
The Primal Code (V9.03)

**reveals a simple number sequence
that has mystified mathematicians for centuries,**

**records how, out of chaos,
the cosmos began and continues to be recreated**

**and resolves the three oldest and greatest enigmas
in mathematics.**

- ***The Prime Numbers Sequence*** (2000+ years)
- ***The Riemann Hypothesis*** (1859)
- ***The Goldbach Conjecture*** (1742)

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What mathematicians & scientists have said

“...The primes represent the most tantalising enigma in the pursuit of human knowledge...”

Cover blurb of *The Music of the Primes* by UK professor of mathematics, Marcus du Sautoy (2004).

“Upon looking at these numbers, one has the feeling of being in the presence of one of the inexplicable secrets of creation.”

Mathematician Prof. Don Zagier speaking of the primes, quoted in *The Mathematical Experience* by Philip J Davis and Reuben Hersh (1981).

Prime Numbers – The Most Mysterious Figures in Math.

Title of a 2005 book by mathematician David Wells.

God's Secret Formula – deciphering the riddle of the universe and the prime number code.

Title of a 1997 non-fiction book by scientist Peter Plichta.

“Prime Obsession ...the Greatest Unsolved Problem in Mathematics”

Title of a 2003 book about the prime numbers by mathematician John Derbyshire.

These few quotes are included simply to illustrate the continuing fascination after many centuries, particularly of mathematicians and scientists, with the prime numbers. The books reveal how each author seemed intuitively to sense something very special which inspired his book. Yet none was able to grasp what actually makes the prime numbers so significant. The primes are also central to the *Riemann Hypothesis* and the *Goldbach Conjecture*, two other longstanding and unresolved conundrums of mathematics.

Albert Einstein made the wise observation that "No problem can be solved from the same level of consciousness that created it". This one can only be resolved by starting out from cosmic principles beyond mathematics, and homing in on the world of numbers, or working from the numbers to the principles.

Prologue

Central to this work is the idea that the very sequence of the *prime numbers* constitutes a **Primal Code** of values which is fundamental to understanding how the cosmos was and continues to be formed. In this bigger context, a universal coherence can be appreciated, certain mathematical problems, previously considered unresolvable, can be resolved and various special numbers, called 'irrational' by mathematicians, can be seen as rational.

Since the approach taken here is by no means an orthodox mathematical one, it does involve questioning some perhaps previously unquestioned assumptions. Embedded in normal mathematical practice for many years, these would seem to have been contributing to the problems all along.

In the 1930s, mathematician, Kurt Godel, established that there are statements which cannot be proved true or untrue within the axioms of a mathematical system. For a mathematical '*proof*' only has meaning within the limited definitions, rules and conventions of the language of *mathematics*. So *meaning* cannot be found in numbers themselves, although patterns of order amongst them obviously can and may imply meanings.

It's also assumed in this work that there is a *coherent order* behind what's normally called *randomness*, a concept that covers up the human inability to handle certain degrees of complexity arising out of the basically simple cosmic principles underlying that order.

An understanding of the pattern and meaning of the *prime numbers* sequence has eluded mathematicians for over 2000 years, and since 1859 no one has been able to prove or disprove the *Riemann Hypothesis*. The *Goldbach Conjecture*, about a self-evident fact regarding even numbers and the primes, has likewise remained unproven since 1742.

So questions inevitably arise concerning the *assumptions* behind the thinking of all those striving to resolve these three related enigmas. That is to say, these problems have to be viewed in context from outside the mathematician's mindset, from outside the box, with questions more of a psychological than a strictly mathematical nature.

Assumptions of Threshold Mathematics

1. **Universal Consciousness** (*UC*) is the original animating principle of the void/vacuum of no-thing-ness, an idea beyond the limited capacity of *individual*, incarnate human consciousness to comprehend fully. *UC* is *axiomatic* to this work since it's what accounts for humans being able to think about such abstract subjects as mathematics.

2. The second and third universal principles, **polarity** and **resonance**, account for the *coherent order* that prevails throughout the cosmos, behind all superficial disorder.

3. **Zero** has two complementary, polar opposite meanings, both of which carry the sense of a threshold, itself of no substance or numerical value. *Big zero* is the periphery where finite 'somethingness' and the infinite 'nothingness' interface. *Little zero*, as a number symbol, represents those points which serve as portals into the same infinite nothingness. This theme will be developed in this work. Beyond *zero* is the so called 'negative' realm of potential/virtual values, the great void of no-thing-ness aka the fullness of pure energy.

4. The number **One** serves as both the biggest and smallest number: the all-inclusive, total **unity** and its polar opposite, the exclusive, single **unit**.

I. The *Threshold Perspective*

Two Greek words: **khaos** (chaos) implies a potential, *pre-physical order* in the void, womb, matrix, cauldron (the *negative*); **kosmos** (cosmos) means a worldly *order* (the *positive*).

The **cosmos/chaos cycle**

This refers to the continuous cyclical process of *manifestation* from the pre-physical state of chaos into the physical-material state of cosmos, followed by *redemption* and so on.

