

Now Machines

(Foundations Paper 1)

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Abstract

Traditional sciences deal with predicting the future from the past or inferring theorems from assumed axiomatic truth and so forth. The standard preoccupation is with the *a priori* and *a posteriori* aspects of reality and the relationship between the two. An alternative synthetic scientific paradigm follows the path of the ancient Greeks and explores the non-dualistic position of the Parmenidean world in between. Things in the future and the past do not objectively exist. Only what is present *now* objectively exists. Traditional science is thus diachronic in nature; the alternative and complementary synthetic science will be *synchronic*, anchored to the immediacy of the subject's *nowness*. Everything changes. However, the Now never seems to go away. In fact, it starts to take on the allure of a universal invariant, always there, never absent no matter what the situation.

This paper argues that in order to solve the age-old problem of developing a synthetic alternative to analytic sciences there is no need for massive innovation. The ancient Stoics already worked out the basic ingredients. The paper fills in the dotted lines and presents a reverse engineering of Stoic physics, logic, and ethics to illustrate how tightly and interdependent the system was integrated. A key ingredient in the unification of the Stoic system is a universal construct based on ontological gender. Using the ancient gender construct, one can revive the classical four element theory of substance, and show how it can apply universally even to "logical substance" in the form of Stoic logic based on the five indemonstrables. The paper illustrates how this gender-based algebra of substance provides explanations of familiar quantum mechanics style phenomena. The paper also investigates Four Element Theory as a universal science of Nature explaining the four-letter genetic code together with the four fundamental forces of physics.

Keywords: quantum algebra; genetic code; gender; non-duality; First Classness; Stoicism; four letters; geometric algebra; epistemological bi-lateralisation;

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1 Introduction

According to Kant, traditional sciences all rely on *a priori* constructs. Since modern, axiomatic mathematics needs axioms *a priori* to function, then it too falls under the same umbrella. Such sciences involve a duality of precedence with a temporal or logical opposition between *before* and *after*. Mathematics relies on axioms to deduce theorems, empirical sciences relies on accumulated past knowledge to predict the future. All of these sciences can be characterised as primarily *diachronic*. What is missing is a science that escapes this dichotomy between the *a priori* and the *a posteriori*. Such a science must be located in the in-between world of the *Now*. Needed is another kind of science to the traditional sciences, a non-dualist science of *Now*. Such a science will not be diachronic but primarily *synchronic* and hence *operational*, somewhat reminiscent of the operational calculus alternative to analysing time series, but on a much grander ontological and epistemological stage. As well as being non-dualist, the science will be non-abstract.

Although all present day sciences, including axiomatic mathematics, embrace abstraction and the consequent dualisms, this was not always the case. The paper examines the logics of Aristotle and the Stoics in the quest to provide a coherent rational framework for a universal, non-abstract, operational science. Because of its operational

nature, we argue that such a science will be simple and simplifying, perhaps even stupefyingly so. The alternative to linear thinking is not “complex thinking” as advocated by French author Edgar Morin and others, but simple, *operational* thinking.

In this paper, the rupture from traditional science concerns the role of attributes. The new science must take the radical step of eliminating all reliance on accidental attributes. To get the system off the ground, an alternative, very ancient construct is employed – *ontological gender*. As will be shown, gender is not like colour or sex, it is not a determined attribute. Gender provides the basis for a generic typing system. All typing can be expressed in simple or compound genders and nothing else. The paper shows how the gender construct underpins the ancient theory of the four classical elements. The approach is modernised to show how the four binary gender types *MF*, *FF*, *MF*, and *MM* relate to the four letters of the generic code and reveal hidden generic semantics,

The generic science approach advocated in this paper provides new insights into the purposefulness of life. What this means is that any autonomous, no-strings-attached, being must maintain and not violate the principle of non-duality. The organism must maintain at all costs systemic First Classness of non-duality. By bootstrapping from this principle alone, it can be shown how the semantics of the genetic cum generic code can be reverse engineered. This is the first of a series of papers directed to that objective.

2 The Double-Paradigm Paradigm

The history of ideas inevitably recounts the incessant conflict between two opposing perspectives on reality. The protagonists vary over time and place. Materialists confront idealists, realists confront anti-realists, and the atomist Epicureans confronted the non-atomist Stoics, the physical sciences declare themselves as the “hard” sciences that have to put up with the not so serious “soft” sciences. Karl Popper saw the latter dichotomy as simply that between science (potentially falsifiable) and self-justifying non-science. One can even note that the bilateral architecture of the brain is an expression of this twin paradigm view of reality. The position taken by the author is to accept that there are deep ontological reasons for the bi-lateralisation of rational thought. Our objective must be to understand and provide the fundamental characterisation of these two opposing poles of rationality.

We start with Aristotle. Aristotle gave the first characterisation of traditional sciences as the study of things with a determined genus. For the purposes of our exposition, we will informally refer to these kinds of sciences as *left side* sciences as the reasoning involves a “left brain,” realist kind of mentality. Aristotle pointed out that there was the possibility of another kind of science involving entities without determined genus. He characterised the science as the study of Being, or more precisely, the study of Being *qua* Being, a science that later often became known as metaphysics. We will refer to the science of the entity without determined genus as *right side* science, a decidedly non-realist adventure. In modern times only the left side sciences qualify as “hard” sciences; the right side scientific paradigm with its metaphysical, anti-realist overtones having not really advanced at all since antiquity. As even Kant proclaimed in his time:

It seems almost ridiculous, while every other science is continually advancing, that in this, which pretends to be Wisdom incarnate, for whose oracle every one inquires, we should constantly move round the same spot, without gaining a single step. (Kant, 1783)

Despite many attempts, usually based on speculation, introspection, and even supposition, the situation has remained practically unaltered to the present day.

In a modern context, axiomatic mathematics qualifies as a left side science as all mathematical entities are determined by axioms or deduced from axioms and hence have

determined genus. Our objective is to develop the epistemological framework of right side mathematics, the mathematics of the entity without determined genus. One could refer to right side mathematics as *generic mathematics*. Obviously, generic mathematics cannot be axiomatic and must resort to some other formalism, a foundation without predetermined genus. Note that the lack of determined genus means that in right side science there cannot be any determined distinction between mathematics and other sciences like physics, for example: they must all be part and parcel of the one universal science. Thus, from the right side scientific paradigm perspective, physics is generic mathematics and generic mathematics is physics.

Present day sciences are all instances of left side science. No left side sciences can claim to be universal. However, they can claim great generality as demonstrated by their capacity to come up with abstract theories and their ability to quantify the phenomenological world. Gaining confidence from success, left side sciences have come to bask in the belief that no other kind of scientific paradigm is necessary. All left side sciences are intrinsically realist as there is no reliance, involvement, or reference, to mind or subject in the mix. After all, what is meant by mind or subject has no determined genus and hence is out of bounds. Any science that includes the subject forcibly becomes subjective and even ‘too metaphysical’, so to speak, a point that Karl Popper persistently underlined and actively undermined. However, there is a price to pay for the mind independent objectivity of left side sciences. Like right hemisphere stroke victims, the epistemological brain with no functioning right side counterpart can suffer from “hemineglect” and may end up only eating food on one side of the plate.

For right side science and its generic mathematics there can be no such “hemineglect.” Right side science must embrace not only its proprietary right side of the epistemological equation, but also the seemingly hostile left side. From the right side perspective, all of traditional left side mathematics must be covered by generic mathematics. The right side mantra must claim that mathematics *is* generic mathematics. The only difference between mathematics and generic mathematics is the point of view. Simply put, traditional mathematics has no points of view whilst generic mathematics has. Moreover, the points of view must be in the mathematics. In fact, generic mathematics might even be considered as nothing more than the science of points of view.

From a left side perspective, there is the mathematical world of axiomatically determined mathematical objects. This mathematical world may be the product of the mathematical mind, but the mind is never in the mathematics. On the other hand, the right side perspective of generic mathematics must somehow simultaneously embrace the specifics of reality and of the participating subject. From the right side perspective, neither subject nor its reality are capable of independent existence, hence the intrinsic anti-realism.

Kant provided an additional characterisation of the distinction between left side and right side science. Traditional scientific knowledge all depend *a priori* constructs in order to get off the ground. The other kind of scientific knowledge, what we call right side knowledge, must somehow bootstrap itself up without reliance on any *a priori* knowledge whatsoever. Kant dressed up his argument in terms of analytic and synthetic judgments and so forth, but we need only take his central formula. There is a reality that can be known in some way but without relying on any *a priori* determinations whatsoever. The requirement that a science be free of any *a priori* constructs. we will call the *Kantian Condition*. The condition applies not only to the science but also to the object

of the science, as neither can be *a priori* to the other. To develop a science satisfying the Kantian Condition will be referred to as the *Kantian Problem*.

It is now time to demystify this classical problem. Our demystification proceeds in two steps. The first step is just to get a handle on the problem. Firstly, we take into account that the Kantian Problem refers to a very specific reality, a reality without *a priori* determinations. We must find a name for this kind of reality. The most obvious and accurate name is to call it *Now*. To resolve the Kantian Problem one must develop a science of the *Now*. Right side science is *Now Science*, a science of being, a science of being *now*. It is only in the *Now* that both the reality of the subject and the subject are in perfect synchronicity, neither being *a priori* to the other. Traditional left side science exploits the *before* in an attempt to predict what comes *after* or *vice versa*. The essential relationship is between the antecedent and consequent. In the right side version, there is no determined antecedent-consequent relationship but only the immediate presence of the Self and its reality, both concurrently present in the one boat. The idea goes back to Parmenides according to which the true objective reality was the eternal present. In essence, for the organism in question, nothing ever changes. It might structurally change but the organisation remains the same. For a living entity existing in its own immediacy, this is the desired situation throughout its whole lifetime. It has no real choice in the matter. Accompanying the individual organism is the Parmenidean reality living in its eternal Now. As we shall see, the Nowness of the personal individual organism must somehow accommodate itself with the presence of the impersonal.

This all sounds even more mystical than the Kantian Problem itself until we come to the second part of our demystification. We now inquire as to whether the traditional mathematical sciences might harbour any embryonic forms of “*Now*” Science. It turns out that the first step towards developing such a science, albeit from a left side perspective, was due to Oliver Heaviside in the nineteenth century. Heaviside developed an ingenious method of simply transforming integration and differentiation operations in calculus to algebraic division and multiplication. Heaviside had invented the Operational Calculus. A more formal development of the approach was expressed in terms of Fourier and Laplace transforms. From thereon, an alternative perspective on understanding dynamical systems became possible. The diachronic approach of traditional differential equations can be replaced with the synchronic approach of Operational Calculus. Time in the “before” and “after” of the time domain gets integrated out to give way to the synchronic perspective of the frequency domain.

The Operational Calculus and Fourier transforms greatly simplifies the mathematics of dynamical system. However, there is a significant downside. The Fourier transform integrates over a time interval. Thus the Fourier transform of several hours’ worth of voice signals, say, will be practically meaningless. The Fourier transform is too global to be of much practical use in this case, In the quest to get rid of the “before” and “after,” any semblance of a *Now* has been thrown out with the bathwater. To overcome this problem, practitioners have developed the Short Term Fourier Transform, leading to a time varying Fourier transform. The original time varying function of a complex variable is constantly modified by only considering the portion of the function appearing in a sliding window. The location in time of the window thus becomes an empirical expression of “*Now*.”

Of considerable interest is that the size and shape of the sliding window contributes significantly to the Short Term Fourier Transform result. In some cases the result might depend more on the specifics of the measurement window rather than the time function itself; a good example of subject-object interference, This interaction can even be

expressed in an analogous way to Heisenberg's Uncertainty Principle (Oliveira & Barroso, 2003). In this context, the sliding window can be imagined as the *Now* of the subject, with the object corresponding to the chopped part of the signal. Both are present in the one window, one *has* the window the other *is* the window. Both are present in the one instance. This useful anti-realist illustration helps demystify what we mean by the formalisation of a subject-object relationship.

Nevertheless, this Operational Calculus example is *only* a left side, pale imitation, of what we must achieve. Our problem is to develop right side science as the operational version, not just of time series, but also of the whole gamut of traditional sciences and mathematics. Both left and right paradigms allow an interplay of the synchronic and diachronic but above all of that, left side science must be *firstly* diachronic and right side science is characterise by being *firstly* synchronic. For left side science motion is a verb whilst for right side science, true to its operational vocation, motion is a noun. In other words, traditional left side sciences are based on the language of actions whereas right side science is based on a language of things where even an action is a thing in its own right. One can glimpse shades of meaning by referring to the Operational Calculus example above.

In summary, the mathematical toolkit of the System Engineer has two compartments. In the left hand compartment will be found the tools for the analysis of systems with time series inputs and outputs. In this perspective, there are three kinds of systemic entities, input entities, system entities, and output entities. On the other hand, the right side compartment is non-dualist in that it only contains one kind of entity, notably functions of a complex variable. Inputs, outputs, and the system itself, can all be modelled by functions of a complex variable. A very important observation is that if $X(s)$ is the input to a system $F(s)$ then the output $Y(s)$ is given by the *product* of input and system, i.e., $Y(s) = F(s)X(s)$. When this potentially synchronic construct is taken over to the right side generic version of the paradigm, the notion of product will become paramount. Entities will become geometric entities and the geometric product pioneered by Grassmann will define the interaction between entities. The product is a *synchronic* construct.

Meanwhile the author must press home the point that present day professional System Engineers, in their everyday work, apply a "two hemisphere" approach to building and analysis of real systems, constantly flipping from one hemisphere to the other, depending on context. The objective of this paper is to develop an epistemological "two hemisphere" approach at the foundational *epistemological* level, One epistemological brain, the left side, has already been well advanced over the past few centuries. It is time to develop the right side leading to a non-dualist, operational version of all the sciences.

The principle obstacle to developing an operational version of the traditional science can be put down to one sticking point – attributes. Left side sciences are addicted to attributes, be they measured, postulated, hypothesised or whatever, left side sciences are all heavily and fundamentally attribute orientated. Take away attributes and there would be very little left of traditional science. Left side sciences can be characterised by their realist take on reality. Each science views the world as full of knowable objects where each object is knowable in terms of the attributes it may or may not possess. The articulation of knowledge about a thing thus takes the form of an enumeration and explanation of its attributes. In brief, all the traditional sciences, including axiomatic mathematics, are attribute-based sciences.

