Inc.

United States Patent No. 4,721,569 entitled “Phosphorus treatment process” issued on January 26, 1988. Inventor Jere Northrop. Assigned to Zabion, Ltd.

Chapter 10.

Informational Disease

In 1970 I wrote a paper that proposed that an eight dimensional topological space might be able to unify language and physics. It was never published but it did describe a problem that I called Informational Disease. I considered myself as being a scientist at the time so I never followed up on this, believing that science and new technology could solve the major problems facing an emerging global society. Recent events have now led me to question that choice.

We have the science and technology to resolve the two biggest external challenges that currently face us, Climate Change and the coronavirus pandemic. However, we have not rationally or effectively used these technologies to solve these problems, and I believe that this is the result of Informational Disease and the misinformation, racism, sexism, excessive wealth inequality, and rise of autocratic forms of government that it propagates.

I still believe that people are good and fundamentally want to do what is best for themselves and society. The problem is that all of us have various forms of informational disease and that this is causing us to act in manners that are contrary to our own self interest and the greater good for all. Informational Disease is something that affects our knowledge and consciousness just as severely as vitamin deficiencies, microbial infections, and cancers affect our bodies.

This document proposes to take the concept of informational disease and show that The Relational Symmetry Paradigm provides a way to both understand this phenomena and to resolve it. This will involve looking at ways that the Relational Symmetries can act like therapeutics, or vaccines, or antibodies to help resolve or cure the Informational Diseases that are infecting our beliefs, judgements, and decisions.

To begin this analysis consider again the initial representation of our experiences that was presented as the foundation of our beliefs in the formulation of The Relational Symmetry Paradigm.

	Noun	Verb	Modifier	Relational
Mind	Consciousness	Desire	Emotion	Memory
Matter	Body	Action	Sensation	Creation
Word	Symbol	Definition	Image	Idea
World	Thing	Interaction	Property	Connection

Generally I did not expect that there were any disagreements with this, with the possible exception of the last idea of connection. Connectivity may be understood in different ways. In one view we are all composed of matter, which is not conscious, but which does interact with, and hence is connected to, all of the other matter in the universe. This may occur via gravitational and electromagnetic forces. In another view we as conscious entities are connected to a superior consciousness, a God, which in turn is connected to all of the rest of the universe. In a third view we as conscious entities are connected to our immediate environment and to all the other conscious entities with whom we can communicate.

In all of these views we are connected, but in different ways. We all believe in the last view. However, the first two are frequently viewed as being incompatible. You believe in science or you believe in religion. If you believe in both, and many people do, you probably have difficulty in explaining them in terms of each other.

A key component of these views of connectivity is the scope of the universe or environment to which it is applied. If we want to find solutions to the global problems that we initially identified, Climate Change, pandemics, wealth inequality, and the rise of autocratic governments, then we need to address the disagreements that occur anywhere on our planet. Therefore the scope must include all of us. All humans or groups of humans that have disagreements are relevant. The process of resolving disagreements must be equally valid for personal disagreements or disagreements between organizations or nations.

The best way to start deriving this process is to examine our own personal experience. Suppose that you and I are discussing a subject and that we disagree about some aspect of this subject. How can we understand and hopefully eliminate the factors that cause the disagreement. One way to look at this is to consider that

these causative factors are Informational Diseases. This is analogous to the way we look at our own human health and how that can be destabilized via factors that are physical diseases.

However, there is one big difference. We can almost always detect when we have a physical disease, we get sick. But with Informational Diseases that is not always obvious. We may suspect that an Informational Disease is present because we have a disagreement, but we usually won't be able to tell if it is your disease, or my disease, or both or our disease. In fact, it is usual for us to assume that it is not our disease and the disagreement is caused by someone else (who may have an Informational Disease).

There are a number of categories of Informational Diseases that can be identified as causing disagreements. Three simple ones that are easily resolvable are as follows.

First we need to verify that the disagreement is not the result of differences in our respective languages. If we do not share the same definitions and images for the signs we use in communications, we may have different understandings of just what we are saying to each other.

Second we need to make sure that the integrity of the signs that are used in our communications are preserved in the communication process. If noise, poor eyesight, or other factors change the signs or the appearances of the signs during the communication process, then you may not be correctly hearing or reading what I am speaking or writing.

Third, we need to verify that our memories pertaining to the subject are consistent. If you remember something differently than I do, then we need to resolve this difference. This can hopefully be achieved through communication and reviewing external documentations that have been recorded by ourselves and/or others we mutually trust as being objective.

Once the unintentional language, communication, and memory errors have been resolved through dialogue and reference to external information, then we have to deal with how our disagreements derive from fundamental differences in beliefs. What do you believe that I don't, and what do I believe that you don't.

The process that has the best chance of resolving differences in beliefs stems from the success that science has had in explaining differences in various models that describe phenomena in the physical universe. First there has to be a dialogue about

the models themselves and the evidence that supports the different models. This comprises a disclosure of why each model is believed by various parties. This has to be a full disclosure. You can't lie about it or the data and reasoning that supports the model. Once this is done then a comparison can be made and an optimization procedure, the Maximum Entropy Principle if applicable or calculatable, adopted for the support of the "best" model. If disagreement persists then any use of a model needs to include a description of the disagreement.

This process is a Relational Symmetry and as such should also be applicable to other areas than just science. The Relational Symmetry Paradigm proposes that the Relational Symmetries apply throughout the whole universe. Thus they should work for all other areas of our experience.

We can categorize our fundamental beliefs as belonging to one of three paradigms, science, religion, or politics. No one of these explains all of our experiences and they all can contain informational diseases within themselves. However, the differences between them generate additional Informational Diseases that can lead to disagreements that are very difficult to resolve.

Science creates models based on observation and evidence to predict and understand a perceived physical reality. Its existence is viewed as being independent from any connection to consciousness or conscious entities. Science forms hypotheses, tests them through experiments and observations, and then accepts them, rejects them, or reformulates them for further testing. Belief is established via the evidence that this process provides, but it results in a mechanistic world view that is all too often impersonal and dehumanizing.

Religion is faith based and describes how we as conscious entities should interact with other conscious entities. There usually are general principles, teachings, which are not based on traceable evidence but are generally recognized and agreed upon as good models for our behavior. They are learned from trusted authorities who have apparent access to wisdom obtained from historical records or divine sources. Religion uses prayer, stories, poetry, art, music, and architecture as ways of experiencing and communicating this way of thinking. Belief is derived through establishing an emotional resonance with both the experiences themselves, and with others who share in these experiences with us.

Politics deals with how we, as members of a society of conscious entities, actually interact with each other. In particular, this includes how the society allocates the resources and the creations of the society to all of its constituent members. This

comprises a series of distribution functions or principles to assign the resources and creations to its members based on their participations, contributions, and efforts. Sometimes the allocations are made arbitrarily by a subclass or ruling class in the society. A key factor here is who is included and who is excluded in both the ruling subgroup and the entire society itself. Belief then stems from a pragmatic evaluation as to how our interaction with others and society can maximize our own personal safety, comfort, and survival.

