

The Fundamental Logic of Existence

Eric Louis Beaubien
X @el_beaubien
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Abstract

The logic by and through which the universe exists can be derived directly from set theory. The fundamental principles are simple, becoming exceedingly complex in their consequences. Here, those initial principles are expounded from which a model can be rationally generated very much like the observed universe ... too similar to be coincidental.

Our preliminary observation is to acknowledge the validity of the *"Incompleteness Theorem"* (Kurt Gödel 1931). In fact, the logic of existence cannot be made to validate its own logic. Logic cannot operate on itself to the end of *"proving"* itself. This is the philosophical equivalent of the snake eating its tail. It may begin to do so ... but the effort must necessarily fail in any finite demonstration. That is, the universe is logic in pursuit of proof ... to be found only after infinite demonstration which cannot transpire from within.

For instance, how would we "prove" that A exists relative to B? We might do so by cataloging the interactions between both and noting complete consistency. In fact, a preliminary definition of existence would be *"consistency of interaction"*. However, by any number of finite trials, consistency is not proven absolutely. The behavior of AB might still be random, and the next interaction could be contrary to the hypothesis of mutual interaction. The path of one particle relative to another may therefore be only coincidental yet unrelated. Only an infinite number of trials can provide absolute proof of any logical-physical interactive hypothesis.

With this intellectual 'cul-de-sac' preemptively removed, we may proceed to build the universe from scratch within the limitations of non-provability. There is an order to things that is demonstrable, understandable and sufficient to answer all questions formulated ... except the final proof that cannot occur by any conceivable finite sequence of steps.

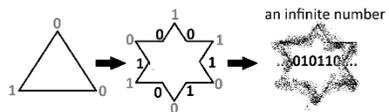
We begin then with *"nothing"* ... having imaginatively removed everything from existence. What yet remains? This is all that we have to work with. We can here refer to Leibniz' quotation upon his formulation of base two mathematics, *"For the generation of all things, one principle is sufficient"*. And, indeed, that is what we must work with ... nothing. And it is sufficient. We need only ask *"How many nothings are there?"* ... to which the only reply can be "1". We have exactly one state of nothing. For if there are "0" such states, we negate the primary state leaving us with its antithesis *"something"*. So, we have "2" concepts present in our nothing ... a quality (0) and a quantity (1). But with the added concept of '2' we now have three concepts (0,1,2) ... and this now adds up to four (0,1,2,3). In this way the integers are generated as in set theory.

The universe is therefore conjectured to be fundamentally an integer count.

In *"nothing"* there must be contained all things conceivable ... logic, the contradictory, the non-contradictory, chaos, any abstraction whatsoever.

Imagine a string of binary numbers arranged in a fractal triangle.

We add a 1 or 0 at each vertex thus creating an infinite number by successive cutting/expanding of every line segment thereby increasing the total number of digits by (3×4^n) .



The resulting construction is an infinite number in a finite space that can be representative of any state of being whatsoever. It is the “*set of all sets*”. This set contains all contradictory sets and all non-contradictory sets. The universe we observe is necessarily the only set from the set of non-contradictory sets that is “*forced out of nothing*”. That is, we are positing that the universe is the one and only universe that leaves logic “*no choice*” but to instantiate that set.

Instantiation is then the identity of the difference between all other non-contradictory sets and our universe. There may be other non-contradictory sets, but they are not instantiated. For example, there may be a 10-dimensional universe that is inherently non-contradictory ... but it is not instantiated. Instantiation is posited as the unique identity of that one non-contradictory set that is *forced out* of nothing (nothing being as before “*the set of all sets*”).

Instantiation means “*objectified by quals*”. The set of quals that objectifies the universe is called “*geometry*” ... specifically, three-dimensional geometry. Logic is forced to do something different with this single set because it differs from all others, requiring a separate, distinct form of identity. Our universe is the only member of {*non-contradictory sets forced from nothing*}.

The Postulates of Active Logic

These are derived (a posteriori) from contemplation upon the observed.