The realist stance of such sciences demands that the things that make up the science must enjoy some sort of existence. However, the same does not apply to attributes.

Attributes merely determine the specificity of a thing's existence but do not themselves enjoy existential status. One could say that the things encompassed by the science are First Class entities whilst the attributes are merely Second Class, as they do not exist *per se*. This dichotomy between First Class entities and Second Class attributes is an example of the dualism that runs rampant in all left side sciences.

The distinctive way that left side science views the fundamental nature of what constitutes a thing is well illustrated in the classical physics take on elementary particles. Firstly, all matter is made up of an amalgam of elementary particles. Secondly, elementary particles possess the bizarre property that they are totally devoid of any internal structure, even though they somehow possess individual attributes. Fundamentally point-like, each elementary particle is singularity floating around in the void, another example of duality – the particle-void duality; there is also the particle/wave duality but that is something else again.

Just to be troublesome, Quantum Mechanics, takes the opposite existential stance to that of classical physics. According to the Copenhagen Interpretation, particles simply do not exist. All that objectively exists are the measurements taken at a point in time. The measurements are the attributes and only they exist, not the supposed thing or things possessing them. Nevertheless, it must be said that Quantum Mechanics still accepts the dualism of the thing-attribute dichotomy, only the other way around to classical physics.

The mathematical formalisation of the point-like nature of things is expressed in Set Theory, the foundational discipline of traditional, axiomatic mathematics. In Set Theory, the things of the theory correspond to the elements of a set. Thanks to the Axiom of Choice and Zorn's Lemma, the elements of any set can potentially be distinguished from each other by labelling them with distinctive real numbers. Zorn's Lemma guarantees that such a labelling exists. Being typically non-constructive, as is the case for all left side mathematics, the lemma does not indicate *how* to label.

Each set in the theory, corresponds to an attribute, be it simple or composite. Elements *have* that attribute if they are members of the set. Correspondingly, it could be said that the set *is* that attribute. The basic dualism in Set Theory is the set-element dichotomy. The Set Theory world is thus split right down the middle with the entities that *have* an attribute on one side and any entity that *is* an attribute on the other. In Set Theory, the elements of a set *have* attribute in the form of set membership, the set *is* that attribute, at least as expressed by the formalisation. This rigid dichotomy between what *is* attribute and what *has* attribute, expresses a fundamental characterisation common to all left side sciences. Overcoming this rigid dichotomy is the mission of right side science.

Right side science must be totally free of rigid dichotomies and thus qualify as a non-dualist theory. We will say that any system that is organised along the lines of maintaining an environment that is free from rigid dichotomies will be a system satisfying *First Classness* (FC). Such a system can be said to be a First Class system enjoying and maintaining its FC. Such systems are autonomous, needing no external control. In fact, the First Class machine has no choice but to reject any external control of its being, as that would violate its systemic FC. In the realm dominated by the non-dualist demands of FC, even the duality between the science and its object cannot be a rigid dichotomy. The language of the science, its code, must form an integral part of the system. The formal language proscribing the First Class system must be its systemic DNA, so to speak.

3 First Classness and the Kantian Problem

The term First Classness (FC) is borrowed from Computer Science. Despite FC articulating the most fundamental paradigm of Computer Science, the concept has

escaped any successful attempt at a universal, all-embracing formalisation. This is not surprising when one considers the nature of a system that perfectly satisfies the demands of FC. In such a system, no entity is allowed to occupy second-class status relative to all others. What this means is that no entity can be a logical or temporal antecedent to all others. In other words, no entity is logically *a priori* to the others. Without too much effort, it becomes clear that a system that satisfies FC will be the kind of system satisfying the Kantian Condition. The science of a system satisfying the Kantian Condition is the science of systems satisfying FC. So, once and for all, to solve the Kantian problem one must solve the problem of formalising the concept of the system totally respecting FC. Such systems will fit under Aristotle's umbrella involving the science of systemic entities that have no determined genus. Such systems, devoid of determined *a priori* or even *a posteriori*, live in their *Now*. We need a science of *Now* machines.

By moving this age old classical problem from the domain of pure philosophic speculation to that of the science of systems respecting FC, the problem starts to gain traction. First, consider some present day practical examples of FC.

A good illustrative example of FC in Computer Science is the Object Oriented (OO) paradigm, one of the most important paradigms of the discipline. The OO paradigm demands FC amongst the objects of a computer system. FC is thus expressed by the OO mantra that "everything is an object." In the OO paradigm, an object is defined as being an instance of a class. Such a definition immediately runs into trouble as it violates FC by inferring a rigid dichotomy between object and class and not respecting the mantra that "everything is an object." FC violation is overcome by considering a class as being also an object, but an instance of a different kind of class – a meta class. This once again violates FC but is overcome by considering a meta class as an object instance of yet another kind of class – a meta meta class. One might think that this leads to infinite regression with an infinite hierarchy of classes, just like Bertrand Russell's Theory of Types. However, this turns out not to be the case as the meta meta class becomes an instance of itself and so the regression ends there. The computer system Eliza written in SMALLTALK developed by Xerox in the eighties was the first attempt at an OO operating system. Note that software developed in popular programming procedural languages like Java, C#, or C++ lead to only a cut down version of the OO paradigm. Unlike SMALLTALK, the languages only support classes, and not meta classes nor meta meta classes.

Also, note that the OO paradigm is based on a Three-plus-One structure where the triad component consists of objects, classes, and meta classes. The One consists of the meta meta class, the class which is an instance of itself. In the Xerox SMALLTALK version, the One was tantamount to the Eliza operating system, itself.

There are many other examples. The recursive, functional programming language LISP for example, expresses FC in the form of the mantra "Everything is a list." Thus, data is a list or a list of lists. Functions take lists for arguments and return lists as return values. Functions, which are based on Lambda functions, are themselves lists. Thus, FC is satisfied by the fact that functions can take functions as arguments and even return functions as return values. It is interesting that a system written in LISP is restricted to its functional, list-processing paradigm. The paradigm does not allow for any "side effects" like interacting with the outside world. It cannot even print to a printer or display to a screen without violating its list-oriented mantra. Practical systems written in LISP graft on such capability, but in so doing violate the functional language paradigm version of FC.

FC is not restricted to computer science. Take Category Theory for example, which introduces FC into the foundations of axiomatic mathematics. Henri Poincare once said that mathematics was not the study of mathematical objects but the study of mathematical relations between objects. Category Theory proceeds in that spirit. Category moves the emphasis from mathematical entities like sets and their elements to that of the relations between mathematical entities. Arrows represent the relations. Henceforth, the mathematical discourse of Category Theory becomes a conversation in the potentially non-dualist construct of auto-determining ensembles of arrows. The mantra for Category Theory, in its arrow-theoretic guise, is that “everything is representable by arrows.”

We now come to the Three-plus-One structure of Category Theory. First of all, there are the concrete categories of mathematics. The arrows at this level correspond to concrete morphisms between sets. A typical example of a concrete morphism is a function between two sets. After the concrete category comes the next realm of abstraction. The arrows in this case will be simply called morphisms. The third realm of abstraction involves arrows transforming categories to categories. These arrows are called *functors*. This marks the triadic part of the Three-plus-One structure. The One part involves the most universal type of arrow possible. These are called Natural Transformations. Natural Transformations transform functor to functors. Natural Transformations are very “categorical” as the construct is expressed in arrow theoretic methodology with no explicit reference to the peculiarities of any underlying structure. Category Theory is the most universal kind of discourse possible in traditional left side mathematics. However, its axiomatic foundations inevitably compromise FC integrity. Any set of axioms constitutes *a priori* knowledge and so immediately violates the Kantian condition and hence FC. Nevertheless, Category Theory is no doubt the best universalisation that one can achieve of axiomatic mathematics *within* axiomatic mathematics.

In order to achieve our goal of an operational epistemology of the sciences, our discussion has indicated that we need to develop science that is free from attributes. In what follows, we will replace the attribute construct by a more profound construct, one based on *ontological gender*.

4 Ontological Gender

As stated above, traditional sciences and mathematics are all attribute based. Each science is characterised by a rigid dichotomy between objects and attributes. The element/set dichotomy in Set Theory, the particle/measurement dichotomy in quantum mechanics and the point-like particle/attribute dichotomy are examples. Such sciences all involve rigid dichotomies establishing a dualist reality. In order to solve the Kantian Problem we must establish a new kind of formalism that eliminates all such rigid dichotomies. In so doing we will eliminate any possible *a priori* determinations. The result is a non-dualist reality, the reality of *now* and only *now*. Forcibly, such a reality can only be understood and formalised as a synchrony, unlike the diachronic realities of left side science. In this way, right side science becomes the *operational* version of the traditional sciences and mathematics.

Instead of the formalism of axiomatic mathematics, we need a formalism that has no need for axioms: the formalism must be driven by the draconian demands of constructing a system that respects FC. FC demands that the system does not tolerate any rigid dichotomies. As such, the system cannot be dualist. It must be founded on the principle of non-duality, a nuanced form of monism. Traditional axiomatic mathematics relies on the normative role of axioms as a source of truth. Non-dualist mathematics must rely on the normative role of FC. The non-dualism demanded by strict FC must become a self-

justifying truth, a self-realising prophesy, a truth constantly asserted and reasserted in the immediacy of its now. This pre-occupation with FC dominates the life of the Now Machine. Left side mathematics always relies on the mathematician for the proof. Systems based on right side mathematics enjoy no such luxury. Organisms out in the wild open world are inevitably burdened with the task of constantly proving themselves.

4.1 The Diachronic and Synchronic

This paper turns back to the ancient Greeks and explores the non-dualistic position of the Parmenidean world situated in between what has gone and what might be coming. This in between world between the past and the future is the world continually experienced by the individual. Moreover, it is objectively the *only* world experienced by the individual. Experience is never tomorrow or yesterday as there no individual can venture. For the individual, temporality is always stuck to *now*.

The Stoics stated the dogma. For any individual, things in the past and the future do not objectively exist. Because they do not exist, no things in the past or the future can affect or harm you. Only what is present *now* objectively exists. This raise the important question concerning what things exactly do exist in the Nowness of the present. For the Stoics, there were two entities in play, notably you and Nature. To be kept in mind is that the Stoic synthetic system of reasoning did not allow for abstractions, as abstractions do not exist only individuals exist. Thus more technically, the two entities occupying the Now would be the personal individual and the impersonal individual, the latter loosely referred to as Nature. Clearly, for personal self-interest it would be opportune that these two individuals get on. The two should be in harmony, from whence struts forth the Stoic mantra: the individual should live in accord with Nature. Moreover, any individual can only influence what is in its power to influence. Any attempt to do otherwise would be futile. In the Stoic system, individuals are known by their powers and dispositions to act and be acted upon, not by any abstract categorisations. The Stoic system is *dispositional*, not *categorical* like the analytic sciences of today.

Here we glimpse the possibility of an alternative to the traditional sciences. The alternative becomes a Science of *Now*. As Heraclitus opined, things come and things go. Everything changes. Nothing is permanent. However, there is something in the scenario that is not so ephemeral. There is the inescapable fact that *Now* never seems to go away. It is always there. In fact, this Now thing starts to take on the allure of a universal invariant, always present, never absent no matter what the situation.

In the following section, we will start to investigate the nature of this mysterious Now entity. Our task will be to develop a Science of Now as the foundational science, the ground science. We have already pointed out how the task can be demystified somewhat by considering such a science as analogous to the Operational Calculus pioneered by Heaviside. Another example of the operational paradigm is the Geometric Algebra (GA) approach to geometry. GA provides a simpler and simplifying approach to geometry compared to the traditional diachronic version of geometry, which is linear vector analysis. This time the diachrony is not expressed in temporality. The 3D linear vector Euclidean space \mathcal{R}^3 has no temporal dimension, for example. However, \mathcal{R}^3 is defined in terms of a coordinate system based on 3-tuples of real numbers. Diachrony creeps into the system through the real numbers. Numbers can be ordered and so contribute to a *spatial diachrony*. Just as something can be near or far away in time the same applies to space. In contrast, In its present form the GA paradigm does not remove the need for numbers but it does dispense with the need for coordinates. With GA, geometric entities can be built and manipulated algebraically. All geometric operations can be expressed through the *geometric product* pioneered by Grassmann. The geometric

product is the unifying feature of GA. Mirror images, reflections, rotations and translations, for example, are expressed in terms of geometric products between geometric entities. This expresses a key feature of operational methodology; the objects of the system can serve as verbs equally well as nouns. We will return to the GA paradigm further on.

In Quantum Mechanics applied to the Particle Physics, a fundamental mathematical device is the wave function, which expresses the probability of a point-like particle being in a particular location in time. The wave equation provides Heraclitus perspective on Particle Physics. To overcome the explanatory shortfalls of the diachronic approach, David Bohm (Bohm, 1980) presented a picturesque holographic perspective where the totality of existence presents as an unbroken whole, a clear call for a synchronic alternative to present day physics.

This paper addresses how Boehm's holistic vision of reality can be constructed and understood. What are the elementary basis elements? How do they combine? What kind of geometry is necessary to explain such a science? In this paper, we initially turn to the thinkers of antiquity in our quest for a universal synchronic paradigm for the sciences. We present a modernised form of the synchronic paradigm of the ancient Stoics. In following papers, we move on to see how the remarkable insights of Leibniz fit into the picture.

4.2 Gender and Truth

An essential ingredient for any science is that it possesses some kind of normative apparatus that can act as an arbiter of truth. In the case of formal mathematics, it is a set of axioms that provide the semantic substance of what is provisionally held to be true or false. In the case of the empirical sciences, the experimental results of measurement play a similar role. One might debate the epistemological objectivity status of the truth involved but one thing is clear, such sciences are tractable. Very often, they are also very useful. When it comes to the other kind of science that both Aristotle and Kant were talking about, the truth problem raises its ugly head. There is an apparent lack of any kind of normative apparatus that can thread the way between what is true and what is false. What can serve as the founding principle of the science?