Most of our disagreements arise when we have differences in how we view and use these three paradigms. Do we believe in just one of them or do we believe in some combination of them, or combinations of parts of them. This can lead to inconsistencies and contradictions in our beliefs and this in turn impacts on how we compare and share our beliefs with each other. The situation is further complicated by instances where there is intent to use or hide the true nature of the communications concerning our disagreements, as well as the disagreements themselves, so as to create or perpetuate a personal advantage for an individual relative to others in a society.

For example, one of the causes of Informational Disease stems from our excessive use of the linear relation in inquiry. This can result in miscommunication and misunderstanding which has recently become an issue with the notions of “fake news” or “alternative facts” which spread confusion and distrust.

A simple question that we would normally answer with a yes or no, can be compromised with an “I don’t know” or an “I forgot” or even an “I don’t want to tell you and I don’t want you to know that I don’t want to tell you”. Binary choices which are derived exclusively from a linear relation often do not convey these aspects of what we are or should be saying. To resolve this look at such situations in a framework that includes the relations comprising the three part of the one – three fourness Relational Symmetry. We have represented these three relational signs as | ⊢ H . The | sign is the binary choice, yes or no, true or false. From the ⊢ sign perspective “I don’t know” or “maybe” becomes a possibility that should always be considered when asked to respond to a question with a binary, | , yes or no answer.

A similar situation concerns statements that are considered to be true or false. Take the statement that says “This statement is false.” If it is true, it is false, and if it is false, it is true. Such statements again need to be understood or considered from

the ⊢ relational sign perspective as possibly being meaningless, uncertain, ambiguous, irrelevant, or unnecessary. Again, it is important to consider the ⊢ relation before committing to the binary, | , true or false response.

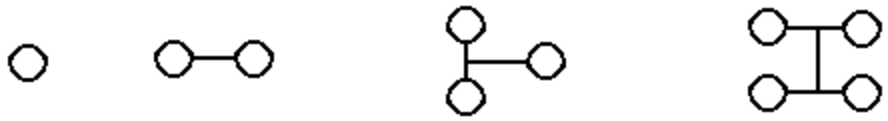
We also need to understand what constitutes a fact. Actually fact is probably a bad word to use in that it carries a connotation of certainty. Thus it should be redefined so that facts are viewed as probabilistic statements bolstered by evidence and promulgated by people who can be vetted as being reliable, consistent, and interconnected. Therefore "facts" need to be understood in a context that includes the H relational symmetry. Thus a fact is seen as an opinion that is supported both by evidence and by the credibility and trustworthiness of the person or sources that present it. This would distinguish fact - opinions from binary simplifications, with or without any ⊢ qualifications, and from the "fake news" and "alternative facts", which do not consider the total ⊢ and H nature of the universe.

The rest of this document will describe how the Relational Paradigm could be used to evaluate and expose misinformation that has been propagated by various sources and incorporated into our beliefs.

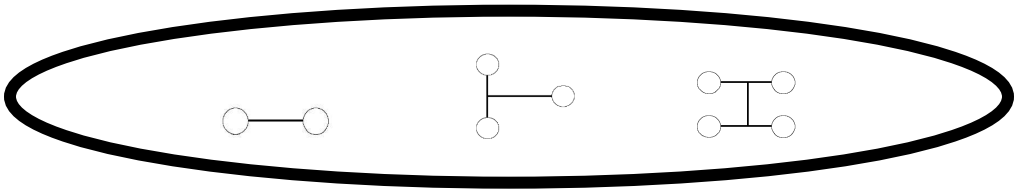
To review, The Relational Symmetry Paradigm tool is based on the notion of Relational Symmetry. It comprises a one-three fourness symbolic formalism that is based on the assumption that understanding is relational, and that there are four fundamental types of relations. We have discussed the initial four signs that represent this symmetrical structure in other documents.

These are reflected as,

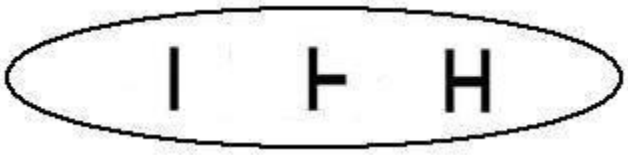
We return to the Relational Systems formalism and how the system concept was viewed as a self relational boundary that could include the concept of system as comprising the first fundamental Relational Symmetries. Thus



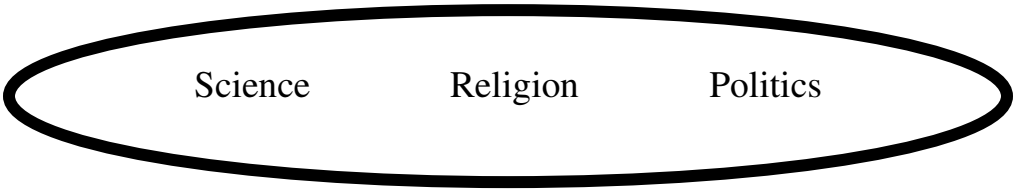
can be reconfigured so that the first circle system is expanded to contain the other three sign relations.



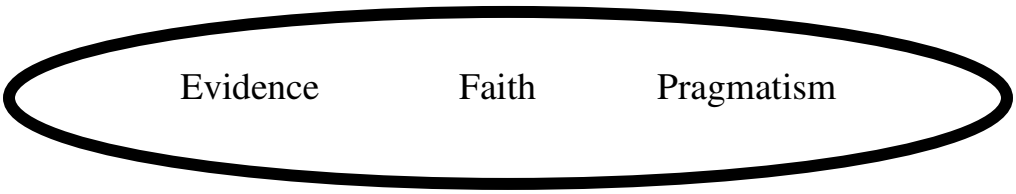
Where the initial self relational sign, a point, is reflected as a circle and then is expanded to include the subsequent three signs in the one-three fourness symmetry. This was discussed in Chapter 3 and Appendix B of The Relational Symmetry Paradigm relative to how the self relational symmetry can generate the concept of a particle in physics.



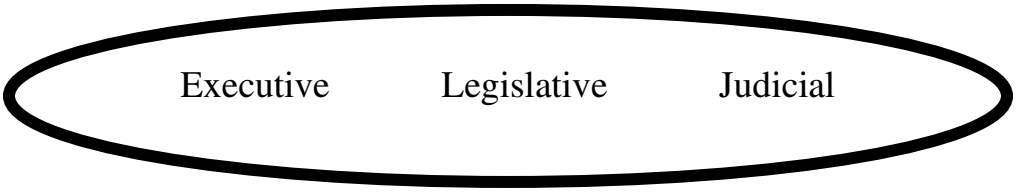
This concept of particle or boundary is also valid when applied to our own beliefs or how they may be implemented in organizational or governmental form. Consequently, the concept of Informational Disease can be considered as an imbalance within this formalism. For example, consider these symmetrical interpretations;



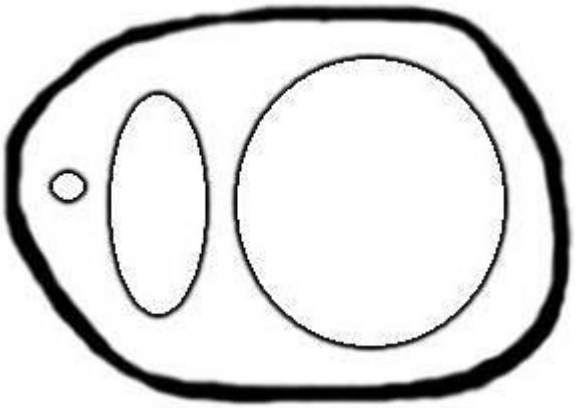
or



Or the three branches of the US government



If these three elements become unbalanced then a pathology can result. The symmetry is degraded or destroyed and the symbolic formalism loses its aesthetic appearance.