- 1) The elements of logic are anterior, posterior or congruent.
- 2) All that which interacts must have a form.
- 3) All that which has a form must interact.
- 4) All interactions must have an active form.
- 5) Logic may not choose between equal alternatives without cause.

Corollary 5a ... Two differing finite quantities, existing relative to one another cannot, simultaneously, exist relative to infinitely large or small quantities.

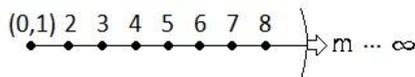
Corollary 5b ... When apparently forced to choose a number without cause, logic will always choose the number ‘one’.

- 6) Existence is validated (proven) after infinite demonstration.

Note: The Aristotelian postulate of static logic ... “*Identity, Contradiction and Excluded Middle*” is amended to accommodate “*subjective physics*”.

- **From:** “*A thing cannot be both itself and another thing at the same time and in the same place.*”
- **To:** “*A thing may be itself and another thing at the same time in the same place, provided that both objects or attributes are of two opposite types, each of which is the logical referent of the other.*”

Our initial set generator starts with 0,1 and recursively forms the integer count ... meaning that what has been generated before determines what is generated next (like the Fibonacci series). A better representation is then a number line in the form of a ray. We can instantiate this in one dimension starting at 0,1 and moving along a line there must be some form of “*marker*” that differentiates what has been counted from what is to be counted.



Here the marker (m) passes successive points along a ray. Here is also exemplified the concept of “*time*” meaning that logic has a direction. Propositions are anterior, congruent or posterior. Time is then the logical “*sequence of events*” not necessarily associated with entropy.

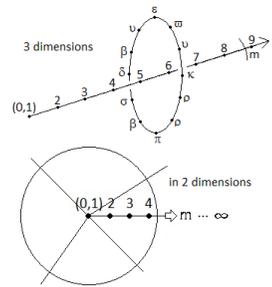
Another basic property ... “*space*” ... is represented in a number line. Successive points (countable units) must be differentiated by something, else they will be on top of one another and are therefore the same point. The solution is to instantiate a “*unit space*” between successive integer points.

The distribution of integral points along the number line requires further elaboration. If such points are randomly distributed, how many may we expect to find in any chosen unit length? The range of possibilities is between zero and infinity. P5 requires the average number between these two extremes. However, no finite average between zero and infinity is mathematically possible. Any finite number is equally invalid.

Therefore, by P5_b, there will be one cardinal point per unit length. The placement of the cardinal point within the unit length requires also, by P5, an average placement. Because there are an infinite number of places within a finite length, the distance (measured in points) to the ends of the unit length is everywhere equal. We must therefore posit that the position of the cardinal point within each unit length is determined by absolute chance, i.e. it is anywhere within that length or more precisely ... *its position is indeterminate*.

Now we wish to resolve the geometric composition of the space between countable units. We are using the integers to designate the count. So, the space between them is ... what? Space is composed of those points represented by the set of numbers, each of which has an infinite number of digits. Thus, there are two major sets of numbers: those with a finite number of digits designating quantity; and that set of numbers each with an infinite number of digits designating quality.

Such numbers must be on circles (two dimensional) to objectify them in finite relationships to finite integers. This is the reason for our 3-dimensional display. Quantity requires only one dimension. Quality requires two dimensions. They are at right angles so that the identity of each type is preserved while allowing interaction to occur, i.e. the space must "exist" relative to the countable units.