The object under study is the entity without determined genus. Kant saw this entity as the *thing-in-itself* that could be characterised by the fact that we can have no *a priori* knowledge about it. In other words, the object of study can be characterised by the fact that it is uncharacterisable. The problem is to find a tractable methodology for constructing the science of such an enigmatic entity. It seems that the only tool at our disposal is what Kant called *Pure Reason*. Somehow, the nascent knowledge of the science must be bootstrapped into existence using Pure Reason alone, whatever this Pure Reason thing may turn out to be. Can this metaphysics science exist? The general opinion today is that there is no resolution to the problem. Metaphysics can never be a science. There is no right side science.

The key obstacle to developing a right side science is the lack of founding principle. What is the founding principle for such a science? This is a very fundamental matter. As Charles Sanders Peirce once commented, when it comes to fundamental matters originality has little to recommend it. Thus, rather than trying to be cleverer than anyone else over the past few thousand years our attention turns back to a school of thought that dominated the Greek Roman world for five hundred years. We turn once again to the Stoics.

To a Stoic, Kant's thing-in-itself entity would appear quite meaningless. Stoic physics was only concerned with things that exist. The Kant's thing-in-itself must be

qualified as existing before being eligible for consideration as an entity. The existence qualification is quite different from demanding that the entity be coloured red, for example. The colour qualification imposes a determined attribute on the entity and hence situates it under the determined genus of “red coloured entities,” a clear violation of Aristotle’s non-determined genus condition. The existence qualification is different. Existence does not establish a determined genus. It is a tautology to say that an existing entity exists.

Demanding that an entity be qualified as existing before admitting it as worthy of scientific consideration is equivalent to a well-known condition in logic called *Existential Import*. The usual definition of the Existential Import condition can be couched in the language of Set Theory and simply states that that all the sets of elements covered by the logic be non-empty. Satisfying this condition is essential for Aristotle’s Syllogistic Logic. If the Existential Import condition is not met, the empty sets will result in the A terms and I terms of the syllogistic becoming indistinguishable from each other. Aristotle’s Square of Oppositions collapses down to be the same almost trivial structure as for Boolean Algebra. The Syllogistic becomes superfluous without Existential Import.

However, this Set Theory definition only demands a weak form of Existential Import. Stoic logic and physics demands what we will call *Strong Existential Import*. The Weak Existential Import admits sets of elements like “All men” in the proposition “All men are mortal.” This is inadmissible to the Stoics as the entity “All men” is an abstraction and not a thing. The entity “All men” simply does not exist. Only individuals exist. Thus, the Strong Existential Import condition is incompatible with Set Theory. There can be no sets of individuals, only individuals and these individuals must exist. Stoic natural philosophy and its logic demands Strong Existential Import.

With the help of the Stoics, our right side science is starting to gain a little traction. We must not upset the applecart by imposing accidental attributes onto our object of study. Fortuitously, the entity under consideration by the science can be qualified by the Strong Existential Import condition without imposing determined attributes. The next step is to fully realise what we mean by an entity existing. Firstly, existence demands that the entity be immediately present. Secondly, existence demands that the entity is immediately present with whatever else is immediately present.

The only specificity of the entity under consideration is that it has an undetermined specificity. This nonspecific specificity, despite everything, is a specificity nevertheless. After all, not many entities can be characterised by this kind of specificity. The next question is to determine which entity or entities are immediately present. Looking around, there is only one entity in play notably the specificity that the first entity *has*, a specificity considered as an entity in its own right. Thus, in this very beginning of the story, instead of there being only one object of study for the science, there are two. The first entity has an undetermined specificity and will be said to be of *feminine gender*. The second entity is that specificity as an entity in its own right and will be said to be of *masculine gender*. Thus, the feminine entity *has* specificity the masculine *is* that specificity. These two entities are objectively different because they differ in gender. One *has*, the other *is*. Note that gender is not an attribute like colour, or sex. These two entities cannot be distinguished, as that would require a difference in specificity, which is impossible to determine as there is only one specificity between them. One *has* it the other *is* it.

Note that in the above scenario, the entity immediately present is the object and the “whatever else present” is necessarily the subject. From this, one can begin to appreciate that existence if something is always relative. Existence is not an absolute.

The feminine entity in the immediate presence of the masculine entity is the most elementary entity that can possibly exist. The only specificity of this entity is that it exists *now*. The feminine entity is the most elementary entity that has a *Now*. As for the masculine entity, it *is* this *Now*, as an entity in its own right. As a consequence the feminine entity might now have a future, generically speaking. At least it has a now.

We come back to our quest for a normative source of truth. In the science we are explaining, the truth is not given, it must be self-fulfilling. For what we have said to be the truth, the relationship between the feminine entity and its *Now* entity must be such that the neither entity can be in a privileged position with respect to the other. Neither can be before or after the other. Only if this condition is continuously maintained can it be said, with truth, that the *Now* entity is a *Now* entity. Only then can these two entities claim to exist.

This principle is rather difficult to explain and comprehend at first. The principle applies in the much wider scope of more determined forms of existence. In all cases, at any cost, the principle demands that no entity in the system can be in a privileged position relative to all others. There can be no maximal element and no minimal element. No entity can be absolutely before or after all others. Provided this condition can be achieved and maintained, the existence of the system can qualify as truth. Any system that satisfies this condition can be said to satisfy First Classness (FC). This is the generic explanation of the principle of self-organising, self-reliant systems. The generic purpose, the final causation of such organisms is to achieve and maintain FC. The FC principle provides the normative structure for the generic science of self-organising systems. FC provides the normative “source of truth” for all such organisms. In this way, the organism and its science share the same objective. From the science perspective, the principle of FC provides the generic alternative to axioms in mathematics and measurement in the empirical sciences. The first result of right side science is that its object of study consists of two distinct but indistinguishable entities, one of feminine gender and one masculine.

5 The Stoic Four Element Theory

The entity of study for right side science is the generic entity that can be referred to as *any-entity-whatsoever*. However, this any-entity-whatsoever thing is a totally different animal to Kant’s *thing-in-itself*. Referring back to the preceding section will reveal that the thing-in-itself is not totally as bland as may at first appear. In fact, Kant’s thing-in-itself is *gendered*. The only specificity of Kant’s thing-in-itself is that it *has* a specificity (albeit totally unqualified) and thus, as such, is of feminine gender. Kant ignores the other entity involved, notably the specificity (of total unspecificity). To avoid violating FC, the specificity must be considered as an entity in its own right, an entity of masculine gender. Kant, who stated the Kantian problem, failed to see that his draconian demand placed on the new science effectively contained the solution. The Kantian adventure then meanders off on a quest to attempt to glean some knowledge of his intrinsically unknowable entity, the mystically feminine thing-in-itself. This is the wrong animal to follow as it involves a totally intractable, unsolvable problem. The basic truth of the matter is that knowledge can only be gained and explicitly expressed via the masculine, never the feminine wildcard. In this generic algebra, the feminine is the true epistemological wildcard in the equation and can be carried along in the algebra as such. The masculine expresses the fact that we know that the feminine is a wildcard. However, this feminine wildcard entity itself is intrinsically uncrackable.

What effectively is involved here can be interpreted as Socrates’ declaration of ignorance. Socrates is said to have proclaimed that the only thing he knows with absolute certainty is that he knows nothing with absolute certainty. The feminine, by definition, is

totally unknowable and corresponds to the first clause of the declaration. By contrast, the masculine nails down this observation and turns it into absolutely certain knowledge. This is the masculine part of the declaration. In later work, we will take a geometric perspective influenced by Leibniz. Geometrically, the feminine will correspond to undetermined extension. The masculine will correspond to an undetermined *situs*. In other words, some kind of undetermined geometric body is situated somewhere or other. One might be tempted to interpret this most generic of all feminine/masculine oppositions as an opposition between object and subject. However, as we will see, which is object and which is subject must be quite nuanced.

The correct animal to investigate is the generic entity, referred to as any-entity-whatsoever. The generic entity is the object of our right side science. One naturally asks the question concerning the gender of the generic entity; is it masculine or feminine? The short answer is that the gender of the generic entity is unknown or, at least, undetermined. This is an extra “degree of ignorance” to Kant’s thing-in-itself.

Kant effectively claims that the generic entity is pure feminine (i.e., totally unqualified) and hence is just another name for his thing-in-itself. However, the correct answer is more nuanced and must depend on context. There are two contexts; one is the third party perspective from outside the system, the other from inside. Viewed from outside, the generic entity will appear as a single entity with two quantum like states in superposition, the two states corresponding to the masculine and feminine gendering of the entity taken as a whole. The generic entity could be understood as simultaneously of masculine and feminine gender in superposition. However, if one were ever able to conduct an experiment on the generic entity in order to ascertain the gender, the superposition would “collapse.” The generic entity would appear as either masculine or feminine, This is analogous to the “collapse of the wave equation” in Quantum Mechanics. However, even this situation is over simplistic and needs to be more nuanced.

5.1 Generic Marbles

Instead of considering the system as one entity with two quantum states F and M , we should consider it as made up of two different entities, one typed F and the other typed M . Since the F entity *has* a specificity and the M entity *is* that specificity, the two entities will be indistinguishable to any third party. However, from the interior viewpoint of the M entity, there is no ambiguity. The M entity knows its gender because that is what it *is*. Presumably, the same would apply from the viewpoint of the F entity, provided it has a viewpoint, which it will indeed have. The viewpoint that the F entity has is an entity in its own right. It is none other than the M entity itself. The M entity is the viewpoint the F entity has it. This is a small world.

Returning to the outside, consider the scenario as an experiment played on a generic bag of marbles. There are only two marbles in the bag, one typed M and the other F . The experiment involves all possible choices and the consequent choice outcomes.

First comes the most fundamental of all choices, that of choosing whether to choose or not to choose. Choosing to choose will be called the *active* choice. Choosing not to choose will be called the *passive* choice. First, consider the two possible outcomes of the active choice. One might be tempted to think that the two outcomes might result in the simple choice of M or F ; however, this is not possible. The only way to choose an entity is by its specificity. The problem is that amongst the two choice candidates in the marble bag there is only one specificity, the masculine entity M . No matter how hard one might try, only a masculine specificity will be chosen. Due to the active act of choosing, the object chosen will *be* a specificity (after all, it has just won the lottery) and hence must be masculine gendered. However, the “real” gender of the object chosen will be unknown

The way around this conundrum is to denote the masculine gender imposed on the object chosen by a lower case m . The gender of the chosen object thus becomes binary gendered as either mM or mF . The outcome of the active choice will be either an mM or an mF typed entity. This can be said without actually being obliged to consummate the choice. The entity typed mF can be said to be of feminine gender acting *as* masculine, that is to say, the feminine *acting as* specificity. Even though the feminine is not a specificity, it can be considered *as* a specificity. In that context, the entity becomes mF typed. The mM entity can be said to be of masculine gender acting *as* masculine.

Similarly for the passive choice. Even though this choice is never consummated, the two non-chosen, in fact, never chosen outcomes will be binary typed as fM or fF . The fM typed entity will be the masculine acting *as* feminine; the generic attribute acts as a generic entity having attribute without being one. Similarly the fF typed entity becomes the feminine acting *as* feminine.

5.2 The Four Classical Elements

The context of the interaction of the chooser and the to-be-chosen can be expressed as a kind of direct product of the f/m split and the F/M split as

$$\left\{ \begin{matrix} m \\ f \end{matrix} \right\} \otimes \{F \quad M\} = \left\{ \begin{matrix} mF & mM \\ fF & fM \end{matrix} \right\} \quad (1)$$

resulting in four distinct entities of mixed gender. The conclusion to be drawn from this is that there are four universal generic building blocks for non-dualist right side science. From the perspective of the generic marbles game, the very act of choice has transformed a two simply gendered system into a four binary gendered system. The intervention of the individual m and f entities has resulted in them becoming a part of the system.

There are many alternative interpretations than our generic marbles game of chance. The simple interpretation is that we start with the pair $\{F \quad M\}$ with one entity typed F and the other M . The M typed entity corresponds to the impersonal subject. It can be thought of as a lonely version of Reverend George Berkley's spectator god. Thanks to God's presence the indeterminate F stuff, possibly with a tree on top, can claim to exist even when we, as determined personal individuals are not even thinking about it. This God is always in the picture and guarantees the existence of the spectacle, just as Berkeley demanded, merely by watching the scenario. Then entering onto the scene from left stage is another individual, the active personal individual, you for example. Like any other entity, the personal individual is made up of a masculine and a feminine entity and so will have the form $\{f \quad m\}$. The lower case letters distinguish this personal individual from the impersonal $\{F \quad M\}$. The immediate presence of the two individuals violates non-duality. The conflict is overcome by multiplication of the two as in expression (1). Finally, the scene resembles that of an egg being fertilised and immediately splitting into four parts, which apparently, fertilised eggs do.

5.3 The Stoic Semiotic Square

The four genders can be arranged in a square that the author likes to refer to as the Stoic Semiotic Square as it illustrates the coming together of the opposition of genders and the active-passive opposition so important to the Stoics. Note that the square has a left and right hemisphere typed F , and M respectively with "frontal lobes" typed m (active) and rear area typed f (passive). This suggests an interpretation of the semiotic square a generic mind architecture where the same configuration applies to the mind as to apprehended reality.

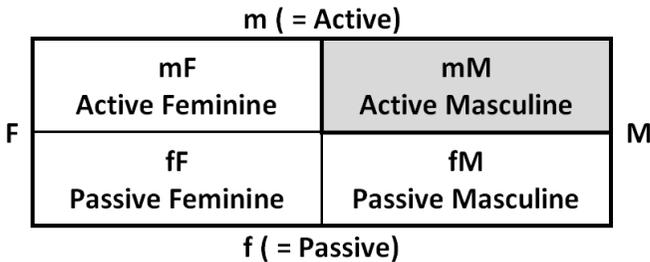


Figure 1 The Stoic Semiotic Sqware. To the Stoics, the active feminine, active masculine, passive feminine, and passive masculine corresponded to the four classic elements air, fire, earth, and water, respectively.