1. It all starts with *UC*, the void, full of potential, within which is created a focal *point*, a *singularity*. That point becomes the centre around which an expanded sphere instantly forms, a pre-physical *sphere of potential manifestation*, a **one**-ness, an order, a *cosmos*.
2. The *symmetry* of this sphere is distorted like a bubble by 'external' and 'internal' forces. The resulting *asymmetry* accounts for the various natural, archetypal forms and shapes. Consideration of the forces involved is beyond the scope of this work.
3. As universal consciousness tends towards re-establishing its original unity state, a rhythmical, pulsating dynamic of two **polar** opposite forces arises between periphery and centre, inwards/outwards, an order of **two**-ness within the **one** cosmos. This **dynamic 2-dimensionality**, **D2D**, is a key concept regarding the currently evolving mathematics of the *Threshold*.
4. The interaction between the polar opposite forces of (a) inward *contraction* (*gravity* creating *density*) and (b) outward *expansion* (*levity* creating *rarity*) generates a primal, pre-physical *potential*, a dynamic, ie basic, raw ENERGY.
5. The interface, the **threshold** where these two forces meet and balance out, establishes **three**-ness from the **two** forces in the **one** cosmos. This threshold can be imagined as a spherical *standing wave*, transient but enduring so long as the two polar opposite forces maintain their dynamic, rhythmic state of balance.
6. The *threshold* standing wave, a concentric sub-sphere within the original *sphere of potential manifestation* (the cosmos), forms a *resonant cavity*.
7. Within it, repetitively, further sub-spheres are formed in accordance with the principle of *harmonic resonance*, which the acoustical *Harmonic Series* of Pythagorus demonstrates.
8. Towards the centre point, the increasing density of concentric sub-spheres impedes the rhythmically pulsating energy until eventually some becomes trapped, frozen or 'woven' between the densely packed sub-spheres closest to the centre.
9. Here *matter* is created, 'woven' through the interplay of the inward/outward movement (*weft*) and the standing wave inertia (*warp*). The process passes through the four states of matter - from the rarest, transformative, fiery plasma, through the gaseous and liquid, to the densest inert solid. These four states correspond to the four traditional archetypal *elements* of fire, air, water and earth.
10. When the original universal consciousness, as primal energy, cools, contracts and sinks ('descends') into dense solid *matter*, disintegration and fragmentation occur. Discrete bits of material substance form within the previously continuous fluidity, like lava.

11. Meanwhile, individualised, earthly human beings have been evolving from a pre-physical, aethereal state into physical-material embodiment, and begin to use, compare, standardise and measure material objects in an embryonic mathematical way.

12. The now *individual*, point-centred consciousness of incarnate humanity, deeply embedded in matter, gradually evolves the capacity for detached, abstract thinking, ie disconnected from its immediate physical circumstances. That enables a way of *quantifying* to develop, applicable to all aspects of the physical-material world: an **equal measuring unit (EMU)** system of standardised quantities, an EMU number system.

This very useful but artificial device does not truly reflect the *continuity* of Nature and the cosmos. It requires a kind of *suspension of disbelief*, like the cinematic experience of 'seeing' a series of still pictures as if moving and alive. It has, however, now long dominated and distorted humanity's conception of what might be 'real', true or factual.

One pathological consequence of this is the current epidemic of sterile, dead (static) *statistical* thinking. This completely excludes the living dynamics of *will* and *feeling*, ie active consciousness, from all calculating, analysis and projecting into the future.

13. In the 20th century, the reversal from the **descent into matter** and *materialism* towards the **ascent out of matter** began to be reflected in physical science – especially in *quantum* physics. The shift of emphasis, in this bi-polar cosmos, has significantly affected human consciousness as it continues to progress and evolve in both directions, as follows:

(a) Further *inwards* leads 'through' the centre, the inner infinitude or vanishing point of density and smallness, ie beyond the *atom* (the Greek word 'atom' means an *indivisible* entity), and beyond the so called *quantum* level ('quantum' means the smallest discrete quantity of physical energy). This 'passing through' the original centre point results in a 're-emergence' into the non-quantifiable, continuous *pre-physical* realm.

Physical science, having not yet realised this, still uses the materialistic terminology of fragmented, separate *particles* etc in its endless categorising and quantifying.

(b) Further '*outwards*' leads directly to the peripheral infinitude of rarity and vastness, ie into the pre-physical realm and the unlimited void of *UC*. Astrophysicists and cosmologists search in this direction, but also still seem locked into the terminology of the physical-material world - while allowing themselves a little imaginative poetic license here and there, such as in *curved space*, *event horizons*, *black holes*, *dark energy* and so on.

A new mathematical language has long been required to deal with the *pre-physical* realm, given its qualitative difference from the physical-material realm from which the EMU system emerged. And, as will become clear later in this work, certain improvements to the currently conventional *number system* are required.

To recapitulate, the continuity of the cosmic formative process can be summarised as:

-1: From the unlimited, **negative** void/fullness of *Universal Consciousness* beyond...

0: the **zero** (*non-dimensional*) *Threshold*, emerges as...

1: the **oneness** of a pre-physical *sphere of potential cosmic manifestation*, forms around a focal point (**one-dimensional**), the periphery and centre creating...

2: the dynamic **two-dimensional two-ness** of the primal polar forces, *gravity* and *levity*, out of which arises a pulsating matrix/medium of primal **energy**, in which...

3: **three-ness** is present in the *Threshold* between the two forces, and in the manifested cosmos.