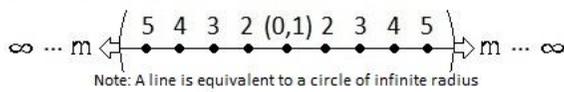
	6 2 7 4 0 9 5 7 2 ...	← this number is not in this list		Cantor's Diagonal Proof
	5 5 1 3 6 3 4 6 6 ...		↓	
1	5 8 6 7 8 4 8 4 4 3 3 4 2 2 1 1 9 6 3 9 8 5 6 6 0 8 6 4 5 7 8 7 5 ...			
2	8 5 6 6 0 8 6 4 5 7 8 7 5 3 5 9 9 6 4 5 4 6 7 4 5 7 6 6 ...			
3	2 1 1 9 6 3 9 8 5 6 6 0 8 6 4 5 7 8 7 5 3 5 2 2 1 1 9 6 3 9 8 ...			
4	4 8 4 3 3 4 2 2 1 1 9 6 3 9 8 5 ...			
5	6 6 0 8 6 4 5 7 8 7 5 3 5 2 2 1 1 9 6 3 9 8 5 6 6 0 8 ...			
6	2 1 1 9 6 3 9 8 5 6 6 0 8 6 4 5 7 8 7 5 3 5 9 9 ...			
7	5 6 6 0 8 6 4 5 7 8 7 5 3 5 2 2 1 1 9 6 3 9 8 5 6 6 0 ...			
...	3 4 2 2 1 1 9 6 3 9 8 5 6 6 0 8 6 4 5 7 8 7 5 3 5 9 9 6 4 5 ...			
ℵ ₁	3 9 8 5 6 6 0 8 6 4 5 7 8 7 5 3 5 2 2 1 1 9 6 3 9 8 5 6 6 0 ...			

By Cantor's diagonal proof, the set "0" is larger than the set "1". Thus, it can compose the space between two integers. A number, infinite in both directions must be cut with one end serving in Cantor's proof, listing next to the natural numbers.

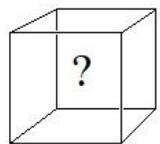
Note: Cantor's naming of Aleph₀ and Aleph₁ would better reflect reality if reversed. Presumably, he anticipated further Aleph sets which do not exist.

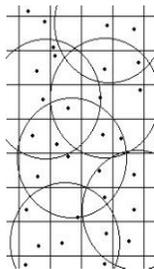
Cantor's naming system is therefore *rejected* and *reversed* in the present work. ℵ₀ will now be the set of all numbers possessing an infinite quantity of digits while ℵ₁ will be the integers.

Because each point on the number line is not, by its form, discernibly different from any other (e.g. 01 = 5), each must be the beginning of its own number line. Also, the postulates given in this article require that the ray be extended in both directions, forming a line such that each integral point on the line is both the beginning position of its own ray, and the nth position of any other ray beginning at any other integral point.



From the foregoing, we now expand the geometry to three dimensions such that every unit cube of the Euclidean frame contains one cardinal point. Each such point possesses unit determinacy ... it is *in the cube* ... as well as unit indeterminacy ... it is *anywhere within the cube*.

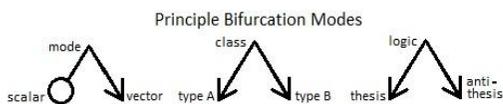




From each cardinal point radiates an expanding sphere that completes the construction of the marker (m). Per P5, all spheres must expand at “unit” velocity (designated as ‘c’). Because the Euclidean field is unitary, it is constructed all at once, while the spherical fields that inhabit it, expand at finite velocity and are, at the start, only “chain connected”, which means $A \rightarrow B \rightarrow C \rightarrow D \dots$ (A touches B and B touches C ... but ... A does not yet touch C). The entire infinite manifold is complete in 1 unit of time, whereas the time required for the marker ‘m’ to encompass all is an infinite number of such time units. Each expanding sphere (m) encompasses $4\pi R^2$ new units per unit time and is itself encompassed by that same number.

The Hierarchical Structure of Logic

The elements of logic form a hierarchical structure with those principles of greatest commonality at the top, and those unique at the bottom, and may be compared to a tree or root system. Reasoning from the specific to the general is called induction ... reasoning oppositely, deduction.



In the hierarchy, elements below a fundamental proposition are said to be “understood”. That is, they stand under those by which they are subsumed.

Clearly then, that topmost principle cannot be understood, because it is, “on the top” (Gödel).

Another form of reasoning is here given the term “conduction” and is defined as following a path of reasoning laterally, from a beginning proposition to a conclusion. Examples are sentences, equations, computer programs, flow charts ... (“to apprehend” is to acquire). Facility in both yields a “comprehensive” state of knowing.