This construct goes right back to Empedocoles and his theory of the Four Roots or Four Elements of matter. The Stoics embraced the Four Element system and ended up with the same alignment as shown above. Instead of a secondary gender split *m/f*, they used the active/passive typing split. The relationship between gender typing and Stoic typing of the four generic basis elements as the classical Four Elements is illustrated in Figure 1. The Stoic system identified the binary genders mF, fF, fM, and mM as Air, Earth, Water, and Fire, respectively.

The right side paradigm says that the “outcome” of the fundamental choice will not be one entity but four objectively different entities, each with one of the four compound genders mF, fF, fM, and mM. This is the right side paradigm in action. Here it appears as synchronic rather than diachronic, is non-dualist and well and truly constructionist. Thus, the intervention of a personal individual into the inner sanctum of the pure generic entity has two outcomes. First of all, the superposition of the pure masculine and feminine collapses to a determined value. Secondly, the determined collapsed value is not *F* or *M* but rather, one of the compound binary gendered states mF, fF, fM, or mM. The intervening $\{f\ m\}$ entity pair has increased the number of “quantum states.”

In passing, is this approach to the generic foundations of reality realist or anti-realist? Clearly, the system is an interplay of both with different interpretations from inside and outside the system.

A Quantum Mechanics kind of rationality would take the view that that the four objective entities of the right side paradigm are in fact quantum states of the one single entity. The quantum states would be in superposition. At the moment when a measurement were to be made, the situation collapses down to the left side paradigm view where the entity takes on any one of these four “gender states.”

At this point, we can dispense with the lowercase and uppercase convention for the different gender instances as that is implicit in the binary typing order. Thus, the binary gender types mF, fF, fM, and mM can be written as *MF*, *FF*, *FM*, and *MM* without any loss of precision. These four types of entities make up the four elementary bases of right side science forming the basis of its geometry, its algebra, its logic, its physics and even its “biochemistry.”

In 1661, Robert Boyle discussed the criteria for deciding whether a substance can claim to be a chemical substance. He concluded that the four classical elements of antiquity were not chemical substances because they could not compose or be extracted from substances. Despite supporting the validity of the classical four element theory, the author concurs with Boyle’s analysis. However, Boyle only considered that composite substances would be composed by a process of addition – like adding 10 grams of this stuff with 20 grams of that. The saving grace for the four element theory is that

composites of now-systems are not formed additively they are formed by multiplication! To provide motivation for the reader, the author claims an association between the four binary gender types MF , FF , FM , and MM with the four letters A, U, G, and C of the RNA encoding of the genetic code as illustrated in Figure 2 Iconic diagrams for the four binary genders MF , FF , FM , and MM . Each binary gender is denoted by a single letter A, U, G, and C respectively of the genetic cum generic code. The structure of the genetic code is dominant theme of this work as developed further here and in following work. In the living biological world, the gendered entities are not added and mixed like in a chemical soup, they multiply and concatenate.

Our claim that the four binary gender types $\{MF, FF, FM, MM\}$ perfectly matches to the RNA encoding $\{A, U, G, C\}$ respectively will be called the *Generic-Genetic Code Conjecture*. A definitive or even convincing proof of the conjecture will take some considerable effort. However, for the purposes of this paper, the conjecture is assumed valid. In the meantime, even a wisp of suspicion that the conjecture might be true should rock a few boats.

In keeping with the inherently geometrical flavour of right side science, these four types of fundamental entity can be represented by dyads and even be considered as the four fundamental kinds of elementary geometric object, the generic basis of universal geometry. We propose an iconic representation of these generic types of entity as shown in Figure 2. A very intuitive and informal interpretation of an entity of feminine gender is that it is content without form whilst the masculine comes across as form without content.

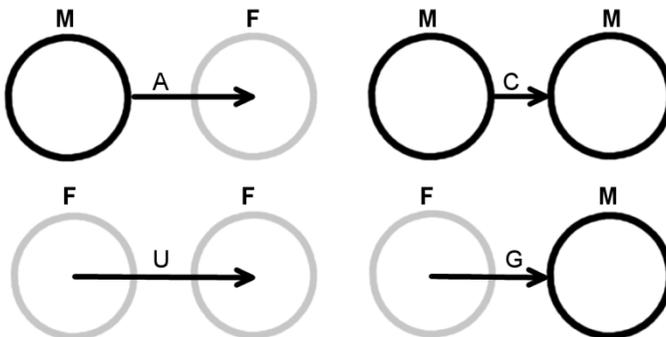


Figure 2 Iconic diagrams for the four binary genders MF , FF , FM , and MM . Each binary gender is denoted by a single letter A, U, G, and C respectively of the genetic cum generic code

5.4 The Quantum-Like Nature of Gender

To our knowledge, the gender construct, as presented here, will not be found in any modern scientific or philosophical literature. The construct provides new ways to interpret familiar principles known to physics. We have already looked at the concept of superposition, from a gender perspective. The gender construct even expresses its own version of Heisenberg's Uncertainty Principle in the form of the Socratic Uncertainty Principle and is stated as follows:

5.4.1 The Socratic Uncertainty Principle

Socrates is attributed as saying that all he knows with absolute certainty is that he knows nothing with absolute certainty. The gender construct posits the feminine entity as the bearer of the attribute of absolute ignorance. In order not to violate FC, this attribute must itself be considered as an entity in its own right. As such, it can be thought of as ultimate singular statement of certitude. In Heisenberg's Uncertainty Principle, one can know with high certainty the momentum of a particle. In this case, the position of the particle will be

equally uncertain, or vice versa. This reciprocal nature of certainty and uncertainty typing is expressed in its most fundamental and generic form in the generic construct of gender.

5.4.2 *The Gender Exclusion Principle*

Another similar principle in Quantum Mechanics is the Pauli Exclusion Principle. Here we present the gender form of this type of construct. The gender construct can be loosely interpreted as a dialectic of value and placeholder. There is no absolute dichotomy between placeholder and value. A value can act as placeholder and vice versa¹.

Of course, from the generic perspective there are two kinds of placeholder, one feminine and the other masculine. The feminine placeholder is totally catholic and places no specificity requirements on content. Whilst the feminine is always an expression of the pure ignorance side of the Socratic confession, the masculine demands absolute certainty without in any way polluting the generic with any *ad hoc* specificity. How to be specific without being specific: that is the question. This can only be achieved by opposing the “anything” mantra of the feminine with the “something” mantra. The feminine can contain *anything*. The masculine must contain *something*. This can be formalised by defining the masculine as the Exclusion Principle, something analogous to Pauli’s Exclusion Principle in Quantum Mechanics. The Exclusion Principle states that the placeholder can only contain one single entity in any instant; such is the nature of the single tasking masculine placeholder.

The feminine can contain any number of entities in any instant: it multi-tasks so to speak. We start to see here that the masculine and feminine in this context, or as this context, are primordial expressions of Oneness and Manyness. The masculine, as principle, can be thought of as the *Exclusion Principle* while the feminine principle can be thought of as the *Inclusion Principle*. It is the interplay of these two principles that dictate the basic structure of any reality that satisfies the principle of FC.

The dialectic does not end there. The two genders for the exclusion/inclusion principles were only in the impersonal mode. Interpreted personally, as individuals, the entities become values, one value gendered masculine, the other feminine. In this scenario, the two genders differ by value cardinality. The feminine value is characterised by having any value whatsoever, whilst the masculine value is restricted to being unique. This is a value form of the exclusion principle.

6 Generic Logic and Generic Types

The traditional left side sciences are characterised by the duality of objects and their attributes where objects are considered as entities and the attributes as non-entities. The most important feature of this left side kind of reality is that entities are considered to possess, intrinsic, “real world” properties that are spectator and mind-independent.

Right side science is non-dualist. There is no dichotomy between entities and non-entities. There are only entities. In this paradigm, an entity cannot be characterised by absolute, spectator independent properties. No attributes are allowed except for that which can be calculated from the requirements of FC. This leads to two generic types that we call gender. Instead of a dichotomy with entities on one side, and attributes on the other, the right side paradigm only allows a world of gendered entities. The two genders lead to four binary gender types *MF*, *FF*, *FM*, and *MM*.

¹ A simple example is in computer memory. A placeholder for a value in memory can be represented by a pointer. The pointer can be known as a value in its own right. In procedural computer languages this leads to pointer “placeholder” arithmetic as well as ordinary value arithmetic.

Our task is to show how these four letters provide the alphabet for a universal language capable of describing, specifying, and even regulating any system or organism. The only requirement is that such organisms maintains and not violate the Kantian Condition. This autonomous organism must be a First Class System. It is only by these means that the organism can express and maintain its autonomy as a First Class entity with no need for anyone or anything pulling the strings in the background.

Out task is now to understand this language in terms of its logic, its algebraic structure, and the new light it brings to bear on the resulting semantically rich structures and geometries. In anticipation of future developments, we will label each of the four binary genders by the four letters of the generic code as illustrated in **Error! Reference source not found.**

6.1 Russell's Theory of Types

In developing an aspect of right side science, there is usually a left side variant already in existence. We aim to develop a universal foundation for mathematics and science. Russell and Whitehead have already made an assault on the problem, working within the confines of the left side paradigm.

Russell provided the first formal characterisation of left side mathematics in the guise of his “logically perfect language,” a language dedicated to formally articulating the structure of axiomatic mathematics and hence, potentially at least, all of the sciences based on such mathematics.

In a logically perfect language there will be one word and no more for every simple object, and everything that is not simple will be expressed by a combination of words, by a combination derived; of course, from the words for the simple things that enter in, one word for each simple component. A language of that sort will be completely analytic and will show at a glance the logical structure of the facts asserted or denied. The language that is set forth in *Principia Mathematica* is intended to be a language of that sort. It is a language that has only syntax and no vocabulary whatsoever. Barring the omission of a vocabulary I maintain that it is quite a nice language. It aims at being the sort of language that, if you add a vocabulary, would be a logically perfect language. Actual languages are not logically perfect in this sense and they cannot possibly be, if they are to serve the purposes of everyday life. (Russell, 1972)

Without going into any detail, we see that this “perfectly logical language” was essentially a vehicle for articulating higher order logic expressed through an elaborately contrived syntax. Syntactically rich, the language was unashamedly poor when it came to semantics; “one word and no more for every simple object,” demanded Russell. The semantics can be simply expressed in the form of a linear lexicon. The words in this language were nothing more than labels, which is the way Russell wanted it. The idea was to remove any hidden semantics from this artificial language and so leaving it unfettered to tackle scientifically the meaning of things using pure symbolic logical reasoning. This is essentially the approach advocated by Analytic Philosophy. We will refer to this kind of flat lexicon meaning structure as *zero order semantics*. Zero order semantics can be thought of as the semantics of the barcode, pure labelling technology.

The richness and complexity in Russell’s perfectly logical language was obviously in the logic, not in the semantics. There is a natural hierarchy of logics. At the bottom of the hierarchy is the propositional calculus, considered as the zero order logic. Next up the rung is the lower predicate calculus, a first order logic. Zero order logic is logic restricted to individuals. We will say that individuals are zero order entities. Sets of zero ordered

entities will be defined as first order entities and sets of sets as second order, sets of second order entities will be third order and so on. The order of a logic becomes that of the maximum order of the entities covered. The order of a logical entity can be thought of in terms of Bertrand Russell's hierarchical Theory of Types. We can thus define Russellian type of an entity as a numeral corresponding to its order as a logical entity.

Russell provided a valuable service as we can extrapolate his thinking on these matters to characterise left side scientific reasoning based on his profile of what constitutes a logically perfect language. Expressed simply, left side scientific reasoning is characterised by a "logically perfect" high order logic together with zero order semantics. Such thinking is naturally atomist, dualist, analytic, and above all, abstract. Such a language cannot claim to be universal but it can claim to be capable of very general abstractions. One of its roles was *abstractly* to explain semantics.

We turn to our task in hand, the quest for a truly universal generic language; not of high logical pretensions, but *semantically* perfect. High order logic and zero order semantics of the left side sciences must give way to zero order logic and higher order semantics and so lead to right side science.

6.2 Logic based on Generic Types

The gender construct provides the generic types necessary for the foundations of generic logic, its algebra, and its geometry. Progress in this domain did not occur after Russell and Whitehead but well before. In fact, the first formal step along these lines is due to Aristotle. One of Aristotle's great achievements was his categorical syllogistic logic. A common view nowadays is that syllogistic logic has been supplanted by modern propositional logic and the predicate calculus. This modern left side view sees logic as a rational tool of deductive, sequential, abstract reasoning. Left side logic expresses itself in linear linguistic expressions to which can be associated a truth-value. The preoccupation is whether a given logical expression is true or false in a particular circumstance. However, Aristotle's syllogistic logic is not constrained to this mould. Aristotelian logic, although applicable to left side contingent applications, is also concerned with universal generic truths. This is also a theme developed by the Stoics who followed, as we shall see further on.

In order to get a firmer handle on this distinction between contingent and generic logic, one should put aside any left side set theoretic Venn Diagram interpretation of the syllogistic and take a more fundamental perspective. As well as providing a logical tool for formalising rhetoric, Aristotelian logic also has a dialectical side, which is totally lacking in modern symbolic logic.

In what follows, we provide the outline of the alternative right side paradigm, which turns out to be based on diametrically opposed logic and semantics. The left side language based on high order logic and zero order semantics will give way to a language based on zero order logic and high order semantics. Russell's logically perfect language meets up with the right side *semantically perfect* language. We claim that the right side language will turn out to be the generic version of the genetic code. With this language, there is no need to contrive a clever syntax, as was the case for Russell's left side approach. The right side language has virtually no syntax. It is more a code, than a language. There is also no room for creative fictionalism when it comes to semantics. This code must obey the draconian demands of the Kantian Condition as expressed by FC. For right side science, the only arbiter of truth is FC.

In passing, it is worthwhile noting that, unlike Russell's esoteric, perfectly logical language, the employment of the generic code abounds throughout every aspect of

Nature. The generic code has a universal user base. The user base for Russell's language is much more restraint.

6.3 Non-Zero Order Semantics in Greek Antiquity

Symbolic Logic has *zero order semantics*. This is the most elementary non-trivial form of semantics possible. Zero order semantics can be completely characterised by a lexicon. In other words, zero order semantic simply involves a labelling system. The meaning, the semantics of a label is simply what it labels.