Here an asymmetry allows one component to dominate the other two and this can generate a faulty view or understanding of how we are interacting with the rest of the universe. This can lead to predictions of the outcomes of our actions that sometimes result in catastrophic consequences.

A possible resolution of this imbalance or asymmetry can be generated by considering the Maximum Entropy Principle (MEP). This can serve as a guide to both recognize imbalances and to suggest ways to resolve or mitigate the imbalances.

Consider the three independent paradigms that predominate in our current society; science, religion, and politics. On a stand alone basis they are each reasonably consistent. Even though they do not describe all of our experience they are very powerful and useful in their respective areas of application. However, they are susceptible to becoming internally unbalanced because of misinformation and the consequent impact on our beliefs within the paradigms.

Additional problems occur when we deal with situations where there is overlap and conflict between the paradigms and where this overlap leads to inconsistencies. In such situations we make choices, which paradigm will prevail in a particular situation where there is paradigm overlap. The contradictions that occur when we make choices in these situations generate an internal stress and torsion in our individual or group beliefs. The manifestations of such stress is a source of Informational Disease.

Consider an example. Suppose that you are an engineer and that you believe in science because it provides evidence for applications that work in the practical situations that you encounter in your job. But you are also a religious person who believes in a universal consciousness that pervades the universe and is the source of what you believe is good and right and beautiful. You know charismatic individuals that, through your experiences with them, you believe to be good and caring people. You feel that their faith in their belief emotionally resonates with you in situations where there is no engineering or scientific guidance. This provides comfort to you in the face of uncertainty or unexplainably catastrophic events.

Now suppose that you are faced with a political decision. There is an election coming for a leader that will make many important decisions that will impact you and your friends and family. It is unfortunately a binary ❙ relational choice.

One candidate expresses beliefs that emotionally resonate with you. You trust this candidate because of this resonance. You like the charisma of this candidate. However, this candidate also expresses opinions for which there is no evidence.

Even worse, they occasionally express opinions for which there is substantial counter evidence.

You don't share the same emotional connection with the other candidate. They do express opinions for which there is evidence, and, where there is counter evidence, they present both sides and provide reasons and analyses for their support of their position. However, in situations where evidence is lacking or not relevant you do not emotionally agree with their position. There is no evidence for this but something in your belief structure does not match your perception of their belief structure. This is an emotional and not an evidence issue.

So what do you do. You make a political decision. Do you "go with your gut" or do you "go with your head"? This comes down to a pragmatic assessment of what might be the consequences of this decision. What will be "best" for you and your friends and family. However, in this process you have to at least consider the evidence and what it tells us about the situation and ourselves. You can't responsibly just go with your gut. You have to reconsider just what it is that you believe relative to this issue.

We make different choices in these situations, and the existence of the inconsistencies creates stress within us. This differs depending on who we are, but the stress is real, and it exists regardless of which choice we make. It is a torsion type of effect, not visible or even describable, but it is there. Often it will be manifested as anger, depression, worry, etc. These are real and they do have and lead to consequences. This is what we are calling Informational Disease.

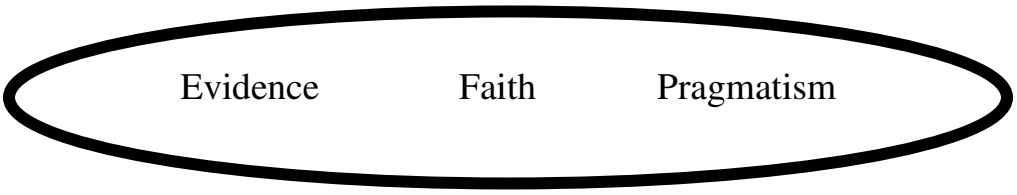
So how does a unified paradigm resolve this problem. It starts by incorporating the key elements of each model or paradigm into a single model. Science has to include consciousness and language into its foundations. Religion has to include the understanding that evidence based hypotheses and models are sometimes relevant to what we emotionally believe. Politics as pragmatism has to consider both evidence and the power of faith. We all have to pay attention to what are the expressions of our most foundational beliefs, our philosophical presumptions, and how do these get represented in our language. How we express these to ourselves and each other. We have to maximize how we evaluate and use the available evidence. Remember the MEP.

We start by recognizing the relational symmetry that pervades our consciousness and our experience. If we believe that our basic beliefs are different then why are they different. We all believe them in the same manner. The symmetry is there, in

science, in religion, and in politics. We just need to recognize that the symmetry is the same, and then we can reconcile the perceived differences in terms of how we perceive and understand them.

Consider the current situation in the United States. This country operates with two major political parties in accordance with basic agreed upon principles and an evolving governmental structure that is over two hundred years old. It now faces a number of major global problem areas, viral pandemics, Climate Change, wealth inequality, and rising autocratic political movements. The US has the knowledge as to how to resolve all of these problems but to date has not effectively done so because of disagreements between the two political parties. This is clearly a case of widespread Informational Disease, so how do we cure it.

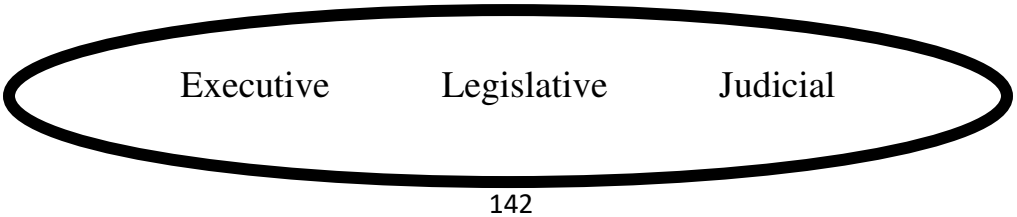
Remember the diagram presented above for a balanced one-three relational symmetry of our operating paradigms.



To apply this to the United States consider the initiating principles that are expressed in the beginning of the Declaration of Independence (1776).

“We hold these truths to be self-evident, that all Men are created equal, that they are endowed by their Creator with certain unalienable Rights, that among these are Life, Liberty, and the Pursuit of Happiness”

Add to this the organizing procedures that were contained in the US Constitution (as ratified in 1788) which authorized three equal branches of government, the legislature, executive, and judicial branches, and also included procedures for amending the Constitution in the future, if so needed.



The members of both major political parties often publicly pledge support for these principles and structures. However, sometimes this is accompanied by an expression that the interpretation of the constitution should also be consistent with the intent of the founders who wrote and signed the initial document. This can appear to be in conflict with various amendments adopted after its initial ratification.

