

Karl Seldon, Interview **#2**. A mathematics of “*the qualitative*”, Part **1** of **2** Parts.

Background. The text presented below is an edited excerpt, selected from out of many years of extended dialogue, between Karl Seldon, the co-founder of **Foundation Encyclopedia Dialectica [F.E.D.]**, and a long time monitor of the www.dialectics.org web site, who is also a personal friend of **our** co-founder. This excerpt constitutes Part **1** of the **2** parts of this *second* [published] interview ever granted by Karl Seldon.

The *first* published interview is available to you via --

http://www.dialectics.org/dialectics/Blogs_%26_Interviews.html

http://www.dialectics.org/dialectics/Blogs_&_Interviews_files/Edited_First_Interview_with_F.E.D._Co-Founder_Karl_H._Seldon,29DEC2012,re-edited_02APR2013.pdf.

The two questions catalyzing this interview, with the corresponding responses broken out separately to form its two parts, are the following --

1. We typically think of arithmetic as dealing with quantities or numbers. Yet the dialectical arithmetics seem to be operating with numbers that represent qualities. What was the fundamental breakthrough that led you to realize that an arithmetic of qualities was possible?

2. Did development of your first dialectical arithmetic precede recognition of its core application?

-- **E. D.** Editors, *Special Council for the Encyclopedia*.

Part 1 of 2.

Q1: We typically think of arithmetic as dealing with quantities or numbers. Yet the dialectical arithmetics seem to be operating with numbers that represent qualities.

What was the fundamental breakthrough that led you to realize that an arithmetic of qualities was possible?

R1: Thank you for this -- excellently crafted -- question!

The **F.E.D.** General Council and I, in consultation with the **F.E.D.** *Special Council of Psychohistorians*, have decided that, as of *this* time, the time is right to render a more thorough response to both of your queries, as addressed in this interview, than we have thought appropriate earlier, in regard to other, earlier inquiries about the course of the discovery of **F.E.D.**'s first ‘qualitative calculus’, or ‘calculus of qualities’.

I will not shrink back, this time, from some of the autobiographical aspects of such a more thorough answer.

Beginning in my tenth year, beginning while I was in the fifth grade of “grammar school”, I was suddenly catapulted into a vastly enriched, university-based culture of science and mathematics, one that suddenly, explosively, and *qualitatively* expanded the horizons of my self-identity, by *many* “‘orders of magnitude’”.

Up until that time, I had avidly followed the sciences, especially nuclear physics, but only via the popularized books that were offered to “civilians” -- outside the university loci of advanced learning -- and to their children.

Both of my parents had read to me extensively from, for example, the “All About...” series of books on various sciences, starting from an early age, during my pre-school years. They had taken me on outings to see various exhibitions of the primitive “android” robots that were then already beginning to appear. They selected popular, Disney, etc., television programs about the sciences for me to view. My mother, especially, had nurtured my interest in the emergences of outer space exploration that were then just beginning. My father, especially, nurtured my budding interest in science fiction, as well as in the home construction of scientific apparatuses.

I devoured, for example, the “Tom Swift” science fiction novels, new, and old, alike.

My father took me to see science fiction films, like “This Island Earth”, and “Forbidden Planet” -- two of the films that, I think, provided grist for the ‘dream-vision’ which changed, and which has guided, my life. I will, shortly, recount that ‘dream-vision’, in more detail than ever before in [our](#) public material, and, especially, with reference to how that ‘dream-vision’ is involved in the answer to the first of your two questions.

So, when my father -- who was long deeply active in the Boy Scout movement, even before his marriage, and even before the birth of his children -- learned of a special course, to be given for those seeking to earn the Boy Scout chemistry merit badge, he signed up for that course *for both of us*.

My father had worked his way into the “white collar”, managerial stratum of post-WWII capitalist society. He worked as Vice President for a small and highly innovative manufacturing corporation. However, my father’s father had been an unskilled laborer, and my father had been unable to afford college, only later in adulthood taking “night school” courses at the college level. He was as hungry for deeper knowledge of science and mathematics as I had become, via the exposure that he and my mother had lavished upon me from an early age.

This course was going to use, on weekends, the freshman chem. labs., at a university near our home.

This chem. course was to be designed and conducted by three Ph.D.-track chemistry graduate students at that university, who had been Eagle Scouts themselves. They said that they wanted to give young merit badge seekers a “leg up”, via a “one of a kind” curriculum, to learn chemistry at the college freshman level, and, thereby, to earn the chemistry merit badge, toward winning their own Eagle Scout badges.