On the other hand, the elementary constituents of right side logic are not abstract symbols with truth-values, but are gendered dyads as illustrated in Figure 3 the four types of term in Aristotelean logic and their corresponding Heraclitus Diagrams. Each elementary diagram can be labelled with a letter from the four letter alphabet system invented by the Scholastics. Based on dyads, right side logic can be said to express *non-zero order semantics*. These dyads, as we shall see are the proto-components of a totally generic geometry. The dyads are not scalars, as scalars only express zero order semantics. Dyads are fundamentally *geometric* entities and as such express higher order semantics.

The difference between Symbolic Logic and generic right side logic becomes even more apparent when it comes to composite structures. The flat zero order semantics of the left side scientific paradigm gives way to the geometric valued semantics of right side logic. The order of the semantics increases with the dimensionality and complexity of the geometric structure constructed.

Right side science involves structure of a very specific kind where for any context, all aspects of the structure are present in the one instance: they are all present in the *Now*. The structure must be primarily synchronic and geometric in nature. Note in passing that the synchronic, in our sense of the notion, does not mean static. Intuitively one can think of synchronic structure as being concurrent or coherent with the Parmenidean *Now* of the organism in question: nothing changes but everything changes in this paradigm. Thus, in the sense meant here, the synchronic is not defined as simply "not diachronic."

Right side reasoning demands synchronic structure in order to avoid duality – nothing can be left out of the picture; all immediate players must be present, and present *now*. This contrasts with left side reasoning, which is fundamentally diachronic, and necessarily dualist. There is always something missing in the left side perspective, always some kind of "hemineglect."

6.4 Aristotelian Logic and Generic Semantics

Aristotle was the first to present a formalisation of non-zero order semantics. The semantics are implicitly expressed in his Syllogistic logic. Aristotelian logic is usually called *term logic*. However, Aristotle's original terminology was to call it the logic of *limits*, where the notion of limit goes back to the Pythagoreans. The *logic of limits* terminology puts an emphasis on the dialectical rather than the linear rhetorical. In this perspective, the logic expresses relationships between two opposites, two extreme limits. The best example of extreme limits is that between the feminine and the masculine ontological genders as discussed above, the opposition between the totally unknown and the totally known. Aristotelian logic introduces its own version of two extreme limits. The two limits are used to type the terms that make up a syllogism. There are two types of term, *distributed* and *undistributed* analogous to the masculine and feminine genders respectively. We will call the distributed/undistributed construct as *Aristotelian typing* as distinct from the gender typing developed in this paper. However, it has the same form. A simple diagram, as shown in Figure 3 can represent each binary type. We will call them *Heraclitus diagrams* as they invoke the notion of a flow of reasoning correspond to some kind of generic "Heraclitean flux" of the Logos.

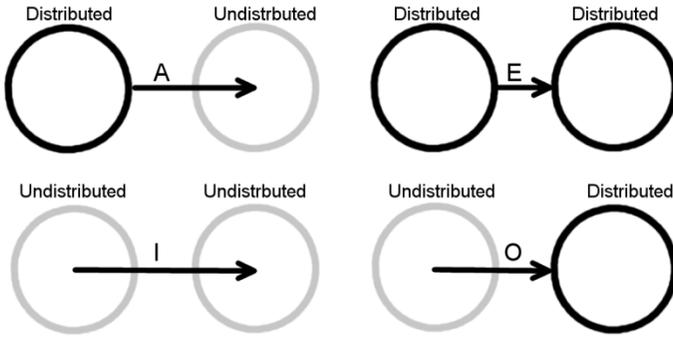


Figure 3 the four types of term in Aristotelean logic and their corresponding Heraclitus Diagrams. Each elementary diagram can be labelled with a letter from the four letter alphabet system invented by the Scholastics.

Left side formal reasoning usually tries to explain Aristotelian typing in terms of Set Theory. Using Set Theory, the term “All P” can be defined as of distributed type as it refers to all of the elements of a set P. The other side of the limit is the term “Some P” which is typed as undistributed. Interpreted from an ontological gender perspective, the distributed term articulates certain knowledge when answering the question, “How much of P?” is embraced by the term. The answer is a confident and resounding “All P.” This contrasts with the immense uncertainty of the undistributed term “Some P.” In this case, one has no idea of “how much of P” is embraced by the term. However, attempting to define Aristotelian typing of terms in this way becomes rather obscure. For example, in proposition “Some S are not P,” the first term is undistributed whilst the term with negation is distributed. In the proposition the proposition “No S is P,” the negated term is distributed but so is the other term. Students can be taught rules for determining whether a term is distributed or not, but such rules do not lead to any deep understanding. In what follows, we will ignore the left side, linguistic interpretation of syllogistic propositions. We ignore the “rhetorical” form of the syllogistic and just consider each proposition as a dyad made up of two terms, each with the Aristotelian typing U or D.

Aristotelian logic makes no assumptions about any underlying Set Theory structure. Set Theory did not exist in Aristotle’s time but even if it did, he had no need for it. In his right side relativist epistemological framework founded on binary typed dyadic terms, Set Theory notions are an unnecessary apriorist complication. The underlying epistemological structure of each of the 256 possible syllogisms is uniquely defined by a configuration of three dyads. The head of each dyad corresponds to the subject term. The tail to the predicate term. Each term is simply typed as either distributed or undistributed. We adopt the notation of using the letter ‘D’ to signify distributed and ‘U’ for undistributed. Thus, each dyad representing a proposition will be typed as one of the four binary types DD, DU, UU, and UD. We call this *Aristotelian typing*.

The standard from for an Aristotelian syllogism consists of three dyads as shown in Figure 4, where there are four dyad configurations making up the four figures of the syllogism. Given all possibly binary typing combinations, together with the four figures, there are 256 possible combinations. Only nineteen of the syllogisms are considered valid.

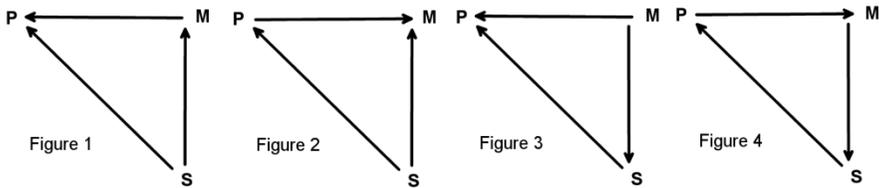


Figure 4 The geometric structure of the categorical syllogism is based on four possible configurations of the underlying dyads.

From here, it does not require much imagination to make an association between Aristotelian typing with the generic gender typing MM , FF , FF , and FM respectively. What we are saying here is that Aristotelian logic is founded on the semantics of generic gender. In what follows, to avoid unnecessary duplication, we will often use gender M/F typing in the place of the Aristotelian D/U typing. Note in passing that the Scholastics labelled these four types of term with the four letters A, I, O, and E, respectively. It was the Scholastic's lettering system that initially inspired the author to start considering whether there was any connection to the genetic code. Based on an empirical fit, we will end up labelling the four term types by A, U, G, and C, respectively in accordance with the RNA coding of the genetic code. The correspondence between the two typing conventions is illustrated in Figure 2 and Figure 3.

We now briefly touch on the notion of logical validity. Left side reasoning is concerned with the particulars of contingent validity. Right side reasoning is concerned with generic validity, the universal validity that is totally free of external contingencies. Left side logic based, as it is, on the propositional calculus and its qualifiers has the vocation of addressing contingent validity. The genius of Aristotelian logic is that it can address both particular validity and the universal. In order to tackle the contingent domain of left side logic, each term must be clothed with linguistic apparel that adds contingent semantics to the mix.

In this paper, we ignore this traditional left side interpretation of the logic, and concentrate on the right side. What this means is that, like the biological right hemisphere, right side logic is effectively mute. Instead of logic expressed as syntactically crafted sentences of symbols, the logic is articulated in terms of geometric structure. This is what we mean by a science based on zero order logic but non-zero order semantics. Non-zero order semantic structure is intrinsically geometric in nature.

There are two takes on geometry, one left side, and one right side. Left side geometry, like all left side sciences, is dualist whilst the right side geometry must be non-dualist. The fundamental dualism of left side geometry appears in the dichotomy between a geometric space within which "things can live." There are many different kind of spaces, Euclidean, Minkowski, Hyperbolic de Sitter style spaces, to name a few. A fascinating thing about left side geometry is that all the spaces are identical when it comes to points, lines, planes, and so on, together with their intersections. From an affine geometry point of view, all spaces of similar dimension are identical. The only formal difference from one space to another is the metric – the distance between points so to speak. All the entities of left side sciences live in this kind of geometric abode.

In the non-dualist right side, scientific paradigm there can be no dichotomy between space and any entity populating that space. Space and entity become the one thing and are made of the same stuff. According to our gender typing of approach, there are four kinds of such stuff, each with its own distinctive binary gender typing. From a geometric point of view, there are four kinds of oriented dyads providing the potential basis for a generic entity and its corresponding spatial extent. Looked at from the point of view of

Aristotelian logic, these four gendered dyads become interpreted as D/U binary typed dyads. From a gender typing perspective, they are *M/F* binary typed dyads.

This dyadic structure suggests an implicit arrow theoretic foundation underlying Aristotelian logic. As such, it also suggests a possible comparison with Category Theory, which has its own arrow theoretic foundations. Thus, we can qualitatively compare the morphisms of Category Theory on one side with the D/U typed dyadic terms of Aristotelian Logic on the other.

6.5 The Four Types of Morphism

A mathematical Category is defined by two distinct, disjoint collections, a collection of objects \mathcal{O} and a collection of morphisms or arrows M between the objects where the configuration of arrows satisfy the axioms of Category Theory. There are two kinds of entity in play, *objects* in \mathcal{O} and *arrows* in M

On the other side, we find the Aristotelian dyads, each corresponding to a proposition composed of an ordered pair of terms. Viewed from a geometric perspective, the objects give way to being only endpoints of arrows. Objects give way and only these dyadic arrows count. The nearest thing to an object is an endpoint of an arrow. Such endpoints are typed. Each end-point is either typed feminine for an undistributed term or masculine for a distributed term. Using a bit of poetic license, we could interpret the feminine as made up of undifferentiated objects or pure raw content. The masculine could be interpreted as another diametrically different type of entity, pure form expressed as a singularity. In this informal perspective, the masculine becomes pure synchronic container lacking determined content and the feminine becomes content lacking determined containment. However, even what is container or contained is not determined.

Be it the arrow theoretic approach of Category Theory or Aristotelian logic, attempts at a verbal description lacks cogency and simplicity. Rather than communicate ideas in terms of symbols, a more illuminating approach is “let the arrows do the talking” and simply illustrate concepts in terms of arrow diagrams.

The implicit arrow theoretic foundations underlying Aristotelian Logic suggests a possible comparison (only) with Category Theory. In passing, one should keep in mind that Category Theory with its axiomatic base is a left side science whilst the four dyads of Aristotelian Logic are universal and belong to the right side. To give a mathematical Category Theory flavour one could intuitively liken these four binary typed dyads as four types of morphism although there are no explicit indications of sets, classes, or collections of elements as there are in left side mathematics. From the right side perspective, no set/element kind of duality can be tolerated. Everything is expressed in dyadic arrows only.

Despite the constructionist leanings of Category Theory, it is still a left side science predetermined by axioms and thus ultimately restricted to zero order semantics. Notwithstanding, Category Theory does employ a constructionist arrow theoretic methodology. Looking for a correspondence between the four generic types of right side science, one could say that there are four kinds of arrow or morphism in Category Theory, notably:

- Epimorphisms: (epi) analogous to *MF* typed dyads. In the Category *SET*, they are injective “into” functions.
- Monomorphisms: (mono) analogous to *FM* typed dyads. In in the Category *SET* they are surjective, “onto” functions
- Bimorphisms: (bi) analogous to *FF* typed dyads. Considered to be both an epimorphism and a monomorphism and as a more general form of bijective function.

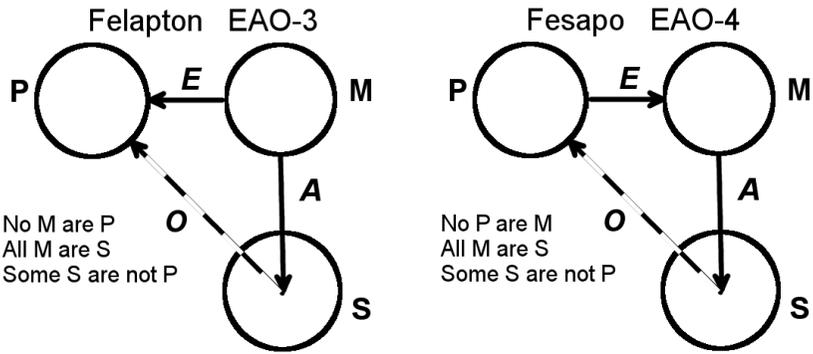


Figure 6 Illustrating that reversing the direction of the “isomorphism” dyad E , does not change the semantics of the Felapton and Fesapo syllogisms.

The asymmetries in the system are expressed by the generic monomorphism dyad A and the generic epimorphism dyad O . Reversing an A dyad makes it an O dyad and vice versa. For example, simply reversing the A typed MS dyad of the valid syllogism *Barbara* ($AAA-1$) results in the syllogism $AOA-3$ which has quite different semantics as well as being invalid.

Aristotle’s syllogistic logic provides a logical tool that is applicable to the contingent world. Unlike modern logic, it also brings with it some nontrivial semiotic infrastructure as illustrated in the Square of Oppositions.

6.6 The Square of Oppositions

Aristotle described how the four kinds of terms could be placed in a square illustrating the various oppositions between them. He then went about characterising each kind of opposition, although the subalterns were not mentioned explicitly. The oppositions between universal statements are contraries. Contraries have the property that both cannot be true together. One may be true and the other false. It is also possible that both can be false together. On the other hand, subcontraries involve oppositions between particulars. In this case, both cannot be false together.