2. The Prime Numbers Enigma (2000+ yrs)

In the *pre-physical* realm there are no discrete, separated parts – only an ever changing continuity of different qualities, forces, tendencies etc. This would seem to be what has confounded many who have delved into the so called 'quantum' world. So, mathematically, you can start from **one** as a whole inclusive unity, or from **one** as a partial exclusive unit.

To *divide* up the wholeness, the unity, into a number of portions is to *multiply* the quantity of units by that same number. So the universal principle of *polarity* finds mathematical expression in, for example, the reciprocity of *division* and *multiplication*.

Six-ness

The process of *manifestation* into many-ness is one half of a two part cyclical process, the other half being the polar opposite complementary process of *redemption* back into the original state of oneness. So **one** whole cycle consists of **two** phases (inward and outward), each of which consists of **three** stages. That makes **six** stages per cycle.

This can be considered *multiplication*: oneness producing two-ness producing three-ness, or *addition*: a state of simultaneous oneness plus two-ness plus three-ness.

Whether 1, 2 and 3 are multiplied or added together, the result is **6**, product or sum.

This special property is unique to the number **6** which is thus known as a *perfect number*.

Pythagorus' *Harmonic Series* connects *resonance* with the mathematics of ratios, while **Euler's** discovery of the basic mathematical *zeta function* coincides with this.

Euler's Product also demonstrates how the prime numbers connect *multiplication* and *addition*. So the work of Pythagorus and Euler together link *resonance* with the *primes*.

The Primal Code begins to emerge in two *arithmetic progressions*, each with the common difference of **6**, which express mathematically the *inward* and *outward* rhythmical pulsation of the cosmos. One starts from -1 (representing the pre-physical potential, ie *chaos*) and the other starts from +1 (representing the manifest physical cosmos). Thus the formula:

$$T_n = 6n \pm 1$$

As these series progress, each new number (ie resonant cavity) that is a multiple of (ie resonates with) an already established prime is automatically subsumed by it, has no independent sound/identity of its own and so is cancelled out, eliminated.

That leaves only those RCs that resonate solely with the original *one* cosmos and those numbers which are only divisible by one, ie the *prime numbers*.

Artificially merging the two number progressions gives us the familiar sequence of *prime numbers*, which previously appeared to be 'irrational'. These are, in essence, a series of *ordinals* to which the *cardinal* prime numbers correspond in the **Primal Code**.

A double helix explains the 'twins'

When the two progressions, from -1 and +1, are displayed as a *double helix*, the two interweaving spirals, pass closely at every count of **6**. This graphically de-mystifies the previously enigmatic phenomenon of the *twins* primes, such as 11 and 13 or 29 and 31.

To summarise, briefly, the formative process:

Pulsation between periphery and centre of the original cosmic sphere/resonant cavity creates *standing waves* which form, within that original *one* sphere, a series of concentric sub-spheres/resonant cavities in resonance solely with the original.

That series - in order of decreasing magnitude and faster rhythmic resonance - correspond to the acoustical/musical *Harmonic Series* of Pythagorus.

The Harmonic Series coincides with Euler's *Zeta Function* (when the exponent $x = 1$). The Zeta Function (when $x=1$) is an *infinite* series.

The Harmonic Series is, therefore, an infinite sequence of resonances, its fundamental (lowest) tone being that of the original *one* resonant cavity.

The Primes, as *cardinal* numbers, are mathematically 'resonant' only with number *one*, while all other EMU numbers can be reduced down to combinations of primes.

Thus the **Primal Code** has a dual function as:

- (a) a series of *ordinals* (1st, 2nd, 3rd...) corresponding to the infinite sequence of cavities which are resonant only with the original one, and which could be called *primal values*.
- (b) those EMU *cardinal* numbers only divisible by (ie resonant with) the number *one*.

'Generating' primes and 'predicting' the next one

The expression 'generating primes' can now be understood as having two meanings:

1. The forming of the cosmos in stages, expressed as a series of *ordinal* values, and
2. Mathematically calculating a very special series of EMU *cardinal* numbers.

The abstract mathematical exercise of 'predicting the next prime' is thus a question of:

- (a) the limits of current computational technology, and
- (b) how much time and resources anyone is prepared to devote to this infinite quest.

A practical working definition of the primes

The primes, expressed as EMU *cardinal* numbers, represent an ordinal scale of markers of the cosmic formative process – from the potential pre-physical realm to the realm of actual physical forms – expressing the principles of **polarity** and **harmonic resonance**.