I think that most Americans in both parties believe in the Declaration of Independence and the US Constitution. From a relational symmetry perspective what does this mean. Does “all Men are created equal” apply only to men? With respect to the question of who could vote, the founding fathers interpretation of “all Men” was white Christian men who owned property. Slaves could not vote. Women could not vote. Neither could Native Americans.

The boundary definition issue was subsequently expanded by amendments to the constitution which prohibited discrimination in access to the polls on the basis of race, color, gender, or previous condition of servitude.

So what do we believe today? Is it what the constitution, as amended, states? Is it the intent of the founding fathers? Is it some combination of the two, or even a further extension of inclusion, all determined by each of us individually according to our own perception of our own self interest?

It seems that if we agree to the presumptions at the beginning of this document, then we would expand this boundary definition to include all conscious entities for which the 16 presumptions apply. Thus it should include every person now living. This might be reasonably restricted to a defined geographical territory for which a government has been established. Thus everyone living in the specific territory covered by the government would be included in the right to vote.

This problem may seem complicated when there are subsumptive levels of government for local, regional, and societal issues. However, since we are proposing that our fundamental beliefs are based on a shared humanity then the highest accepted level of governmental organization should apply. Ultimately this should become a global and not a national conclusion.

But what about children. We know that a child's ability to understand is a function of their age and is limited by their experience and education. A developing brain does not have the capability of an adult brain. Neuron formation is incomplete. So there is evidence that children and possibly young adults below a certain age should not be allowed to vote. Thus we modify our criteria in the face of this evidence. Everyone over a certain age and living in the specific territory covered by the government would be included in the right to vote.

In situations where there are additional exclusions we may be able to identify an Informational Disease that pertains to differing beliefs as to just who is included or excluded in a given government. Given what we have learned about the relational symmetries we all know, deep down, what the best solution is. We know what is right, what is good, what is beautiful, and what is consistent with the law of maximum entropy that is universally existent in the real physical-biological world.

This indicates that we initially need to include everyone (the faith based part of the solution). If there is evidence or disagreement we need to openly dialogue with each other to see if there is substantial evidence for excluding someone or some group, and if there appears to be such evidence, where did it come from and how credible is it (the evidence based part of the solution). If we agree that the evidence is there and that it is credible, then we modify our principle of inclusion.

This can then be pragmatically applied to the voting procedures used for elections. Clearly an age limitation is reasonable while territorial differences should be resolved by application at the highest and most subsumptive governmental level. At present this is national with the goal of a global standard in the future.

There are many other areas of Informational Disease that we can consider. These include the concern that our rising human population may have already exceeded what our planet can sustainably support, and that this may be driving derivative problems of Climate Change, global pandemics, wealth inequality, and the rise of autocratic nationalistic governments.

We have known about these problems for a while now and there is a growing concern that they may even threaten our survival as a species on this earth if we do not properly address them. We know a lot about how to resolve these problems, but we are not doing it.

To resolve this situation this document presented a simple alternative paradigm that includes all of us as conscious entities. This new way of thinking can still

explain and derive numbers, mathematics, science, and technology. It also contains a universal optimization procedure that fairly and cooperatively resolves the distribution of resources issues without jeopardizing our individual and community safety, comfort, and survival. The result is a tool that facilitates increased understanding and this may serve as a cure for all of the forms of informational disease that currently plague humanity.

The keys are;

You have to covariantly communicate and dialogue.

You can’t lie.

You have to disclose what you really believe.

Failure to do this means that your buildings and governments may collapse.

You may run out of water for your farms and cities.

You may die in a pandemic.

We may end up living in an autocratic state, or dying in a world that no longer supports life as we know it.

Chapter 11.

The Planetary Bookkeeper

This is part of a total Project that includes TimberFish. Where it stands today, and how that has recently changed, particularly since August of 2021. However, the total Project involves much more than how TimberFish impacts aquaculture and Climate Change. Those impacts are technological derivatives from the Relational Symmetry Paradigm (RSP) which is an alternative to the reductionist paradigm that currently drives both our technology and social and political structures. The Planetary Bookkeeper is also a derivative of the RSP but it deals with its social implications while TimberFish shows how it can mitigate and reduce Climate Change.

While the technical structure of the RSP is complex, the overall argument is simple and recognizable by many people. It includes the thesis that nature does not do the math, at least not the way that we do. Most people can tell right from wrong, what is beautiful and good, how we should treat other people, without resorting to violence that is supported and maintained by complex mathematical calculations or artificial intelligence to tell us what to do. These abilities stem from certain basic beliefs that we all share (I hope). That all people are created equal, with certain inalienable rights of life, liberty, and the pursuit of happiness, and this should include food, shelter, clothing, reasonable medical care, and access to education.

So if nature does not do the math like we do, how do we function? How can we recognize the good and the right? The proposal is art. The aesthetic and creative judgements we all make. The emotional sense that we know what feels good, what makes us happy, how we want to be treated and how we should treat others. The aesthetic sense is there for all of us, but sometimes it gets submerged, driven out by bad experiences or history. However, this can be restored.

To describe this revisit the discussion of the Goldilocks Expanded Maximum Entropy Procedure which looks at decisions in terms of emotional or aesthetic evaluations. These are viewed in terms of too much, not enough, or about right, in place of the expected value functions that are calculated mathematically in the classical Maximum Entropy Procedure.

The procedure can work to some degree at all levels of effort. However, it can be greatly enhanced by dedication, study, focus, reflection, determination, and

practice, practice, practice. The more you work at it the better your understanding will be. The quality and humanity of your decisions will improve, and so will the happiness and satisfaction of your life.

I expect that all of the above will initially be ignored and/or rejected by most in the scientific and professional communities. However, they, or at least some of them, will have moral and ethical problems with that position. The Planetary Bookkeeper also explains how an extended version of the Maximum Entropy Principle can also be used to illustrate just how our obsession and tolerance of Extreme Wealth Inequality is the root cause for both Climate Change and rising autocracy and their associated and derivative problems.