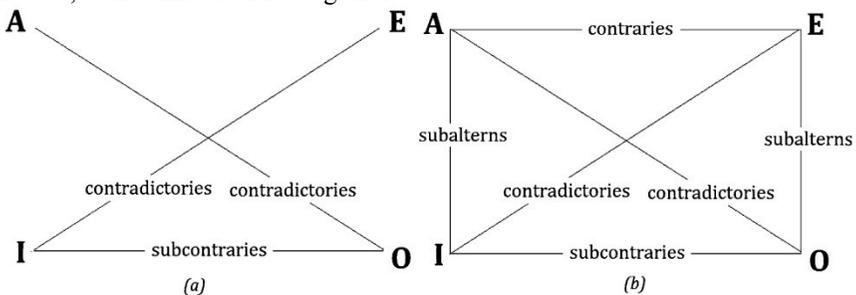


Figure 7 (a) The modern logic version of the oppositions. (b) Aristotle’s square of oppositions.

6.7 The Boolean Square of Oppositions

Of great interest to us is an opposition at a higher-level altogether, the opposition between Aristotle’s syllogistic structures and modern logic. The dramatic difference between the two approaches was clearly illustrated by George Boole, in what has become the modern version of the Square of Oppositions.

Modern logic differs from the ancient logic by simply replacing the universal with the general, in other words with the abstract. This can be achieved by using labels and the

logic becomes *symbolic logic*. Thus, the term ‘All men’ is replaced by the abstract version ‘All X’. A label replaces the thing and different semantics result. One could say that the non-trivial semantics go out the window. The label becomes simply a placeholder and as such, like any placeholder, may be empty. The logicians explain this as relaxing the requirement of Existential Import. From a classical mathematics perspective, the generalisation introduced by modern logic is to allow sets to be empty. This allows modern logic to talk about things that are known not to exist, a characterising feature of abstraction.

Once the reasoning becomes abstract, the logical difference between yellow centaurs and canaries evaporates. Not only that, but all the oppositions except the contradictories have also evaporated. For example, both sides of the contraries opposition ‘All centaurs are yellow’ and ‘No centaur is yellow’ are true. The contraries opposition has evaporated because the set of all centaurs is an empty set.

Figure 7(a) shows the resulting modern logic version of the square of oppositions. The square has virtually collapsed and only the contradictories and the subcontraries survive. We have deliberately drawn the modern version on the left side relative to Aristotle’s square to illustrate that this is the left side variant of logic. The other variant is Aristotle’s seed for the right side version. The left side involves abstract, symbolic logic. The right side in the diagram represents Aristotle’s version of elementary generic logical structure. In practice, the modern symbolic logic approach boils down to a simple bipolar nominalism where the basic opposition is between two particulars, *I* and *O*. The letters *A* and *E* act as pure label signifiers for the *I* and *O* respectively, acting as the signified. The contradictory oppositions *A-O* and *E-I* model the relationships between signifier and signified. In essence, the system becomes a simple two-letter system labelled by *A* and *E*. Thus, although we have not shown that modern day logicians only use half a brain, we are starting to see that they reason using only half of Nature’s alphabet.

6.8 The Stoic Square of Oppositions

Stoicism was a very tightly integrated body of thought, much tighter than might be imagined, especially after Chrysippus had a hand in the matter. The Stoics taught that their non-dualist philosophy involved a tight integration of physics, ethics, and logic. The Stoics likened their system to an egg; the yolk was physics, the white ethics, and the shell was logic. Logic protects and holds it all together. Scholars have long contemplated on this tripartite integration of the three branches of Stoic philosophy but have been unable to gain enough forensic evidence in the literature to indicate exactly how such an integration could be achieved. Given the dearth of extant writings on the subject, it is time to do some reverse reengineering. The key to understanding the Stoics is to understand the glue that held their whole system together. The author claims that this glue was the principle of FC. It is the glue of FC that anchors the Stoic concept of reality to the *Now*.

It appears that the Stoics were early exponents of FC arguing along the lines advocated in this paper. For example, in physics they taught that the attribute of an entity was also an entity in its own right. As for First Class entities, the only entities that exist are corporeal entities, entities with extent that can act upon and be acted upon. Analogous to the OO mantra mentioned previously, the Stoic mantra was that everything (that objectively exists) is a corporeal body. The corporeal body dogma was the physical lynchpin of their version of FC.

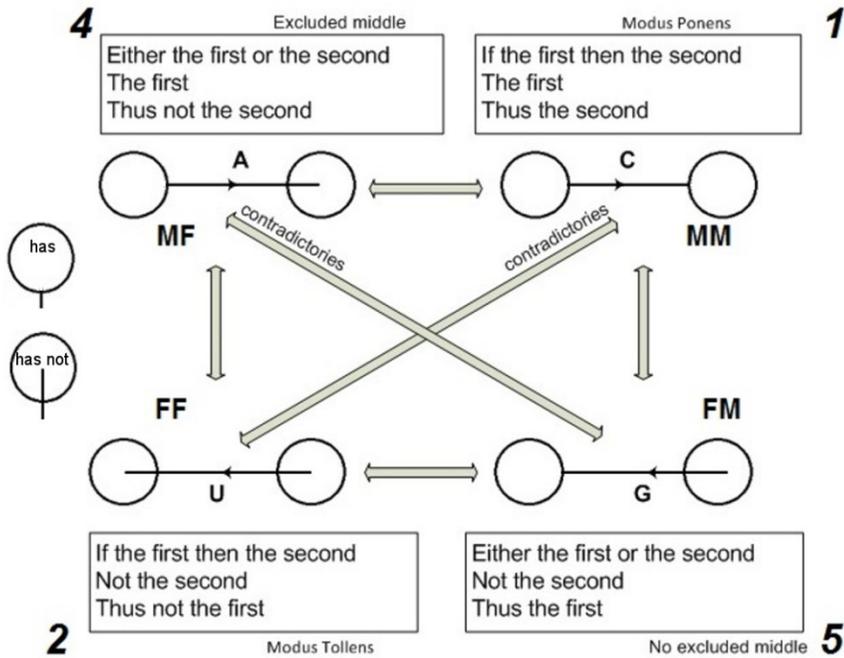


Figure 8 Author's hypothetical reconstitution of Chrysippus' Square of Oppositions. The four syllogisms shown, match up with the Stoic Four Elements, as well as the Aristotle version of the Square of Oppositions. Instead of using the Scholastic A, I, O, E labelling of the four logical elements we have used the A, U, G, C labelling of the genetic code. This is a truly universal structure.

Central for our purposes was the way the Stoics treated logic and physics. Amazingly, the approach was very much the same. They treated a logical argument in much the same way as a material substance. Physical substances are constituted of four elements. To the Stoics, logical arguments had an analogous structure to substances, being made up of a mix of four logical constituents. In order to access the validity of an argument, the Stoic approach required tracing the arguments back to its logical constituents. The four elementary constituents of logic included all of the Stoic *indemonstrables* except the third as illustrated in Figure 8. Note the perfect gender fit with the Stoic Semiotic Square already illustrated in Figure 1,

Taking a logical argument and working back to its constituent logical roots goes in the opposite direction to modern approaches using deduction. As Susanne Bobzien remarks:

„, the Stoic method of deduction differs from standard modern ones in that the direction is reversed. The Stoic system may hence be called an 'argumental reductive system of deduction'. (Bobzien, 1996)

6.9 The Fifth Element

Aristotle argued for a fifth element in his physics, which he called aether. A fifth element was necessary to fill the heavens above the terrestrial world and to explain the constant, unchanging rotation of the stars. The Stoics also added a fifth element to their system, calling it *pneuma*, an ancient Greek word meaning 'breath'. In this perspective, the four elements air, earth, water, and fire were considered passive, whilst the *pneuma* expressed

the active principle. Unlike Aristotle's aether, the *pneuma* permeates everything and expresses the Logos at both the cosmic and individual scales.

According to the author's interpretation, the Stoics regard material substance as explainable in purely logical terms, not just hypothetically, but *literally*. As illustrated in Figure 8, there is a one to one correspondence between Heraclitus diagrams for the four of the Stoic syllogisms as for the four classical elements. In addition, there is the Stoic fifth element, the *pneuma*, which can be associated with the third *indemonstrable* that was left out from Figure 8. Unlike the other four *indemonstrables*, the third has no Heraclitus diagram. The Stoic formulated the third syllogism in the same format as the other four syllogisms as:

The Third Stoic <i>Indemonstrable</i>
Either the first or the second but not at the same time
The first
Hence, not the second

The third syllogism expresses incompatibility and is like the Schaffer Stroke of the propositional calculus. As a universal requirement for systemic integrity of a system, the third *indemonstrable* can be interpreted as a gender typing constraint like the other four syllogisms, but unlimited in context. The syllogism does not demand any explicit gender typing of an entity; an entity can be typed either masculine or feminine *but not both at the same time*. Masculine and feminine gender typing must be maintained as incompatible and this always applies *now*, and continues throughout the lifetime of the organism, which constantly lives in its gender coherent *now* – thanks to the non-violation of the third *indemonstrable*.

The third syllogism plays a similar role to the Principle of Non-Contradiction in left side sciences. The third syllogism demands that that the systemic gender typing of a system be non-contradictory and non-ambiguous, from the perspective of the system. There can be no greys. The exception is when viewed by a third party., in which case, everything is grey as everything appears in superposition.

Stoic logic treats any argument as a logical substance. Logical substance is incorporeal and so does not exist. It is what the Stoics called a *lekta* – a *sayable* that expresses the meaning of things that exist. The sayable explains how matter works in terms of its logical structures. The *lekta* is pure logical substance in this case. In Stoic Physics, material substance can be explained in terms of logical substance. Like the two genders, the two are indistinguishable. The material substance exists, the logical substance is the sayable providing the meaning necessary for a scientific understanding. The third *indemonstrable* is a *lekta* of the fifth Stoic element, the universal, all-pervading *pneuma*

7 Composite Geometric Structure

A fundamental unifying theme of Stoic philosophy is their logic. Stoic logic is a logic of particulars. The logic is limited to be zero order and so is free of any abstract constructs such as variables with values ranging over sets. Consequently, any attempt at abstract generalisations is impossible in the Stoic paradigm. What the paradigm loses in abstraction it gains in semantics. Instead of the high order logic but zero order labelling style semantics of left side sciences, the paradigm opens the way to high order semantics fuelled by a zero-order logic of particulars. However, the Stoic version of semantics as a science lacked one essential ingredient for a proper formalisation; this ingredient is geometry, the generic geometry of forms.

Geometry with its potential geometric forms provides the ideal discipline for expressing higher order semantics. However, the present day traditional approach to

geometry only allows the expression of zero order semantic based on labelling. The standard form for such geometries is an n dimensional vector space R^n with signature (p,q,r) founded on n orthonormal basis vectors $\{e_1, e_2, \dots, e_n\}$. Instead of four types of basis elements, left side geometry only knows three basis elements and categorizes them by how they square. The signature (p,q,r) signifies that p of the basis vectors square to $+1$, q square to -1 , and r square to zero. Vector spaces with non-zero r in the signature are considered degenerate and usually ignored. In practical terms, traditional geometries are composites formed from only two generic types and are of the form $\mathcal{R}(p,q)$. The zero level semantics of such vector spaces is apparent in many ways. There are only two types of basis elements defined by the attribute of positive or negative square. Other than this attribute, the only way one basis element is distinguished from another is by index labelling such as labelling the axes by x, y, z or by the i^{th} indexed element in the basis set $\{e_1, e_2, \dots, e_i, \dots, e_n\}$. In brief, traditional left side geometry is founded on structures that all employ a Bertrand Russell style nominalism of pure labelling, pure zero order semantics.

A fundamental consequence of geometries based on zero order semantics is that the general vector space $\mathcal{R}(p,q)$ is non-chiral. Note that biological systems are dominated through and through by chirality. For example, all the fundamental amino acid building blocks for life have left-handed chirality, except for one, which is non-chiral. Left side geometry can accommodate chiral geometric objects that “live in” non-chiral vector space but such solutions rely on a space-object duality that violates FC. Right side geometry must satisfy FC, which precludes such rigid dichotomies, and so that space becomes an object in its own right and vice versa, leading to non-dualist geometries. Each different type of entity is different to another by its form and content as expressed through its geometry. The entity becomes a geometric entity that does not live *in* spatiality but *lives* spatiality.

Right side geometry is fundamentally chiral, not because of immediate necessity but as an accompanying consequence of how the basis elements of the geometry must be organised. Left side geometry uses a Cartesian organisation of its basis elements with each basis element sharing the origin as a common point, as illustrated in .Figure 9(a). This Cartesian construct violates FC on several fronts. Firstly, the source ends of the basis vectors are *anterior* to all of the other endpoints. FC demands that no point is before or after all others and so the Cartesian approach violates FC. Secondly, the basis vectors are arbitrarily labelled as x, y, z . This violates FC as arbitrary labelling can only come from outside the system, according to the whim of a mathematician for example. FC demands that the system be self-labelling.

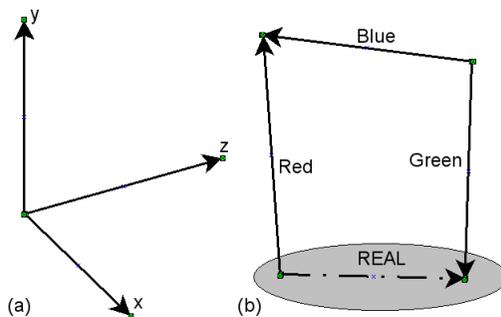


Figure 9 (a) Left side geometry is based on Cartesian axes. (b) The three bases for right side geometry are self labelling and form the “imaginary” attributes of a “real” entity. Unlike in Cartesian

geometry, it may not be logically possible that the three morphisms of the triad be orthogonal to each other.

Figure 9(b) illustrates a generic construct that overcomes these violations of FC. Unlike Figure 9(a), no point in the construct can be said to be *a priori* to all the others. Secondly, borrowing the “colour charge” terminology of Particle Physics, the three basis elements can be labelled as if they were RGB colours. The labelling is not arbitrary but made according to a convention where the convention is established by the construct itself. The system is self-labelling as there is no ambiguity in the geometric configuration shown. Any other like triadic structure can also be coloured according to this convention. This technique will not work for a construct consisting of a single dyad, two dyads, four dyads, or five dyads. It only works for three dyads or multiples of such triads.