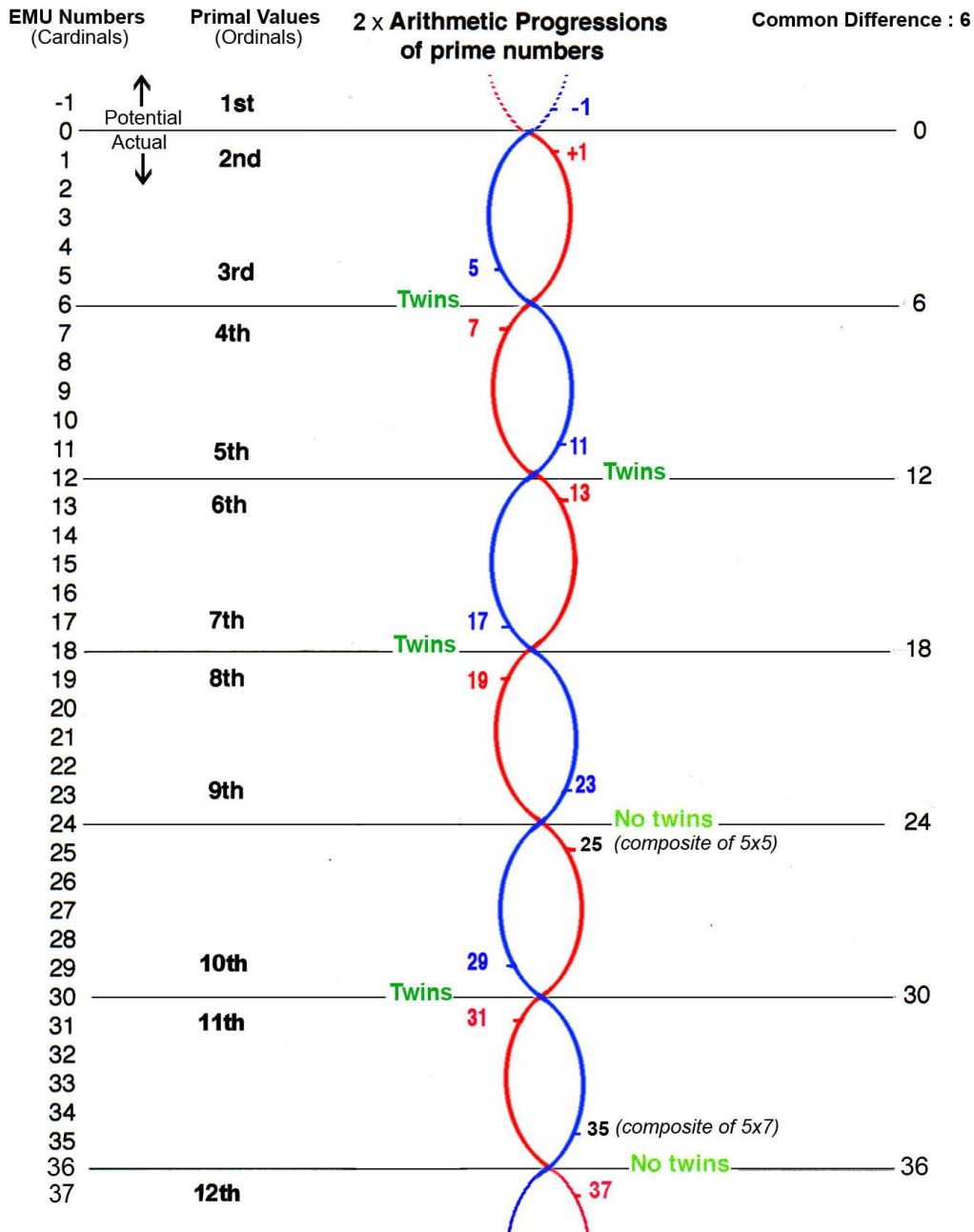
So the primes can be understood as a primal cosmic number system, a **Primal Code**. However, when seen only from the physical-material perspective of the EMU *cardinal* number system, no logical order is apparent. Hence their 2000+ year 'enigma' status.

The fact that this account is not wholly reducible down to a concise formula, algorithm or a formal 'proof' affirms Godel's *Incompleteness* principle and emphasises that the significance of the primes extends beyond the limits of current mathematics. Also, to ignore the subtle, underlying pattern and the greater cosmic context, in favour of a narrow, arithmetic definition of what constitutes a prime number, would be to repeat the failure over the last 2000+ years to appreciate the natural order of the primes.

Thus the enigma of the distribution of the *prime numbers* is resolved by the **Primal Code**.

The Order of the Primes

from *Threshold Mathematics* (2006)



All potential prime numbers, t , occur in the EMU number sequence according to the formula $tn = 6n +/- 1$
Actual prime numbers occur in accordance with the series of *primal values* –
that is, all the potential primes less those *resonant* with, ie a multiple of, a prime number already in the series.
EMU cardinal numbers 2 and 3 are integral to the 6-ness of the two arithmetic progressions,
and fit the EMU definition of a prime number, but do not correspond with the series of *primal values* (ordinals).

3. The *Threshold* Rationale of 'Irrational' Numbers

From the *Threshold* perspective, certain so called *irrational* numbers can be understood as rational *Threshold* numbers, since they regulate or scale the transformations between the pre-physical and the physical realms – serving as a kind of constant exchange rate.

They represent *constant scaling values* of *proportion* or *ratio* between the two realms which, being qualitatively different, function according to different *ratio*-nales.

The fluid, pre-physical realm is not solid and fragmented into separate, discrete, quantifiable EMU bits. Which is why, from the *physical* perspective, any crossover to or from the *pre-physical* realm seems *irrational*, ie has no precisely calculable *ratio*.

Phi: The Golden Ratio/Proportion/Mean

The *Golden Ratio* represents a constant relationship of proportion between the (length) dimensions of the ideal, potential forms of the pre-physical realm and those of actual, material forms in the manifest physical world. The numerical 'echo-ing' of the 'irrational' ratios, 0.618...:1 and 1:1.618... implies a significant relationship. And the widely acknowledged aesthetic quality of the *Golden Ratio* in architecture, art and design through the ages reinforces this as an intuitively sensed principle.