Understanding (static) + apprehension (active) = comprehension

Four Logic Types Identified

- ? “0” logic = the null set ... without referent ... the ‘allow’ mechanism of existence
-  “1” logic = ... self-referential ... makes the universe “get up and go” (by recursion)
-  “2” logic = opposite is referent ... yields “subjective physics” ... identity problem
-  “3” logic = ... states A then B compare to a ‘standard’ C not functionally involved in the interaction (>) ... any scientific experiment is done in this mode

The four logic types are characterized by their referent structure. By “referent” is meant that which logically validates or confirms the nature of an object or state, by qualitative or quantitative comparison.

0-logic is absolute chance, i.e. that which cannot, in principle, be predicted. We observe both order and chaos in the universe. Chaos is that which takes logic out of the perfect symmetry of *thesis-antithesis*, thus allowing observable interactions to occur, instead of displaying a frozen, sterile logical structure.

1-logic is self-referential. An example is Russell’s Paradox. Let R be the set of all sets that are not members of themselves. If R is not a member of itself, then by definition it is a member of itself; if it is a member of itself, then it must not be a member of itself, because it is the set of all sets that are not members of themselves. Mathematical induction is of the same type, generating a recursive string like the Fibonacci series as a “rolling” self-referential string.

2-logic occurs when two objects (or states) refer each to the other. Examples are its occurrence in relativity and in the behavior of bosons, or states like right-left. "2" logic in conjunction with "0" logic forces out the previously mentioned *subjective physics*.

3-logic is the context of Newtonian physics and of all physical experiments. All experiments involve a state A ... an interaction occurs resulting in state B. Both states A and B are compared to a standard C, which is *independent of the interaction of interest*.

Fundamental Quanta

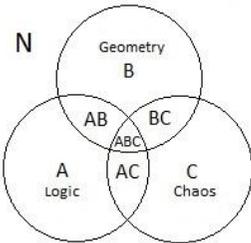
Infinitely small is to finite as finite is to infinitely large.

$$\frac{0}{1} = \frac{1}{\infty} \Rightarrow \frac{0}{n} = \frac{n}{\infty} \Rightarrow n^2 = \infty \times 0 = 1$$

Then, $n^2 = 1 \dots$ and $3^2 = 1 \dots 49^2 = 1 \dots$ etc. which are contradictions ... i.e. $1 \neq 9 \neq 2401 \neq n$
 Or, $6 / \infty = 114 / \infty \dots$ and $\dots \infty \times (6 / \infty) = 6$ and $114 = \infty \times 114 / \infty \dots$ therefore, $6 = 114!$
 Or $\dots 112 / \infty = 7822 / \infty = n / \infty \dots$ or any such contradictions.

By this principle, the quantization of most attributes of existence is generated. We can then comprehend the logic of P5_a and P5_b. Wherever a parameter must take form in geometry, an elementary quantum of that form is required to ensure *non-contradiction of finite observables*. These are *generalized quantum effects* and are essential consequences of the postulates of active logic.

Four Color Theorem



"Four colors are sufficient to color any map on the plane or surface of a sphere such that no two adjoining areas have the same color." Philosophical Note: $ABC = N$ (can be the same color)

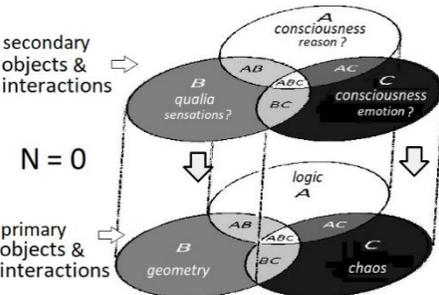
Because logic is a two-dimensional structure (due to bifurcation), the postulates of logic and chaos, then force geometry (the *form of existence*) out of a state of nothing (N). ABC is what is *realized*. AB, BC, AC is that which is *actualized* (potentially real). This, in conjunction with the active postulates, will be used to generate and define "*consciousness*".