The system determines the “colourless” colour white made from the three primary colours. The colour so determined can be interpreted as the “real” attribute constructed from the other three dyads, which, themselves can be considered as “imaginary.” The fourth dyad is always shown dotted in a diagram and is the only true “real” objective colour, the colour devoid of subjective specificity. The objective real can never be understood directly but only indirectly through “imaginary” attributes. The triad RGB structure is the most universal in Nature. Instances of it abound such as the triadic structure of DNA and the triadic quark structures of Particle Physics, complete with their RGB colouring. C.S. Peirce was an exponent of triadic structures and built them into his semiotics. Generic Science must be based on, what Jung would call, a Three-plus-One structure, not Peirce’s Three-plus-None triads.

Note also that Aristotles Syllogistic Logic is based on of types similar to the gender typing presented here. However, the triads are once again of a Three-plus-None form. Aristotle’s logic was not to develop right side science but to project the structures onto the left side paradigm and so develop a logic applicable to contingent reality.

Composite structure in right side science and geometry is founded on the four bases from the alphabet $\mathcal{V} = \{A, U, G, C\}$ as single letter labelling of the generic types $\{MF, FF, FM, MM\}$ respectively. Thus, instead of constructing geometries based on only two types of basis elements, generic geometry must have four. Given the basis types, left side geometry defines an n dimensional abstract vector space of the form $\mathcal{R}(p,q)$ consisting of $p + q = n$ basis elements arranged in the usual Cartesian configuration. Instead, right side geometry only ever employs three basis elements chosen from amongst the four-letter alphabet \mathcal{V} . Thus the signature of a space in generic geometry will be the triplet (x,y,z) where $x, y,$ and $z,$ denote letters from \mathcal{V} . Thus, each kind of generic geometry can be labelled by a signature consisting of a triplet of letters, for example the triplets $\mathcal{R}(AUG), \mathcal{R}(UGG), \mathcal{R}(GGG), \mathcal{R}(CUA)$ are a few of the sixty four possible geometries. Geometries that are more complex can be constructed by concatenating triplets. Complex geometric entities are composites made up of triplets of the simple basis elements $\{A, U, G, C\}$. This is a big difference to the left side counterpart where complex geometries are defined by simply increasing dimensionality. In general, traditional left side geometries are exceedingly poor in structure compared to the startling richness of those on the right side. Right side geometry becomes a real semantics treasure trove.

A more detailed exposition of generic geometry together with applications in biology and physics will be presented elsewhere. The intention here is simply to describe the basics without mathematics.

7.1 Four Kinds of Vector and an Example

This section sketches out the right side equivalent of simple spacetime geometry of the Special Theory of Relativity. The author fell upon this result well over a decade ago but found it so incredibly outlandish that he has only now come around to publishing it. Here we present a brief introduction. Consider the simple spacetime geometry of the two dimensional Minkowski space $\mathcal{R}(1,1)$. The right side, generic version of this space is $\mathcal{R}(AUG)$ or, using a more economical notation, simply the generic geometric form AUG . *Now*, this matches up with the RNA encoding of the start codon in the genetic code!

A sceptic might well claim that the author has simply chosen a suitable mapping from the alphabet $\{A,U,G,C\}$ to the gender types $\{MF,FF,FM,MM\}$ in order to get the right fit. This is partly true. However, there is the fact that there is a fit. Moreover, as further delving into this fascinating world will show, there are many other fits. *Now* it is time to describe the fit.

First, we must establish a fit between spacetime geometry and the four generic binary genders $\{MF,FF,FM,MM\}$. The geometric version of the four types corresponds to four universal types of lines. A good axiomatic account of the four lines given by Robert Goldblatt in his book on spacetime geometry (Goldblatt, 1987). The book studies the geometry of spacetime from the perspective of orthogonality. The methodology is axiomatic and so decidedly left side. Nevertheless, by working at the highly abstract level of the axiom set rather than the possible axiom set models, the exposition can be freed of coordinate considerations. The first three kinds of lines are the familiar timelike, spacelike, and lightlike lines of spacetime geometry. The lines distinguish themselves from one another by the inner product properties. Inner product of a vector with itself can be called its square and is a scalar. There are four kinds of line, timelike, lightlike, spacelike, and singular lines. The square of timelike lines is positive whilst the square of spacelike lines is negative. To every timelike line, there is a corresponding spacelike line orthogonal to it. Lightlike lines are orthogonal to themselves and so have zero square. For completeness, Goldblatt defines a fourth kind that he calls *singular lines*. Singular lines also have zero square and not only are orthogonal to themselves but to all other lines present. However, because of their apparent degenerate nature, Goldblatt provides no practical examples of geometries using singular lines.

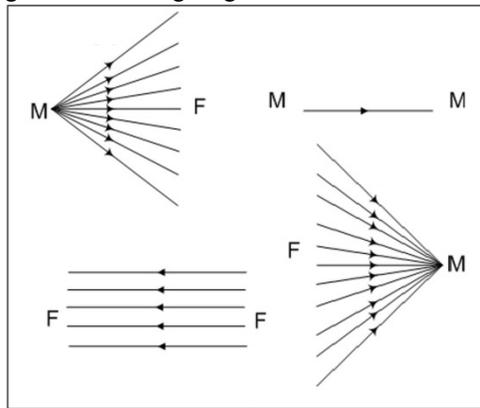


Figure 10 Intuitive illustration of the four types of oriented line in generic geometry typed as MF , FF , FM , and MM . The gender typing here illustrates the number of relative degrees of freedom.

In spacetime geometry, timelike and spacelike lines can be considered to form in cones whilst light like lines come in bundles as illustrated in Figure 10. These cones and bundles can be interpreted as vectors with different degree of freedom at each end.² The number of degrees of freedom can be correlated to gender. The end of a vector with zero degrees of freedom will have masculine gender whilst with one degree of freedom will have feminine gender. Thus timelike geometric cones will be typed *MF* and the spacelike cones typed *FM* where the masculine gender corresponds to the apex of the cone where there is zero relative degrees of freedom. The lightlike bundles will be typed *FF* and have a degree of freedom at each end. Finally, Goldblatt's singular lines will have zero degrees of freedom at each end and will be typed *MM*.

Proceeding very informally in our operational approach, and with no mathematics, These four types of line can be bolted together so matching so that the degrees of freedom restrain each other, leads to the diagram shown in Figure 11(a). This diagram is very similar to the classic two-dimensional spacetime used to explain Special Relativity. If the *MM* typed singular dyad is assumed null, the diagram is identical to the classical form. This could be seen as a Peircean Three-plus-None interpretation. The author advocates the generic Three-plus-One interpretation that remains true to the generic RGB template as illustrated in Figure 11(a). No further analysis or justification will be entered into in this paper. Perhaps it suffices to think of the *MM* typed dyad as some kind of Plank-like infinitesimal remembering that the generic RGB template was arrived at by FC considerations.

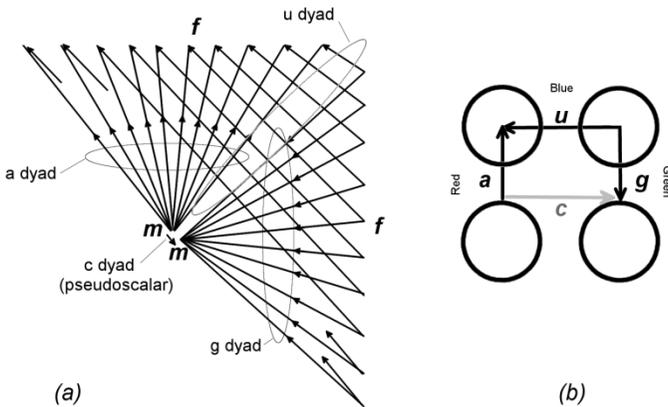


Figure 11 (a) Illustrating the natural fit of the a, u, and g dyads to determine the "real" mm typed c dyad. This is a right side version of the classical spacetime diagram. (b) The Heraclitus diagram for the aug codon.

In traditional physics, the spacetime diagram is a Lorentzian structure that illustrates the geometry of Special Relativity. How this structure could have anything to do with the start codon of the genetic code is a very interesting question. The author likes to replace the physics version of the Special Theory with a more generic version which says:

² This is very similar to Leibniz's Analysis Situs where he labels the end-points of lines A, B, or C, if they are fixed and X, Y, and Z, if they are left dangling. Leibniz will thus have four types of lines when defined this way, depending on the freedom of their end-points. Leibniz's Analysis Situs is the geometry constructed from these elementary line types. He thought that Nature worked along these lines. He was right.

No matter where you start, you must get the same theory

In other words, the generic science theory introduced in this paper, must be itself starting point invariant. This is a more generic version of the Special Theory, which states that the laws of physics are invariant for all inertial reference frames. The start codon geometry can be interpreted in this light. Thus, if right side science is valid and supplies the semantics structures of the genetic code, starting point invariance as principle and systemic convention could be the first and most important message stamped out at the start of every protein encoding sequence of the genetic code.

Figure 11 illustrates the geometric structure of $\mathcal{R}(\text{AUG})$ as a Three-plus-One structure. The traditional left side version is the Minkowski space $\mathcal{R}(1,1)$ which is not even a Three-plus-One structure as the vector space is entirely determined by two basis elements, one with positive square, and the other with negative square. Note that $\mathcal{R}(\text{AUG})$ might claim to be three dimensional in the limit whilst $\mathcal{R}(1,1)$ is only two-dimensional. From a left side perspective, to talk about a two dimensional vector space containing timelike lines, lightlike lines, and spacelike lines naturally leads to only one kind of space, the Minkowski space $\mathcal{R}(1,1)$; the spacelike line information is redundant. This is not the case for the right side version where knowing that the geometric entity contains one A dyad, one U dyad, and one G dyad is not enough. What matters is the ordering. The signature AUG determines the start codon whereas, in a different ordering, the signature UGA , in the genetic code at least, corresponds to exactly the opposite, a stop codon. The signature UGA will lead to an entirely different codon diagram to that in Figure 11 and will perhaps express the semantics of having completed the full circle, once this kind of geometry has been properly formalised and understood.

The essential difference between left side Cartesian style geometry is thus a matter of complexity as expressed in the signatures. Non-degenerate left side geometries are effectively made up only of two kinds of basis elements, in addition, the ordering of the basis elements has no semantic significance. Left side geometric structures are very trivial compared to the generic versions and fully deserve to be considered as only supporting semantics of the very lowest order. On the other hand, right side geometric objects are formed out of not just the a and g dyads but also the u and c . Moreover, the structure of the geometric entity completely changes when changing the order of the three elements in a triad. Generic geometry is the vehicle for structure expressing higher order semantics.

7.2 On Degeneracy and Chirality

Of particular interest is the generic geometric entity $\mathcal{R}(\text{GGG})$. In left side geometry, this corresponds to a vector space $\mathcal{R}(0,3)$, or its isomorphic equivalent $\mathcal{R}(3,0)$. In other words, $\mathcal{R}(\text{GGG})$ is the generic version of traditional 3-dimensional Euclidean space. In biochemistry, the GGG codon codes the amino acid glycine, Glycine is the smallest of the amino acid molecules and is unique amongst the other coded amino acids in being non-chiral. Intuitively, one can see that $\mathcal{R}(\text{GGG})$ produces a non-chiral geometry just like its left side variant the Euclidean E^3 .

The triads GGA, GGU, and GGC also code glycine. This is an example of the degeneracy of the genetic code. How to explain this degeneracy has been a long-standing question. From a right side science perspective there is only one generator of explanations that expressed in terms of FC. Thus, a simple answer is that the space $\mathcal{R}(\text{GGG})$ violates FC. It suffers the same problem as E^3 in that it is not homogenous. The space is incomplete as it lacks a generic origin as well as a generic "point at infinity." Geometric Algebra handles this sort of problem by extending the dimensionality of E^3 *without changing the number of degrees of freedom* - see (Hestenes, 2001), for details.

This results in Conformal Geometric Algebra, a preferred space for computer graphics. Thus, an informal explanation of the degeneracy of the genetic code in this instance is that $\mathcal{R}(GGG)$ is incomplete and not a geometric whole satisfying FC. The completed space will be $\mathcal{R}(GGG/A/U/C)$ defined as a homogenous extension. Given any one of the individual codings, the first class extension will lead to the one and same composite entity.

The hypothesis, needing to be explored in detail, is that the degeneracy of the genetic code is explained by the first class extension to more homogenous geometric structures. The uniquely coded geometric structures $\mathcal{R}(AUG)$ and $\mathcal{R}(GUU)$ need no geometric extension as they would be complete in themselves.

8 Three-plus-One Structures

We have shown that Aristotle's Syllogistic logic and Stoic logic have a similar generic structural basis consisting of an alphabet of four binary typed dyads. In the case of syllogistic logic, the dyads correspond to pairs of terms making up a proposition. Aristotle used propositions typed in this way to form triadic structures of dyadic terms called syllogisms. The resulting Syllogistic Logic could then be applied to different everyday scenarios. In short, Aristotle adapted right side generic structure and projected it onto left side problem domains as a categorical logic, a logic of classifications.

Working from the same generic base, the dyads can be expressed in terms of four of the Stoic five *indemonstrables*. Interpreted generically, the dyads articulate a logic of substance. According to the approach, four elementary substances can be identified as the four classical elements. Each of the elementary elements is binary gender typed. The gender typing integrates the four elements as elementary substances as well as playing the role as elementary constituents of knowledge. According to this paradigm, there is no mind independent world out there. The perspective is fundamentally anti-realist. Stoic physics is based on the four classical elements together with an ephemeral fifth element, the *pneuma*, which interpenetrates the four more determined types of substance. One way of comprehending the rational essence of these five elements is via the corresponding five Stoic *indemonstrables*, four of which can be illustrated with a simple Heraclitus diagram – the right side alternative to the Venn diagram, but much more profound.

8.1 Characterising Left and Right Side Paradigms

Employing the left and right hemispheres of the biological brain as metaphor, we have explained two kinds of scientific paradigm. All traditional sciences, together with axiomatic mathematics, are founded on the left side epistemological paradigm. These left side sciences can be characterised along the lines of how Bertrand Russel described his "Perfectly Logical Language." Each left side science provides its own perfectly logical language for its particular problem domain, primarily and fundamentally founded on high order symbolic logic and mathematics. Each science employs only a very shallow, nominalist, zero order semantics, sufficient for its purpose.