The Fibonacci series

The *Fibonacci series* is a derivative, a variation of the *Golden Ratio* principle. However, it only applies to the process of organic emergence from the pre-physical realm into physical manifestation, ie physical growth. This could be the growth of an individual organism, as in the various proportions measurable in organisms, or in the numbers of a breeding species.

The *Golden Ratio* and the *Fibonacci series* can each be expressed mathematically as a flat 2D logarithmic *spiral* which can geometrically generate rectangles. The difference between the two spirals diminishes the further out from the centre they progress. This convergence confirms the dynamic *Threshold* description of the increasing density of sub-spheres towards the centre where energy is trapped and matter formed.

Such images also link the continuously changing, curving *movement* implied in the *spiral* with the static, frozen-image snapshots of the straight and precisely quantifiable *rectangle*.

Pi

Pi, the ratio of a circle's circumference to its diameter, is mathematically expressed as the value of approximately 22/7 or 3.141... From the *Threshold* perspective, *pi* serves as a *scaling factor* between the realm of the pre-physical *sphere* and that of the physical-material *cube*, and similarly between the *circle* and *square* in the surface-bound 2D realm.

Because of the inherent qualitative differences, some *approximation* is inevitable when attempting to quantify the volume or area of the continuous, pulsating, pre-physical realm into terms of the discontinuous, static, fragmentation of the physical-material realm.

The symbol e, constant of growth

Given that a pulsating sphere retains its form through the rhythmic contracting and expanding, a constancy in the process has been identified by mathematicians, quantified and reduced down to a so-called *irrational* number 2.718... symbolised by the letter **e**, for calculating exponential growth or its polar opposite, shrinkage.

Imaginary numbers and **complex numbers** are dealt with in the next section.

4. The Riemann Hypothesis (1859)

'All non-trivial zeros of the zeta function have real part one-half.'

'All non-trivial zeros of the zeta function lie on the critical line.'

The *Riemann Hypothesis* is here taken to be an inspired speculation about a particular and significant pattern intuitively sensed by the outstanding 19th century mathematician, Bernhard Riemann. In 1859 he gave it expression in the form of a mathematical model, combining numerical and graphical elements.

The idea emerged as a spin-off, an unexpected by-product of other work on the prime numbers in which he was then engaged. He speculated the existence of a 'critical' infinite line of zeros generated by his modified version of the *zeta function*, incorporating *complex numbers*. This suggested a then unrealised order involving the prime numbers.

A doomed model / polarity ignored

It's suggested here that no one has been able to prove or disprove *Riemann's Hypothesis* because it is based on some long established false assumptions in Western culture about the fundamental nature of the cosmos. These have resulted in an incomplete conception of what *zero*, *one*, *half* and *i* (symbolising imaginary numbers) mean, as well as an inadequate appreciation of what *negative* and *positive* values signify in their broader cosmic context.

The *Threshold* principle of universal *polarity* is here taken as assumed. So any particular aspect of the greater reality signified by a mathematical symbol will always have its polar opposite aspect. Failure to apply this principle can result in confusion.

The *Threshold* perspective thus reveals that *zero*, along with all other number values, has both a *major, qualitative, inclusive* and a *minor, quantitative, exclusive* aspect. However, in Riemann's era of increasingly materialistic thinking and still today, only the *minor* aspect, 'little zero' – as a gap-filler between numbers – seems to have official recognition.

An exercise in unlearning

Consequently, this investigation of the Riemann Hypothesis enigma is very much an exercise in questioning old assumptions, unlearning and abandoning some redundant teachings and untangling knots resulting from these. All in all, it's a kind of opening up of previously locked doors and windows in order to benefit from a fresher, lighter, more expansive atmosphere. As in everyday life, this is not always welcomed by everyone.

A cautionary thought

Converting number patterns into geometric, quasi-physical/spatial structures, as Riemann did, can be a useful device for visualising connections etc. However, it can also result in potentially misleading false metaphors, such as rigid images where fluid patterns become established 'fixtures' as lines, areas, distances, directions etc.

Back with big and little zero

In the normal workings of the decimal number system, *little zero* occupies a position, a space in a grid, as if it's just another 'building block' number with its own specific value, ie nil.

By contrast, in a *number line*, which essentially represents an *order*, a zero serves as a marker, a transition point with no intrinsic quantitative value – just as in the practical world of normal thinking, outside of abstract mathematics, there is no gap between the years IBC (-1) and IAD (+1), ie no 'year zero'. Here zero marks only a crossover or transition point, a *threshold* in a greater flowing continuity.

So, given the universal principle of polarity, **little zero** serves as a space-filler, a symbolic point or portal of no substance or numerical value in the grid/column/EMU number system. Meanwhile, **big zero** represents the *threshold* or *border/interface/field/plane/line* of no substance or value at the transition level between:

- (a) the infinite, pre-physical, unmanifest, potential/virtual, *negative* realm, and
- (b) the finite physical-material, manifest realm of forms and positive numbers.

Zero does not, therefore, simply represent 'nothingness' in contrast to the 'somethingness' of the realm of positive numbers. It has an intermediary role in a number line. It stands numerically midway between -1 and +1.

So, viewed from the physical 'side', beyond zero there lies the potential/virtual and essentially non-quantifiable *negative* realm. This is only made quasi-quantifiable ('as if' quantifiable) by artificially 'projecting' positive values on to it through an act of imagination, creating artificial images and a mathematical mirage.