During that course, I not only learned about “chemical equations”, and how to balance them.

I also learned much “inorganic” and “organic” chemistry, *hands on*, in the Saturday labs., after each lecture. I was exposed to chemistry-involved portions of Quantum Mechanics. I learned the beginnings of the differential and integral calculus. In the after-course that the three graduate students conducted for some of the chem. merit badge course participants, I was exposed to further elements of Quantum Mechanics, including the algebra of non-Abelian groups*. I was exposed to Maxwell’s Theory of the Universal Electromagnetic Field, and to Einstein’s Theories of Special Relativity, and of General Relativity -- of the Universal Gravitational Field. And I was exposed to the related, then already raging controversies in “post-Einsteinian”, ““Schroedingerian”” physics.

Pertaining directly to your first question, I should point out that *chemical* equations are **not** instances of the “purely”-quantitative equations of standard algebra. They are ‘quanto-*qualitative*’ equations, involving

*[Non-Abelian ““arithmetics””, and their “abstract algebras”, involve at least one ““couple”” of elements, call it **{a, b}**, such that **ab ≠ ba**, i.e., which are thus said to be [multiplicatively] “**non**-commutative”. This early exposure to non-commutative operators not only made my later encounter with Musean hypernumbers more approachable, but also prepared me to be comfortable with the varying degrees of multiplicative non-commutativity that I discovered while exploring various possible product postulates for the [Q dialectical arithmetics](#), including the ‘*double-conservation* *«aufheben»* *evolute product rule*’ postulate.].

“‘qualities’”. Yes, “‘quantifiers’” -- standard “natural” numbers -- are involved in chemical equations. But these “‘quantifiers’” do not stand alone. Instead, these “‘quantifiers’” “modify” -- more specifically, they “‘quantify’” -- phonetic-letter-derived, or ‘phonogram-derived’, ‘abbreviative’ *ideographical* symbols that stand for “‘qualities’”, in this case, for atoms -- i.e., for atomic units, like **H** and **O** -- of different kinds, that is, of different “‘qualities’”. In chemical equations, the “‘quantifiers’” “quantify” these -- atom-kind -- unit “‘qualifiers’”, and, in turn, simultaneously, these atom-kind unit “‘qualifiers’” “qualify” their “‘quantifiers’”. Thus, even though the “‘quantifiers’” in the following two cases are the same -- **2** -- the symbol **2H** [for two **H**ydrogen atoms] represents a *very*, a *qualitatively* different reality than does the symbol **2O** [for two **O**xygen atoms]. Using ‘ \neq ’ to signify the relationship of *non-quantitative inequality*, i.e., of *qualitative inequality*, we have **2H** \neq **2O**, the fact that **2 = 2** notwithstanding.

Thus, even if I was not explicitly aware of the fact at the time, my sudden precipitation into a college-level chemistry education was already presenting me with an example of ‘quanto-*qualitative*’ mathematics.

The magnitudes of the impacts of these exposures on my view of the world, on my imagination, on my curiosity, on my thirst for knowledge, and on my sense of the possibilities for humanity, and for myself as of it, are hard to overstate.

Throughout this extended period of accelerated learning, I was regularly peppering and pestering those poor graduate students with scientific questions, but also with questions that they identified as residing outside the purview of science as then self-defined. They declared some of my questions to be “philosophical”, some to be “religious” in nature.

In my late-childhood naïveté, I did not know the difference. I didn’t see that there should be any separations among questions about truths, any division of those questions into scientific versus philosophical versus religious. But, gradually, I learned, from those mentors, how to separate these three kinds.

I think that the ‘dream-vision’, which crowned this period of horizons-expansive experiences and learnings for me, should be grasped as an attempt, facilitated by my subconscious mind, to encompass and to integrate, into my thereby transformed self-identity, the vast new dimensions of knowledge, the revolution in worldview, and the consequent revolution in my self-identity, into which I had so recently and so rapidly been catapulted.

At this point, the detailed content of that ‘dream-vision’, including the way in which that content sent me in search of an ‘arithmetic of qualities’, needs to be addressed.

That ‘dream-vision’ opened in the image of dark, dank, deserted, narrow, indeed, medieval, cobbled roads and courtyards, in what I now recognize as an imagination of an ancient/medieval Spanish city, in the inky blackness of night. I saw myself indoors, in a shop’s storefront, empty but for me, seated at a counter, with the original William O. Lawrence cyclotron by my side [!], having fallen deep asleep, slumped in the frustration of failure over my notepads, after having tried to discern, in the wee hours of that night, the secret, hidden unity of Time, Energy, Space and Matter.