All of the usual characterisations of the traditional sciences follow; the sciences are naturally dualist, atomist, reductionist, and even fictionalist, making up new theories when the old ones fail. However, as pointed out by Karl Popper, in order to be scientific the fictionalist theory other than provisionally being empirically non-refuted must be *falsifiable*.

The sweeping characterisation is that left side sciences, above all else, rely on *abstraction*. Abstraction is a powerful tool within which it is possible to contrive all kinds of artifices, even abstract semblances of higher order semantics. However, any left side, forcibly abstract, attempt at higher order semantics must involve expressing meaning in terms of generalisations. In the final analysis, abstract generalisations of what are already

abstract symbolist structures simply become more of the same: once an abstraction, always an abstraction.

The architectural characterisation of left side sciences is that they are primarily diachronic, addressing the past and the future, the before and the after, and relationships between the two, predicting knowledge of the future from knowledge gleaned from the past. Fundamentally, dualist, left side science embraces the substance-void duality and thus becomes atomistic. The ancient roots of the left side paradigm can be traced back to the atomism of Leucippus and Democritus, which eventually was later developed and refined by the Epicureans, the ancient precursors to modern left side science.

Opposed to the left side sciences and mathematics is right side science that found its most developed expression under the Stoics, the exponents of fearlessly living in the *Now*. According to the Stoics, anything in the past or the future cannot exist and so influence the present; only the present is the realm of real existence. Despite the lack of extant texts, a study of the Stoic philosophy provides a good primer for comprehending the right side scientific paradigm. What is lacking in modern literature on Stoicism is an understanding of how the much-publicised unity of the Stoic system actually holds everything all together. In this paper, we claim that the system was unified by a principle much like what we have outlined as FC. As we have illustrated, modern practical examples of FC are built around a mantra like in OO with its dogma “Every entity of the system is an object,” accompanied by explanations of how entities that might appear not to be objects (like classes) really are objects in their own right. In the Stoic version of right side science, the mantra is that any entity that exists must be material, corporeal entity having extent. The Stoic system becomes a materialist monism where any violation of non-duality is a violation of FC. The non-dualism becomes so strict that even the dichotomy between the past and the future is eliminated; all that objectively remains is the immediacy of the systemic *Now*. In this way, the fundamental diachronic nature of the left side paradigm gives way to generic *synchronic* structures of the right side scientific paradigm. The *ad hoc*, accidental structures of the left side paradigm are replaced by synchronic structures that are operationally and organisationally invariant. The science becomes a non-diachronic, *operational* science. This paper claims that the calculus of such an operational science is spelt out in the algebra of the genetic code, the ultimate operational calculus of Nature.

Central to the Stoic system is Physics, Logic, and Ethics. The Ethics aspect of the paradigm can be understood in terms of the FC principle. What is bad is the violation of FC. FC violation is bad because it compromises the systemic integrity of the organism. The generic purpose of any organism, be it a neutrino, a paramecium, a Roman Emperor, or virtuous hippie living in a hut, is to live in accordance with the universal principle of Nature, the respect of FC. Generic morality and purpose is fundamental to the Stoic paradigm. Physics and logic are just as closely integral to the system. We have illustrated how the Stoics considered logical arguments in a way analogous to how they conceived material substance. Their reasoning was based upon the Four Element structure of four *indemonstrable* syllogisms in the case of logic and the four classical elements in the case of Physics. In addition, there was an additional, all permeating, fifth element *pneuma* for their physics and an additional *indemonstrable* (the third) for their logic. Stoic logic is a zero-order logic limited to particulars and thus impervious to abstraction. The downside of lacking abstraction is compensated by the upside of rich higher order semantics. Abstract generalisations give way to potentially concrete universalisations.

Left side sciences are all attribute based sciences. The obsession with attributes demands a quantification of knowledge where attributes can be formally known in terms

of quantified values. On the other hand, right side science is free of the plethora of attributes of all shapes and sizes that clutter the left side epistemological brain. In fact, the thing-attribute dichotomy is the first casualty of right side science. True to its non-dualist pedigree, right side science has no choice but to adopt an entity-property configuration where there is no absolute dichotomy between the two poles of the equation. The property that resolves this conundrum is ontological gender. Gender articulates the two sides of the knowledge-ignorance equation, the masculine representing what is known as a singularity, the feminine represents what is unknown and is like a wildcard in the subsequent gender algebra. Pure gender typing is too undetermined to be tractable. However, applied to itself, it leads to a more determined form – binary gender typing. There are four binary gender types MF , FF , FM , and MM . Labelling the four binary with the letters A, U, G, and C respectively, opens the way to a four letter generic algebra.

It was shown how Aristotle's Syllogistic Logic employed a similar construct using his Distributed/Undistributed typing of terms instead of gender typing. The Scholastics labelled the four binary combinations with the famous AIOE lettering. Syllogistic logic is based on triads of these letters, arranged in four figures, giving 256 combinations.

The Stoic approach was more in line with the generic right side science paradigm but did not go on to formally consider composite structures of the four base elements. In this paper, we advance a generic form for such composite structures. based on an untyped triadic structure employing an RGB colouring convention. The triad is self-labelling. Each of the dyads making up the triad can be binary gender typed where there are 64 possible combinations of triadic binary gender typing. These triadic structures, or "codons," are proposed as expressing the elementary forms of composite structure. Each of the three dyads in the triad is typed by one of the letters from the four-letter AUGC alphabet. In other words, this is an outline of how to reverse engineer the genetic code, all driven by the draconian demands of a system not violating FC.

This paper is the introductory presentation of the foundations of Generic Science, the science of the generic entity. The paper has been written at a level almost free of mathematics. The paper concludes with a practical example of how the semantics of the starting point of the science can be expressed by a geometry strikingly similar to 2-dimensional Minkowski space $\mathcal{R}(1,1)$. The generic $\mathcal{R}(\text{AUG})$ entity is a three dimensional structure constructed from classic spacetime-like geometric constituents with an extra infinitesimal-like C base in the result. This structure is claimed to express the generic semantics of the start codon in the genetic code.

The paper claims that the right side version of the vector spaces $\mathcal{R}(p,q,r)$ are the generic geometric entities $\mathcal{R}(xyz)$ where x, y, and z, are letters from the four letter alphabet $\{A,U,G,C\}$. It is claimed that the real semantics of the generic cum genetic code can be expressed in terms of these generic geometric forms. Many outstanding problems should be capable of resolution in this new generic geometry framework such as explaining:

- the degeneracy of the genetic code
- why all amino acids coded by the genetic code are left handed
- why D-amino acids are not coded
- why all D-amino acids are right-handed.

9 Conclusion

This paper contrasts the fundamental mindset of the modern sciences with that of the ancient Greeks and particularly the Stoics. Modern sciences, including axiomatic

mathematics, adhere to a diachronic paradigm explaining the *a posteriori* from the *a priori*. Our reconstruction of Stoic philosophy presents an alternative and complementary paradigm based on the synchronic. The paper presents two fundamental concepts that open the way to a tractable formalisation of the synchronic paradigm, *viz.* First Classness(FC) as the organisational principle and ontological gender as the fundamental systemic construct. We introduce *now machines* as the systems organised according to the principle of FC. The paper argues that all biological life forms are instances of now machines.

A stark example of the opposition between the diachronic and the synchronic can be found in Nature. The Theory of Evolution expresses the diachronic aspect of Nature and remains the preoccupation of modern science. The synchronic aspect is expressed in something that does not evolve but remains constant over billions of years. This something is none other than the genetic code. Biochemistry explains away the genetic code in terms of its Central Dogma. According to the dogma, the genetic code only possesses transcription semantics. It is merely seen as a code transcribing to the twenty amino acids. This paper presents an alternative point of view. Underlying the genetic code is a generic algebra based on ontological gender. The four letters of the algebra are binary gendered types that can be interpreted to explain generic geometric forms. As indicated here and developed further elsewhere (Author, 2013), the four letters A,, U, G, and C of the genetic code can be interpreted as expressing timelike, lightlike, spacelike, and singular line like semantics. We have also indicated how the underlying gender construct displays Quantum Mechanics semantics. The general picture emerging from this work is that the synchronic paradigm provides a new operational approach to understanding Nature from a life perspective, the perspective of now machines. The importance of such an observation should become increasingly important.

10 Bibliography

Author, 2013d. How Nature's genetic code predicts the Standard Model. *to be submitted for publication.*

Author, 2013. *The Universal Geometric Algebra of Nature: Realising Leibniz's Dream (to be submitted).* [Online]

Available at: [http://theotherscience.com/private_papers_to_be_published/Foundations Paper Part 3 LONG.pdf](http://theotherscience.com/private_papers_to_be_published/Foundations_Paper_Part_3_LONG.pdf)

Bobzien, S., 1996. Stoic Syllogistic. *Oxford Studies in Ancient Philosophy*, Volume 14, pp. 133-192.

Bohm, D., 1980. *Wholeness and the Implicate Order*. s.l.:Eoutledge.

De Lacy, P., 1945. The Stoic Categories as Methodological Principles. *Transactions and Proceedings of the American Philological Association*, Volume 76, pp. 246-263.

De Lacy, P., 1977. The four Stoic Personae. *Illinois Classical Studies 2*, Volume 76, pp. 168-72.

Doran, C., Lasenby, A. & Lasenby, J., 2002. Conformal geometry, Euclidean space and geometric algebra. In: *Uncertainty in Geometric Computations, Kluwer International Series in Engineering and Computer Science*. Boston, MA, USA.: Kluwer Academic Press.

Dorst, L., Fontijne, D. & Mann, S., 2007. *Geometric Algebra for Computer Science, An Object Oriented Approach to Geometry*. s.l.:Elsevier.

Frede, M., 1987. Stoic vs. Aristotelian Syllogistic. In: *Essays in Ancient Philosophy*. Minneapolis: University of Minnesota Press.

Goldblatt, R., 1987. *Orthogonality and Spacetime Geometry*. Berlin: Springer-Verlag.

- Gould, J. B., 1970. *The Philosophy of Chrysippus*. New York: State University of New York Press.
- Greimas, A. J., 1991. *Maupassant: La Sémiotique Du Texte - Exercices Pratiques*. s.l.:Editions Du Seuil.
- Hestenes, D., 1986. Clifford Algebra and the Interpretation of Quantum Mechanics. In: J. Chisholm & A. Common, eds. *Clifford Algebras and their Applications in*. Boston: Reidel, Dordrecht, pp. 321-346.
- Hestenes, D., 2001. Old Wine in New Bottles: A new algebraic framework for computational geometry. In: *Geometric Algebra with Applications in Science and Engineering*. s.l.:Birkhäuser.
- Jeffreys, H., 1927. *Operational Methods in Mathematical Physics (Cambridge tracts in mathematics and mathematical physics No. 32)*. s.l.:s.n.
- Kant, I., 1783. *Prolegomena to any Future Metaphysics*. s.l.:s.n.
- Leibniz, G. W., 1995. In: *La caractéristique géométrique*. Paris: Mathésis.
- Leibniz, G. W., n.d. *Philosophical Papers and Letters: A Selection*. 2nd Edition 1975 ed. s.l.:Springer.
- Maturana, H. & V. F., 1980. . Autopoiesis and Cognition: the Realization of the Living. In: *Boston Studies in the Philosophy of Science 42*. s.l.:Dordrecht: D. Reidel Publishing Co..
- Oliveira, P. M. & Barroso, V., 2003. Uncertainty in Time-Frequency Analysis. In: *Time Frequency Signal Analysis and Processing: A Comprehensive Reference*. s.l.:Elsevier, p. 114.
- Risi, V. D., 2007. *Geometry and Monadology - Leibniz's Analysis and Philosophy of Space*. Basal - Boston - Berlin: Birkhäuser.
- Russell, B., 1972. The Philosophy of Logical Atomism. In: *Russell's Logical Atomism*. London: Collins.
- Sellers, J., 2006. *Stoicism*. s.l.:University of California Press.

Figure 1 The Stoic Semiotic Sqyare. To the Stoics, the active feminine, active masculine, passive feminine, and passive masculine corresponded to the four classic elements air, fire, earth, and water, respectively.

Figure 2 Iconic diagrams for the four binary genders *MF*, *FF*, *FM*, and *MM*. Each binary gender is denoted by a single letter A, U, G, and C respectively of the genetic cum generic code.....

Figure 3 the four types of term in Aristotelean logic and their corresponding Heraclitus Diagrams. Each elementary diagram can be labelled with a letter from the four letter alphabet system invented by the Scholastics.

Figure 4 The geometric structure of the categorical syllogism is based on four possible configurations of the underlying dyads.....

Figure 5 The syllogisms Darii and Datisi have the same semantics. The only difference in the duagrams is that the direction of the MS arrow is reversed. The direction of the I typed dyad is sematically immaterial.....

Figure 6 Illustrating that reversing the direction of the “isomorphism” dyad E, does not change the seamntics of the Felapton and Fesapo syllogisms.....

Figure 7 (a) The modern logic version of the oppositions. (b) Aristotle’s square of oppositions.

Figure 8 Author’s hypothetical reconstitution of Chrysippus’ Square of Oppositions. The four syllogisms shown, match up with the Stoic Four Elements. as well as the Aristotle version of the Square of Oppositions. Instead of using the Scholastic A, I, O, E labelling

of the four logical elements we have used the A, U, G, C labelling of the genetic code.

This is a trully universal structure.

Figure 9 (a) Left side geometry is based on Cartesian axes. (b) The three bases for right side geometry are self labelling and form the "imaginary" attributes of a "real" entity.

Unlike in Cartesian geometry, it may not be logically possible that the three morphisms of the triad be orthogonal to each other.

Figure 10 Intuitive illustration of the four types of oriented line in generic geometry typed as MF , FF , MF . and MM . The gender typing here illustrates the number of relative degrees of freedom.

Figure 11 (a) Illustrating the natural fit of the a, u, and g dyads to determine the "real" mm typed c dyad. This is a right side version of the classical spacetime diagram. (b) The Heraclitus diagram for the aug codon.