And in this exercise of the imagination lies a clue to the meaning of the 'imaginary numbers', represented by the letter ***i***.

The ambivalence of imaginary numbers

Riemann had already been working on the primes using *complex numbers*, combinations of *real* and *imaginary* numbers. *Imaginary number* values are signified by the letter ***i*** which officially represents the 'square root of -1'. But this is a piece of pure mathematical jargon. No actual square is involved, and so 'square root' is here a meaningless term.

-1 is the product of multiplying together -1 and +1. So ***i*** is an *ambivalent* value, *alternating* between -1 and +1 (across the 0 transition point). This alternating quality of ***i*** is key to its use in practical calculations involving phased and other rhythmical processes.

A basic model reveals...

Assuming a west/east number line of, say, -10 to +10, crossed at its zero marker point by a north/south line, all values on this N/S line would automatically be zero, since this line, midway between -1 and +1 graphically represents the interface, the *threshold* between the negative and the positive realms.

This critical N/S line can also be taken to represent a *plane* at the interface between:

- (a) the realm of *potential*, pre-physical manifestation, ie *negative values*, eg debt, seed power etc... and
- (b) the realm of *actual*, physical-material manifestation, ie *positive values* of discrete forms and objects.

Thus the mathematical symbols here remain connected to the wider context and reality.

Riemann's 'landscape' model

Riemann's model comprised a triple axis graph which produces an artificial 3D image resembling a landscape within which his 'critical' infinite line of zeros is generated.

Axis 1 is the west/east real number line with west as the negative side, east as the positive side and the zero marker positioned midway between positions -1 and +1.

Axis 2 is a north/south line of *imaginary numbers* intersecting the W/E line at +½ .

Axis 3 is a vertical line extending upwards and creating a further dimension, stretched out along the N/S line. This represents the output of all ***i*** values along the N/S line, fed into Riemann's *zeta function* – which itself incorporates *complex numbers*, real and *imaginary* numbers added together. Apparently, to Riemann's surprise, the intersection at + ½ unexpectedly produced the 'critical' line of zeros which he then speculated is 'probably' an infinite series.

What is a half?

The abstract mathematical term *one half* ($\frac{1}{2}$) signifies the *quality* of *half-ness* which is a relationship of proportion or ratio between one-ness and two-ness. It does not itself represent any specific quantity or entity. Like such terms as *majority* or *minority*, it can only describe a particular *quantitative quality* of something. In this respect, $\frac{1}{2}$ describes an entity as being one of a pair of two equal component parts which comprise a greater single entity. In the physical world, two halves add up to one whole only when they are both halves of the same thing. Only in the abstract world of mathematics can two halves of nothing in particular add up to one.

The principle of $\frac{1}{2}$ signifying the dividing of one entity into two equal parts (halves) is universally applicable to the physical world. So there can be a half of just about anything: a half-litre, a half-century, a halfway point of a journey etc. But the symbol $\frac{1}{2}$ on its own does not itself represent an actual quantity of anything: amount, size, weight, duration, power etc. Only when it's applied to a specific substantive situation will the result be a quantifiable value, ie $\frac{1}{2}$ of something. Mathematically, this involves multiplication by $\frac{1}{2}$ (or division by 2). An abstract half (ie of nothing) cannot meaningfully be added to anything else, such as an imaginary number.

Confusion in a number line?

Confusion seems to arise when the symbol $\frac{1}{2}$ appears on a *number line*, ie as a *marker* in the way that zero marks the midway point between, say, -1 and +1. The role of the abstract symbol $+\frac{1}{2}$ is to indicate a location midway between the points marked 0 and +1, and as such a marker, it has no inherent quantitative value itself – just as the point between years IBC and IAD has no inherent numerical value.

It seems that Riemann took the $\frac{1}{2}$ marker on his W/E number line to have an intrinsic numerical value. This was then combined with, ie added to, the series of values produced above the N/S line which crosses the W/E line at the point marked $+\frac{1}{2}$. These values are derivatives of *imaginary numbers* - which have an ambivalent value alternating between *negative* and *positive*, as shown earlier – and the combinations are *complex numbers*.

The result, according to Riemann, was 'probably' an infinite series of zeros, forming his *critical line* - which does not seem surprising, since $\frac{1}{2}$ of nothing plus an indeterminate 'imaginary' value would seem inevitably to have no numerical value, ie to equal zero.

The *critical strip* in Riemann's model designated by contemporary mathematics, within which all the zeros are supposedly proven to lie, extends $\frac{1}{2}$ unit either side of the line at $+\frac{1}{2}$, and so just about includes at its western extreme the N/S line at zero proposed by *Threshold Mathematics*. This 'zero' position for the line of zeros would also seem to resonate with Euler's logic.

For Riemann's inspired idea of a critical infinite line of zeros - his envisioned *destination* of a metaphorical sea level path in his 'landscape' - was all the while accessible via a much more direct and simple route, already implicit in Euler's zeta function. But the mathematical complexities of Riemann's artificial landscape appear to have distracted him and others from grasping the simpler, bigger picture he'd intuitively sensed.

The idea also seems to have come to him only when he was already mentally in the (mathematical) 'territory' requiring a longer route to 'zero level', and so perhaps didn't even consider the possibility of a simpler, more direct one.