A = the totality of all logic ... **B** = the totality of forms ... **C** = absolute chance
N = 0 (nothing, the set of all sets) ... subsumes ... **{A+B+C+AB+AC+BC+ABC} = 1**

Consciousness in General

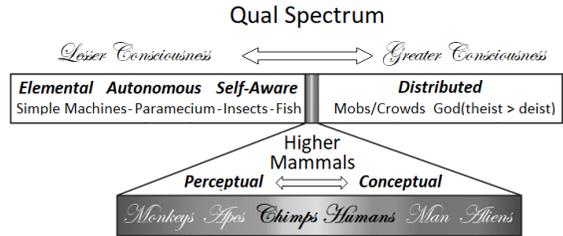
A full explanation of existence requires that we deal with all major named concepts identified by consensus, as being important to the life of man. Most concepts dealing with consciousness are unexplained, some may be illusory, but in general, things are not named unless they exist *in some fashion*. Examples are: sensation, qualia, percept, concept, soul, conscience, God and so forth. *Sensory qualia* represent the concretized (P2, P4) "*objects and operations*" of complex unitary objects,

whereas static and active geometry is the concretization of "*objects and interactions*" in physical space, i.e. the qualia of primary unitary objects.



On a second plane congruent with matter, we have the same shapes representing secondary information, but 'B' represents qualia associated with geometry, i.e. visual appearance. 'C' represents some aspect of consciousness most like chaos ... leaving 'A' to represent that aspect of consciousness most like logic.

Note: The previous diagram is directed to “full analytical” consciousness. This 2nd level of existence is “logically congruent” with the first. Thus, whatever thought exists in a “mind”, is accompanied by some physical artifact in the first level (the “brain”) which is its embodiment. A “thing” is in the 1st level, and its active “meaning” is in the 2nd level. Both levels must be pressed into one to embody congruency.



‘R’ Functions Table

From the foregoing, the observable universe can be generated containing all its major features inclusive of gravity, the nuclear force, electromagnetic interaction, an expanding universe ... all consistent with Dirac’s Large Number Hypothesis. In fact, if the universe is simply (at base) logic, counting ... all the “constants” **MUST BE CHANGING**. There is no possibility of this model being correct unless all the constants change at the approximate rates given in the table below. If they do not change ... the model is falsified. Though it is doubtful that they presently change at a rate sufficient to be detected over a human lifespan.

All the identified active parameters of the universe can be arranged as functions of its radius or age when rendered in terms of its fundamental quanta (unit length and unit time). Unit Length = the distance between baryons if all were equally spaced out. Unit Time = the time required by light to traverse the unit length. Unit Mass = about 10¹³ times the present proton.

baryon number	10 ⁷⁸	(pure no.).....	$\propto R^3$
particle production rate	10 ⁵²	n/ut	$\propto R^2$
reaction velocity	10 ³⁹	ul/ut	$\propto R^{3/2}$
radius of universe	10 ²⁶	ul	$\propto R^1$
Compton wavelength	10 ⁻¹³	ul	$\propto R^{-1/2}$
particle mass	10 ⁻¹³	um	$\propto R^{-1/2}$
elementary charge ‘e’	10 ⁻¹³	uC	$\propto R^{-1/2}$
Planck constant	10 ⁻²⁶	um·ul ² /ut	$\propto R^{-1}$
gravitational constant	10 ⁻³⁹	ul ³ /um·ut ²	$\propto R^{-3/2}$
hydrogen ground state force	10 ⁻¹³	um·ul/ut ² ...	$\propto R^{-1/2}$
e/P mass ratio	1/1836	(pure no.).....	$\propto R^{-1/8}$
fine structure constant	1/137	(pure no.).....	$\propto R^{-1/12}$
speed of light	1/137	ul/ut	$\propto R^{-1/12}$

This model should be on the “short list” of rational models ... the “spectrum of possibilities”. It contains the bulk of the “low-hanging fruit” that could have been known for a century now.

References

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