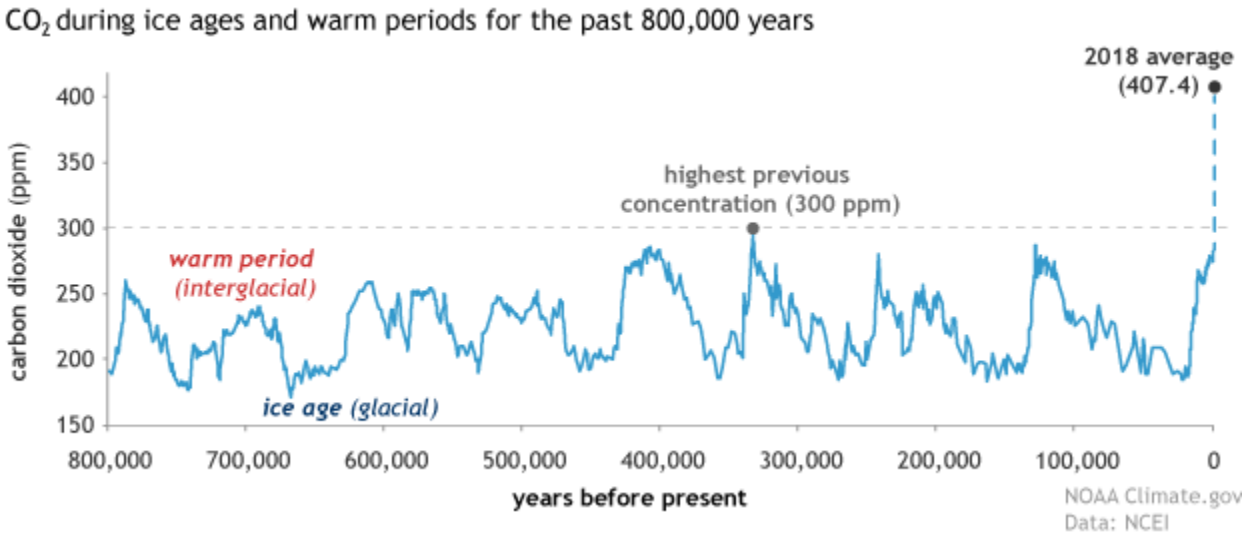
The argument will be presented in terms of five charts and graphs, and several spreadsheets. These will include (with appropriate references);

a. 800,000 years of carbon dioxide data
b. Atmospheric carbon dioxide concentrations 1960 to present
c. World Population growth 1960 to present
d. Global GPD 1960 to present
e. Global total wealth 1960 to present
f. The Global Wealth Pyramid, Credit Suisse Research Institute

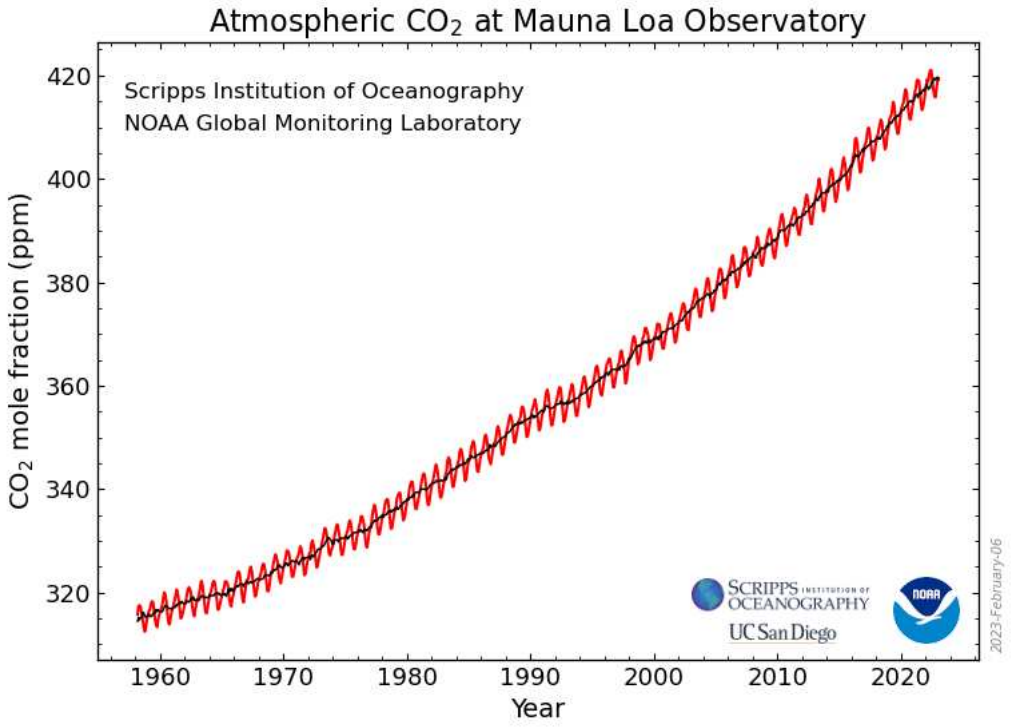
The spreadsheets illustrate what dollar value, (GDP, total wealth, or a function of both) corresponds to a pound of carbon dioxide in the atmosphere. They show who owns that carbon dioxide or at least owns the money that corresponds to it being put into the atmosphere in the first place. The argument is that this identifies who is responsible for Climate Change, and to what extent that responsibility then should transfer to financially doing something about it in the future. This argument can be supported by books such as “Davos Man: How the Billionaires Devoured the World” by Peter S. Goodman.

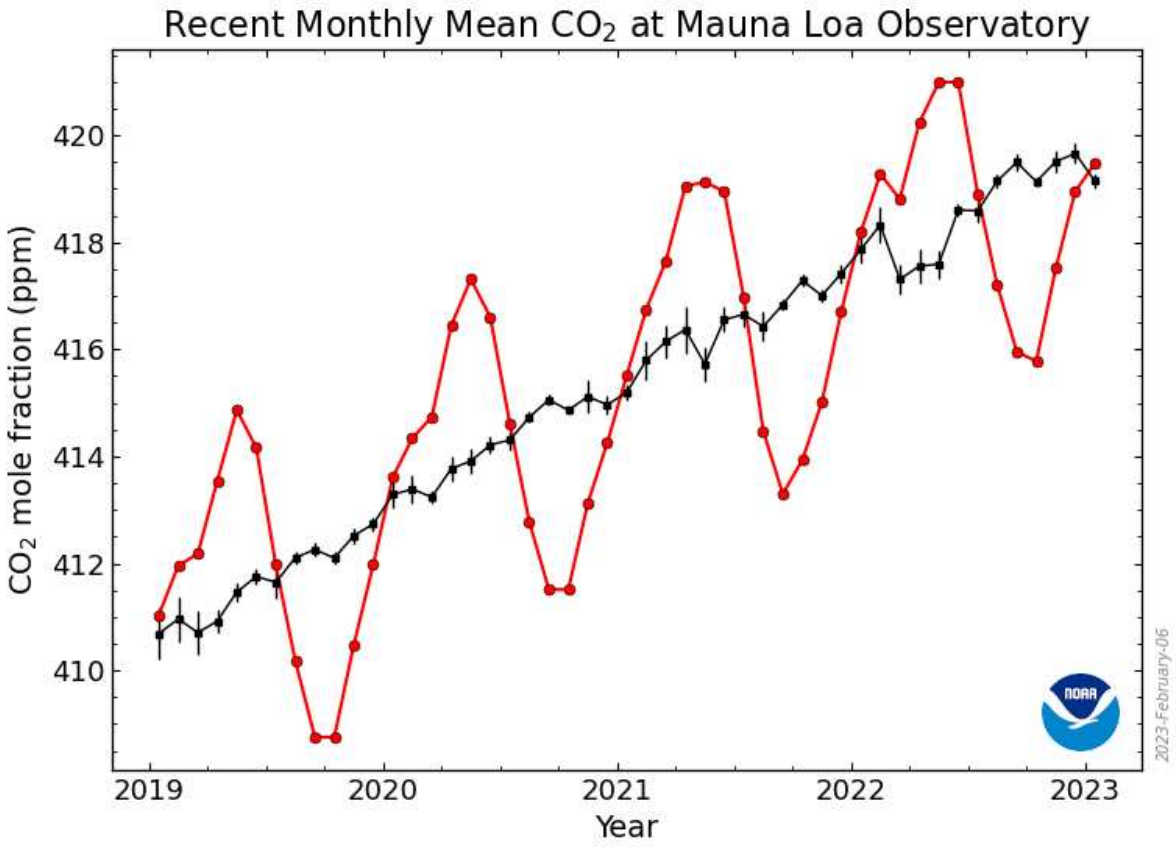
Here are the charts and graphs referenced above, along with the links to the sites that contain the backup for this information.