The bigger picture

When Riemann's visionary infinite *line* of zeros is seen as graphically representing a *plane*, it suggests an early intimation of what's recently become known as the *zero point field*. This plane, from the *Threshold* perspective, is the dynamic interface between the pre-physical (-) and the physical-material (+) realms. As such, it can also be understood as an illustration of the **Threshold** which is the basis of this work.

So the 150 year old intractable problem of no one being able to prove or disprove Riemann's intuitive hypothesis now looks to be a question of whether or not his complex route can somehow be mathematically validated.

It would seem not to be so - whereas, according to the principle of *Occam's Razor*, the shorter, direct route, indicated by the *Threshold* perspective, offers the most efficient way of clearly stating the fundamental principles involved.

Thus the enigma of the *Riemann Hypothesis* is clarified and resolved, as neither provable nor disprovable.

5. The Goldbach Conjecture (1742)

'Every even number over 2 can be represented by 2 prime numbers.'

Goldbach asked the great mathematician, Euler, if he could prove this apparently true statement. But Euler couldn't, and no one since then has. So given that mathematical 'proofs' only have meaning within the rules and logic of mathematics, this would seem to affirm the assertion of another great mathematician, Gödel, that new axioms may be required in such cases.

The **even number** is an EMU concept. The EMU number system, as explained in **Threshold Mathematics**, is one expression of the materialistic 'grid' and 'building block' mentality regarding space, time, quantity and the universe.

Primal values, as also outlined in *Threshold Mathematics*, are *ordinal* values representing the pre-physical 'inward' series of concentric spheres, *resonant cavities*, generated by *harmonic resonance* in the formation of the cosmos. They are the original essential forms which can be abstracted and symbolised as the *prime numbers*.

The *primal value* system is thus prior to and beyond the EMU system of *cardinal* numbers, making the two systems mathematically incompatible.

The **Primal Code** which links them is an ordered, infinite sequence of both *primal values* and *prime numbers*, marking out a cyclic process of cosmic *manifestation* and *redemption*.

From the **Threshold** perspective, the logic then works out as follows:

What makes the *primes* extraordinary numbers – apart from their being not divisible by any number other than one – is the extra quality they possess beyond the scope of the EMU cardinal number system. That is, their significance in the cosmic formative process.

The Primes are explained in *Threshold Mathematics* as both:

(a) *Ordinal* symbols, signifying a sequence of cosmic resonant cavities, ie **primal values**, and

(b) *Cardinal* values, expressed as abstract, EMU, **prime numbers**.

(Primes larger than 2, within the EMU number system, are thus all *odd cardinal* numbers.)

This gives them their dual identity and function, ie their two distinct but complementary aspects, like a valve or duct which works simultaneously in two 'worlds'. This is *polarity*.

To try to define primes in terms of only one of their aspects would inevitably produce inadequate, confusing and paradoxical results. So what fundamentally distinguishes primes from non-primes is their extra, pre-EMU dimension.

Even numbers

- *Even numbers* indicate the abstract idea of a **pair** – but as such, do not specify or explain the substance or constituents of the pair as actual, real entities.

- *Even numbers*, in EMU terms, can comprise a pair of equal values or other combinations of EMU numbers, namely:

- *Symmetrical* pairs of identical *evens* or *odds*, eg $2 + 2 = 4$ and $3 + 3 = 6$,

- *Asymmetrical* pairs of non-identical *evens* or *odds*, eg $2 + 4 = 6$ and $3 + 5 = 8$.

So every even number can be represented by a pair, a *two-ness*, of odd or even numbers.

Two-ness is essentially two *one-nesses*.

One-ness is a quality solely of the number *one* and the *primes* (each prime is a 'one-off').

Therefore, **every even number** (as a *two-ness*) **can be represented by two primes.**

The Becoming (of Cosmos) (see *Threshold Mathematics*)

distinguishes pre-physical time from physical-material *space*, and thus:

- (a) how *quality* is prior to *quantity*,
- (b) how the *one* original sphere is prior to the *many* sub-spheres,
- (c) how the idea of *numbers* developed out of the *descent into matter*.

No pure 'equality'

The process of *universal consciousness* focussing and creating 1-ness, 2-ness, 3-ness...

which involves rotating, spinning, vortexing, ie continuous *movement*, affirms that:

- in cosmic reality, no two physical entities can be exactly equal – only approximately so;
- in mental, abstract, ideal *mathematics*, 'identical' equality and even-ness is possible.

Euler thus could not prove the correspondence of EMU *even* numbers with *prime* numbers because the *primal value* system underlying the primes is *ordinal*, prior to and beyond the EMU system of *cardinal* numbers... and the two systems are thus incompatible.

Goldbach's Conjecture, limited to EMU number logic, consequently has the paradoxical quality of being demonstrably true but not 'provable' within the logic of mathematics, affirming Gödel's 1930s irrefutable assertion.

A longer view

Imagine a child who has not experienced, directly or indirectly, a 'nuclear' family situation comprising two parents and their offspring, and who is also ignorant of the process of biological reproduction. It cannot be convincingly 'proved' to the child that every individual person has two progenitors, a particular male and a particular female – for this is an alien concept to the child's worldview. The child's mind is not yet developed or informed sufficiently to comprehend the bigger picture and its governing principles.