I saw myself, while “sleeping” within this dream, entering into another dream, within my dream, in which my body, spread-eagled like Da Vinci’s “Vitruvian Man”, and spinning in that posture, was pulled, by a whirling vortex of green and purple, liquid-like whorls, into another world, into a *second* dreamed world, accessed while dreaming that I slept within the dreamed world of my *primary* dream.

In this dream's dream, I thought to myself that this other world into which I had been so suddenly deposited was "eight dimensional". I didn't know, or I don't remember, why I chose the number eight. But this world seemed somehow extra "roomy", compared to the [dream, and waking] world(s) from which I had come.

I encountered a 'wall of pillars'. From some sides these pillars seemed solid enough. But from other directions they appeared translucent and fog-like, or diaphanous and curtain-like. From those directions, I could pass right through these "pillars", apparently unimpeded.

Then, near me, I became aware of a ~ 7 foot tall, exoskeletal, red-'enchitined', or red-'enchitoned', humanoid.

I described "him", to myself, as a "giant ant-man".

Seemingly telepathically -- soundlessly, but "heard" in my mind -- "he" invited me to follow "him". For some reason, I felt no fear, so I walked by "his" side. "He" escorted me into a multi-level, downward-pointing cone-shaped amphitheater. 'Guggenheim-like' rings of bleachers filled that amphitheatre, their circumferences scaling down regularly from the top ring, to the bottom ring, looking like an "'inside-out'" version of Botticelli's depiction of Dante's *Inferno*. Just below the 'bottom-most', smallest-diameter bleacher-ring, an upward-pointing cone of stone towered aloft from the bottom, and concentric center, of that conical amphitheater -- from the concentric center of all of its bleacher-rings.

Carved into that upward-pointing conical altar of stone, was an equation [!], which I recognized as being also a "'scripture'", also realizing that this conical amphitheater was some kind of "'church'", or place of gathering for "'worship'", or for "celebration".

This equation was inscribed into that stone altar "'vertically'" -- not "'horizontally'" as were the equations to which I had become so accustomed in my recent learnings.

The bottom-part of this equation was a replete inscription containing many symbols, also vertically arrayed -- an expression "busy" with symbols that were not only beyond my comprehension, but, and, partly, consequently so, beyond the capacity of my memory to retain.

Placed above this sea of symbols was what I recognized to be an equals sign, except that this equals sign, too, was rotated to verticality, instead of being arranged in the, to me familiar, horizontal genre: the symbol was not '==', but '||'. Above that 'verticalized' equals sign, was another symbol, starkly singular, and standing alone, in sharp contrast to the overwhelming multiplicity of the symbols sea below the '||' sign. It looked like this: H .

The only thing that I could remember from my waking world that resembled this sign was the logo of the [former] "International Harvester" company!

I realized that this equation was also a sacred "'text'", as well as a philosophical and scientific statement; that this equation somehow summed up all of the knowledge of the people, to date, of this dream civilization that, per *my* dream, had created it/discovered it; that it somehow epitomized the total history of our cosmos, the story of these people included, and also prophesied the future of our cosmos as a whole, and their future, as part thereof.

It was a 'dream-vision' of the presence of what was so egregiously absent, for me, since the recent explosive expansion of my horizons, in my waking world: a [seemingly impossible] unification of religion, philosophy, and science; a civilization equipped with a knowledge, and a way of life -- of celebration -- which transcended the strife that permeated these three, a strife that pervaded the entire civilization in which I lived, in my waking world.

When I awoke from that dream, the next morning -- and ever onwards, from then on, right up to today -- I found this remembered ‘dream-vision’ far too compelling to ignore, or *ever* to forget.

Yes, my dream mind had evidently “made up” this ‘dream civilization’, and its ‘dream equation’ -- assembled them from elements of my waking life, and from elements of my waking struggle to form an *all-experiences-embracing* self-identity -- in the midst of a civilization ravaged by the strife of religion against religion, of philosophy against philosophy, of scientific theory against scientific theory, and of each of these against each of the rest.

This civilization, this equation was, I thought, “just” ‘dream-fiction’ -- but it was, to me, too compelling a vision not to pursue, just in case it hinted at something that might be discovered to be, and made to be, real and true in the real, waking, world.

It was this dream -- this “sleeping” -- that woke me up.

I vowed to make it my life’s quest to seek, and to find, that “equation”, and that unification, in “the real world”.

The crux of this ‘dream-experience’ -- of this ‘subconscious-mind-contrived pseudo-empiricality’ -- with regard to your first question, is this: While I was staring at that altar-equation-scripture, I realized that the symbol at the top of it, ‘ H ’, could not be a symbol for any single “number”, in any usual sense of the word “number”.