[Climate Change: Atmospheric Carbon Dioxide | NOAA Climate.gov]



[Monthly CO2]





June 1958 - June 2022

Atmospheric C02

June C02 1 Year-Over-Year I Mauna Loa Observatory

June 2022 420.99 ppm

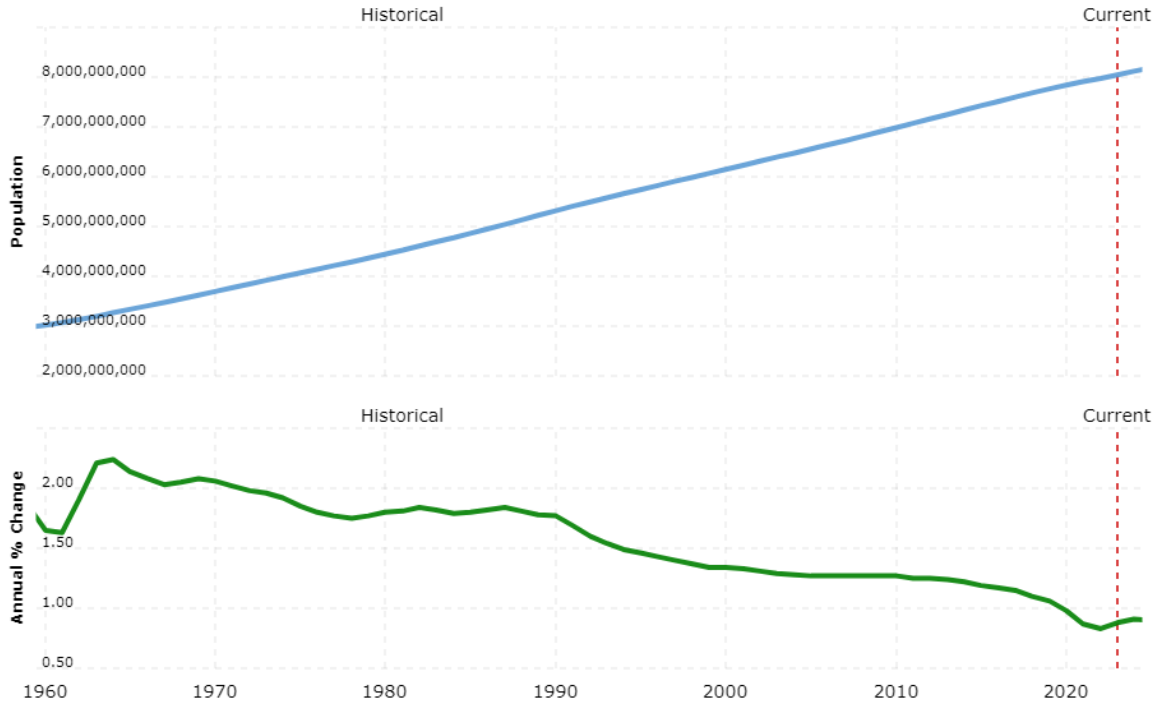
June 2021 418.94 ppm

June 2020 416.60 ppm

CO2 earth Featuring NOAA data of July 11, 2022

Population and CO2 levels can be compared with global population increases.

The following graph is from; [World Population 1950-2023 | MacroTrends]



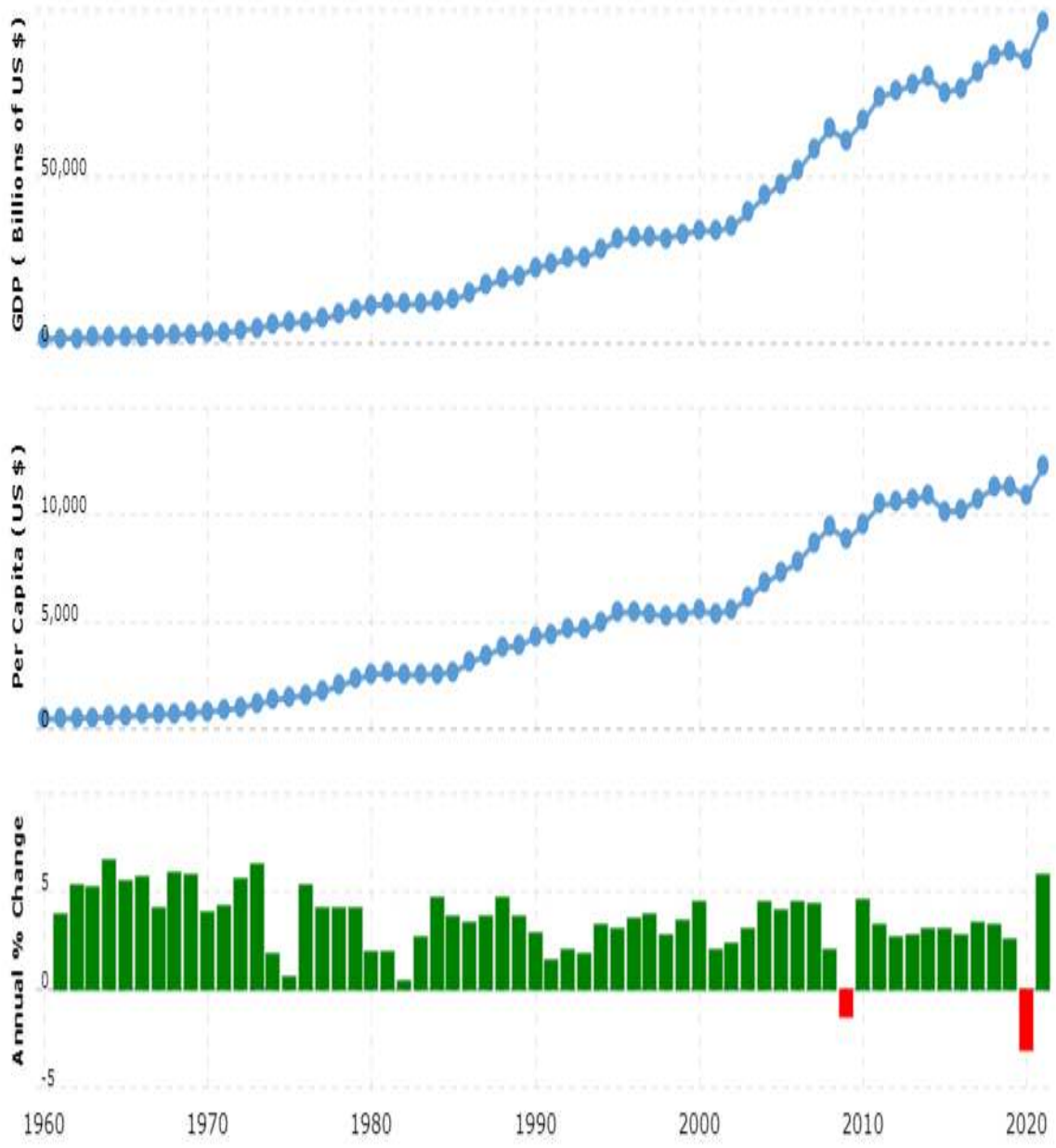
And all this can be compared with the rise in global GDP and total wealth.