A person with a mathematical worldview that has not extended beyond the abstract EMU system taught in childhood is not yet opened up to the bigger, prior picture within which the limited EMU system arose, and so functions, in this respect, with a limited understanding.

Threshold Mathematics shows how the familiar but limited EMU number system, unquestioningly used worldwide every day, emerged from a prior situation with which humanity is not so familiar. In order to overcome this limitation, humanity needs to expand its current worldview, including its mathematics, to incorporate an awareness of the pre-physical world. Addressing *Goldbach's Conjecture* here has opened up this possibility.

6. A Concise Resolution of Fermat's Last Conjecture

$x^n + y^n = z^n$ has no whole number solutions for n greater than 2.

Axioms

- (1) There are at least two kinds of spatial two-dimensionality:
- (a) the primary *dynamic* symmetrical expansion/contraction between the centre point and periphery of a sphere or spheroid, D2D, which produces the secondary form,
 - (b) any planar 2D surface, an area on which spatial relationships can be represented by the use of diagrams and symbols.
- (2) Circles in geometrical formulations displayed in flat planar 2D may be taken as abstractions representing spheres and, similarly, ellipses may be taken to represent spheroids in the world of forms beyond mathematics.

Prologue

According to Gödel's first *Incompleteness Theorem*, there are some true statements that cannot be proved within the currently prevailing number theory of mathematics.

This present approach views *Fermat's Last 'Theorem'*, which is essentially a conjecture, as the outcome of a 3-level, 2-stage reduction and abstraction operation, postulating a logically consistent constant principle, encapsulated in the formulation $x^2 + y^2 = z^2$. The 3 levels are:

Level 1: the cosmic *dynamic* 2D realm, D2D, of actual expanding/contracting spheres and spheroids, reduced down, ie encoded, into:

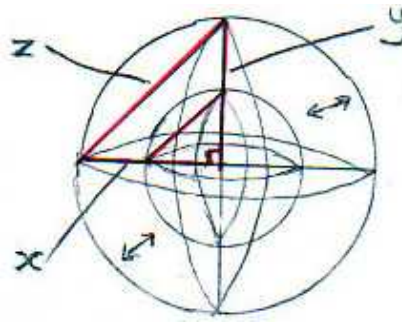
Level 2: the flat, static, *planar* 2D realm of such Euclidean geometric forms as circles, ellipses, triangles and squares, further abstracted and encoded into:

Level 3: the algebraic, *symbolised* formulation $x^2 + y^2 = z^2$ which Pythagoras proved, within the limited mathematical logic of his time, to express a constant principle regarding right-angled triangles.

In these, x^2, y^2, z^2 symbolise, in flat planar 2D, three square areas based on the three sides of the triangle. Pythagoras proved that in all right-angled triangles, if z is the hypotenuse, then $x^2 + y^2 = z^2$. Instances of *Pythagorean triples* are where x, y, z are 3, 4, 5 or 5, 12, 13.

The size of a sphere is defined by its radius. The size and shape of a spheroid is defined by the radii of the two perpendicular cross-sectional planes bounded by great circles, which remain in constant mutual proportion during expansion and contraction of the spheroid.

In a circle or ellipse representing, in flat planar 2D, a sphere or spheroid, where the line representing the axis of one such great circle intersects the perpendicular line representing the axis of the other, a right angle is formed.



Method

In flat planar 2D, let the points where the radii x and y meet the perimeter be joined, creating a line z , so that lines x, y, z form a right-angled triangle with z the hypotenuse.

This can be taken to represent a D2D situation in which the centre point of a sphere or spheroid is connected by straight lines to two points on the periphery.

As the radius of the circle or the radii of the ellipse vary, proportionality among the angles and sides of the created right-angled triangle remains constant.

Conclusion

2 steps connecting the 3 levels:

1. Within the rules and conventions of current mathematics, the algebraic formulation $x^2 + y^2 = z^2$ can always be abstracted from the above flat planar 2D geometric formulation of a right-angled triangle set within a circle or an ellipse.

2. After Gödel's lesson on the necessity sometimes to extend beyond current mathematics, the idealised flat planar 2D geometric forms of the circle and ellipse can always be derived from the D2D actuality of an expanding/contracting sphere or spheroid.

So, any right-angled triangle can be construed as a *flat planar* 2D abstraction, derived from a sphere or spheroid, which are primal forms that vary in scale solely in D2D, *dynamic 2D*.

Given that derivation, proportionality among the angles and sides of any right-angled triangle remains constant only in 2D. This limiting principle is symbolised in the algebraic formulation $x^2 + y^2 = z^2$, proven by Pythagorus, in which the exponent 2 represents the 2-dimensionality of the geometric squares based on the sides of the triangle.

Raising the value of the exponent n to 3 and beyond creates geometric progressions which step by step increase the difference between $(x^n + y^n)$ and z^n .

Thus there is a consistent logic throughout the three levels which shows that the formulation $x^n + y^n = z^n$ is only valid when the exponent is 2.

Therefore $x^n + y^n = z^n$ has no whole number solutions for n greater than 2.

Afterthought

"No problem can be solved from the same level of consciousness that created it." Albert Einstein

This resolution has been reached through a process of *reverse engineering* – logically tracking back from the part to the whole, from the finished product, an algebraic formula about a particular kind of 2D geometric triangle, to certain universal principles beyond current mathematics.