For GDP data see, [World GDP 1960-2023 | MacroTrends]

"GDP at purchaser's prices is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products. It is calculated without making deductions for depreciation of fabricated assets or for depletion and degradation of natural resources. Data are in current U.S. dollars. Dollar figures for GDP are converted from domestic currencies using single year official exchange rates. For a few countries where the official exchange rate does not reflect the rate effectively applied to actual foreign exchange transactions, an alternative conversion factor is used.

- World gdp for 2021 was **$96,513.08B**, a **13.4% increase** from 2020.
- World gdp for 2020 was **$85,105.60B**, a **2.9% decline** from 2019.
- World gdp for 2019 was **$87,645.26B**, a **1.37% increase** from 2018.
- World gdp for 2018 was **$86,456.89B**, a **6.21% increase** from 2017."

This site also shows the trends in global GDP in terms of both total dollars and dollars per capita from 1960 to the present as;



This is shown with a different perspective by the World Bank. See;

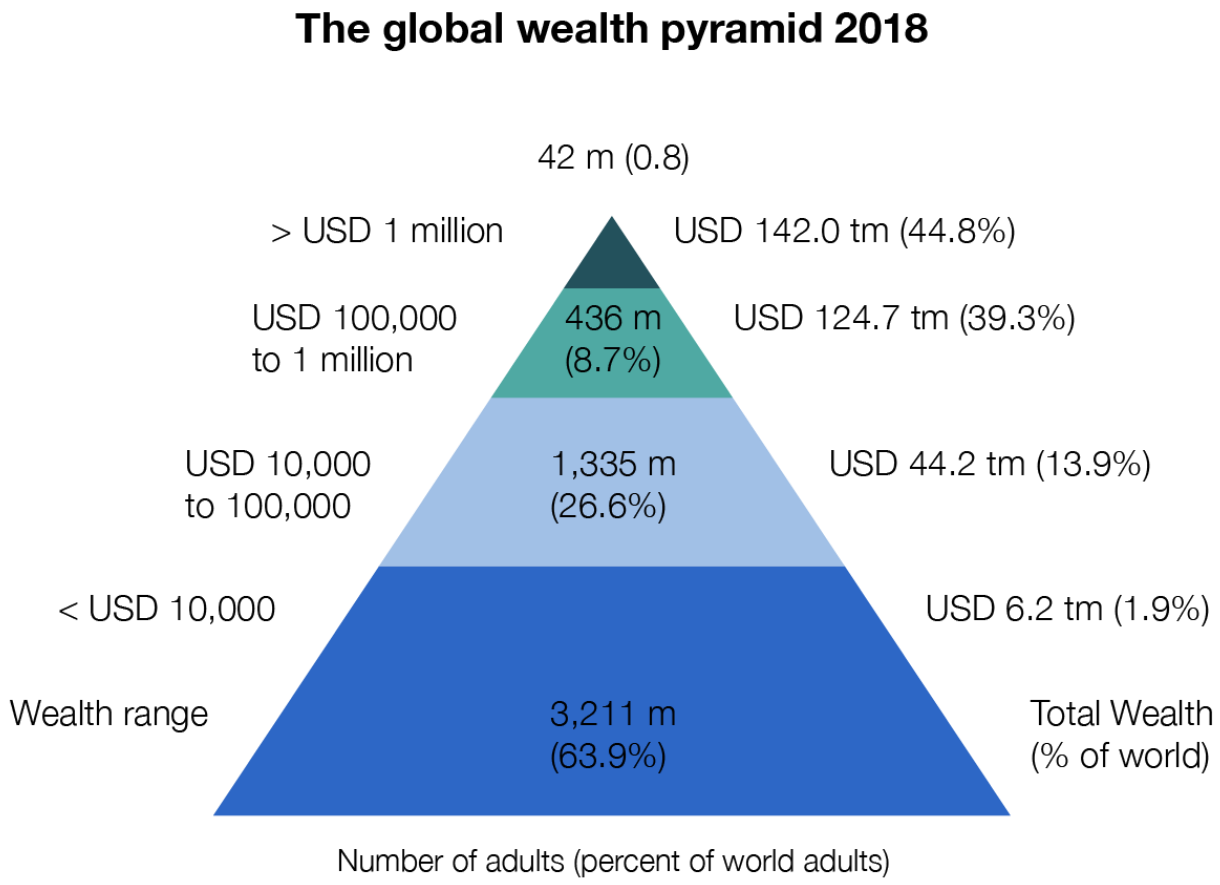
GDP (current US$) | Data (worldbank.org)

Again this tracks World GDP from 1960 ($1.39 trillion) to end of 2021 ($100 trillion) in US dollars.

If we look at this in terms of total wealth instead of GDP there is a lot of excellent data from the Credit Suisse Research Institute which publishes an annual report on how the world's wealth changes per year. All of these Credit Suisse reports can be found at;

Global Wealth Report – Credit Suisse (credit-suisse.com)

For example, here is the global wealth pyramid for 2018 which shows a total global wealth of $317.1 trillion dollars USD



Source: James Davies, Rodrigo Lluberas and Anthony Shorrocks, Credit Suisse Global Wealth Databook 2018

These global wealth pyramids are shown for each year. Going to these reports as linked above shows that on page 17 of the 2021 report total wealth for 2020 was $418.3 trillion in US dollars'

Similarly, on page 21 of the 2022 report the total wealth for 2021 was $463.6 trillion in US dollars.

These data illustrate the tremendous wealth inequality that currently exists in our global society. To show how this is manifested in the annual incomes for most Americans (which are significantly higher than those in most of the rest of the world) consider the following basis US government pay scales at;

General Schedule (GS) Base Pay Scale for 2022 (federalpay.org)

This shows that the US Government in 2022, had the following top step pay levels.

GS-1 $25,234

GS-15 $146,757

In addition this website shows salaries for other governmental elected officiaals.

Salaries of the President, Vice President, and Other U.S. Officials (infoplease.com)

President $400,000 plus $50,000 for expenses

Vice President $230,700 plus $10,000 for expenses

Position	Salary
Vice President	$230,700[2]
Senator	$174,000
Representative	$174,000
Majority and Minority Leaders	$193,400
Speaker of the House	$223,500
Chief Justice, U.S. Supreme Court	$255,500

Assoc. Justice, U.S. Supreme Court	$244,400

Finally note that a 4 star general in the US military makes $203,974 per year.

This is in stark contrast with what high level executives make at most large corporations. See, for example, data from

Equilar | New York Times 200 Highest-Paid CEOs

This site shows the top 200 CEOs, total annual compensation, median employee pay, and pay ratio. Some selected annual income examples from this list include (numbers shown here only represent their standing on the list from 1 to 200, and the dollar value of their income for the year). The last three entries are included because of their relevance to the following list of the largest employers in the world.

1.	$834,959,367	
10.	$177,905,400	
100.	$23,181,184	
200.	$19,171,090	
168	$20,028,132	McDonalds
8,	$212,701,169	Amazon
81.	$24,624,309	Walmart

Relative to this also consider the following employment numbers for;

Top 10 Largest Employers in the World - Business Connect | Best Business magazine In India (businessconnectindia.in)

10. Foxconn: 1.3 million
9. Amazon: 1.3 million
8. National Health Service of the UK: 1.34 million
7. Indian Railways: 1.4 million
6. **Indian** Armed Forces: 1.45 million employees
5. China National Petroleum Corporation: 1.5 million

4. McDonald's:1.7 million
3. People's Liberation Army (PLA): 2.185 million
2. Walmart: 2.2 million
1. The US Department of Defense: 2.86 million people

So what do we make of all this.

First, it is important to stress that while all people are created equal, we do not all have the same sets of skills and work ethics. This is important with respect to wealth allocation because some people contribute much more to the health, stability, and happiness of the society as a whole, and to each of us as individuals, than do others. Consequently, it is reasonable to incentivize these individuals to keep up their good work, and a great way to do this is through unequal wealth distribution. The key question is what is a reasonable distribution given each individuals equal inalienable rights and their unequal contributions to the maintenance and insurance of those rights and happiness.

Attached are four spreadsheets, with discussion as to how they are constructed and operated, and what they show us about extreme wealth and income inequality. The first two sheets entitled Land Allocation examine the distribution of total wealth in terms of the amount of land theoretically available to each person and the dollar value (wealth) which that land represents.

In the spreadsheets the first two columns, A and B, list the values and definitions of the factors that are used in the sheets calculations. This relates back to the information already presented in this document and the evidence supporting the information. You can change these numbers if you want, as long as these is a reasonable argument and evidence for the change. Column D breaks the available land into classes based on lot size, E and F show this in terms of different units. Column G contains your input as to how this wealth should be distributed among the classes subject to computational constraints imposed by the assumptions made in columns A and B. These constraints are shown by target numbers in row 45 that are derived from the assumption sets. Row 42 shows how close your choices for distribution values in column G come to meeting those targets. It is possible to enter values in column G so that all targets are met to arbitrary levels.

This is where your use of the Goldilocks Maximum Entropy Principle comes into play. What do you think is a reasonable distribution given your value structure. Thus in sheet Land Allocation 4.6 I have assumed a distribution in column G with only modest wealth inequalities. This was based on data presented earlier in the document.

In sheet Land Allocation 4.18 I used a wealth distribution for each lot class size that approximates what our current wealth distribution is for the top four lot classes in the world today. Then I filled in what might be a reasonable continuation of that distribution mentality. You can see the result.

The other two spreadsheets follow a similar program but are set up to look at income distributions based on consideration of gpd.

In all these sheets you are invited to enter your own numbers with your own set of assumptions and the rational and evidence for those assumptions. See what you come up with. To open and run these spreadsheets please contact me at

Jerenorthrop@timberfishtech.com


x Land Allocation 4.6c.xlsx


x Land Allocation 4.18c.xlsx


x Compensation Allocation 2.6c.xlsx


x Compensation Allocation 2.18c.xlsx

Conclusions:

We have assumed that all people are created equal, with certain inalienable rights of life, liberty, and the pursuit of happiness That this should include food, shelter, clothing, reasonable medical care, and access to education.

We have also presented a number of problems that are facing us today. These stem from concerns that our rising human population may have already exceeded what our planet can sustainably support, and that this is driving derivative problems of Climate Change, global pandemics, and environmental pollution. While we have the scientific and technical knowledge to resolve these problems we are not implementing this knowledge because of a series of unresolved social problems.

Our contention here is that most of these social issues are derived from our obsession and tolerance of Extreme Wealth Inequality, which we argue is the root cause for both Climate Change and rising autocracy, and their associated and derivative problems of environmental pollution, habitat destruction, racism, sexism, and the spread and acceptance of misinformation.

To illustrate this contention we have presented data that shows what dollar value, (GDP, total wealth, or a function of both) corresponds to a pound of carbon dioxide in the atmosphere. We have also shown who owns that carbon dioxide or at least owns the money that corresponds to it being put into the atmosphere in the first place. We contend that this identifies who is responsible for Climate Change, and to what extent that responsibility should transfer to financially doing something about it in the future.

By incorporating a new way of thinking as represented by the RSP, and applying it via the GMEP, we offer a way to assess how much wealth and income is reasonable given our core beliefs. This is then starkly contrasted with how we currently distribute wealth and income. This exposes the dominant role that a very few individuals have, and have had, in creating Climate Change through their support of the rising autocracy that is necessary to continue and maintain extreme wealth and income inequality.

A possible solution is then to limit individual wealth to no more than $800,000 per adult person, and limit individual adult income to no more than $400,000 per year.

These numbers stem from how difficult it is to justify extreme wealth and income as being necessary to reward the decision making of the top executives of the major corporations when that decision making has resulted in the Climate Change that is now threatening to destroy our societies and the ecology of the planet, and is supporting and driving the rising autocracy that promotes and maintains racism and sexism.

It is also important to talk about the role that all of us must play in stopping population growth and how that can be achieved by limiting our reproduction to two offspring per person. In other words, we can reproduce ourselves but should not increase the population of a finite planet.

Notes and References

Notes:

1. **A new type of thinking is essential if mankind is to survive and move toward higher levels.**
   From "Atomic Education Urged by Einstein", *New York Times* (25 May 1946), and later quoted in the article "The Real Problem is in the Hearts of Man" by Michael Amrine, from the *New York Times Magazine* (23 June 1946). A slightly modified version of the 23 June article was reprinted in *Einstein on Peace* by Otto Nathan and Heinz Norden (1960), and it was also reprinted in *Einstein on Politics* by David E. Rowe and Robert Schulmann (2007), p. 383.

2. Quote by Richard Buckminster Fuller: "If you want to teach people a new way of thinking..." (goodreads.com)

3. Relational Systems Theory
   Personal Communication with Jon Ray Hamann

4. "General Relativity and Matter; A Spinor Field Theory from Fermis to Light-Years", Mendel Sachs, D. Reidel Publishing Company, 1982, and "Quantum Mechanics from General Relativity; An Approximation for a Theory of Inertia", Mendel Sachs, D. Reidel Publishing Company, 1986

5. Diagram is from the Hyperphysics website link, see Exchange Particles (gsu.edu) Which is copyright protected and used herein for non commercial purposes. See HyperPhysics Concepts (gsu.edu) This is an excellent site for the presentation of basic concepts in physics.

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