Though I did not then fully realize this implication of that equation, this symbol had to stand for some kind of summary of the total contents of the cosmos, from start to finish, “from alpha to omega”, or from the beginning of the cosmos, through to the present time, to some predicted or prophesied future time. That is, it had to stand for, at least in part, something *qualitative*; for some kind of a summary of the *kinds* of being that there *have been* in the past, that there *presently* “be”, and, predictively, that there *will* “be” in the future. Or, as I say it today, it had to stand for something *ontological*. [“Ontological” was not a term that I knew at that time!].

After the dream, I repeatedly tried to write down the full equation that I had seen in that dream. I couldn’t call up very much of what I had seen *below* the ‘ H ’ sign. But I did begin to realize that the mathematical language in which this ‘dream equation’ was written had to be of a different kind than the kind that I was encountering in my grammar school arithmetic classes, and in ordinary algebra.

I know that the implied ‘qualitativity’ of that equation was working on me, semi-consciously, from behind my conscious mind. I know this, because, ever after that dream, I became highly sensitized to, and quickly noticing of, any features of *mathematical* representation that also constituted *qualitative* representation, whether in what I encountered in my public school classes, or in my “extracurricular” readings about mathematics.

One of the first big clues to what I was seeking came when I pulled the book *Gödel’s Proof*, by Nagel and Newman, off of the shelf at my high school library, and began to explore it. I realized that the ultimate *mathematical* formula of that book --

$$(\exists y)(x) \sim \text{Dem}(x, y) \supset (x) \sim \text{Dem}(x, \text{sub}(n, 13, n))$$

-- while it was *about* arithmetic(s), essentially asserting that “if [an] arithmetic is consistent, it is incomplete”, was not only *not* an equation, but that *most* of its symbols -- ‘ \exists ’, ‘ y ’, ‘ x ’, ‘ \sim ’, ‘**Dem**’, ‘ \supset ’, ‘**sub**’, etc. -- although they were employed as ideographical symbols, were *not* numerals -- did *not ultimately* stand for the numbers of ordinary arithmetic, although they could be *encoded* by such numbers [e.g., via “Gödel numbering”]. Instead, they stood, collectively, for a formula, proposition, or *sentence* of and about such (an) arithmetic(s), made up out of “*logical* quantifiers” [e.g., ‘ \exists ’], “*logical* [i.e., *sentential* or *propositional*] variables” [e.g., ‘ y ’ and ‘ x ’], “*logical* operations” [e.g., ‘ \sim ’] / “*logical* functions” [e.g., ‘**Dem**(_)’, ‘ \supset ’, ‘**sub**(_)’], etc.

I saw that a mathematics, at least some of whose ideographical symbols represent *non-“purely”*-quantitative kinds of mental objects -- *not* just ordinary numerals -- was not only possible, but, indeed, already existed, to a powerfully developed degree, in the form of modern “mathematical logic”. But it also quickly became clear to me that the language of modern “mathematical logic” could not formulate the equation that I had envisioned in my dream.

I remember that, in one of the anthologies on mathematics that I found and read at about this time, a passage “jumped out at me” with great force. In that passage, one of the writers mentioned a multi-term expression that described, quantitatively of course, the processes of phase transitions, from the solid phase, to the liquid phase, to the gaseous phase..., as the temperature of a substance increased [probably, in hindsight, this writer was describing the second derivative for a “coexistence curve” representing the coexistence of multiple such phases]. The writer noted explicitly the way in which the “shape” of the equation’s RHS itself mimicked the qualitative content of the phenomena, as a sum of different, separate terms, with one term describing, e.g., the solid phase, and a different, separate term describing, e.g., the liquid phase, etc.

Later, as I became aware of the mathematical concepts of “scalars”, “vectors”, “matrices” and “tensors”, I felt uncomfortable with a typical definition of vectors -- as “quantities” having both magnitude and direction.

Yes, “magnitude” seemed to me to be definitive of a “quantity”. But direction didn’t seem, to my mind, to be *just* a “quantity”, or something *merely* or “purely” quantitative. Direction seemed *partly qualitative* to me.

I also noticed that a vector could be represented as a column or row of “scalars”, and a “matrix” as a square or rectangular array of “column-vectors”, or of “row-vectors”, and that a “vector” was a mathematical object richer in descriptive or modeling potential than a “scalar”, a “matrix” yet richer still in descriptive potential than a “vector”, and that the “scalar” concept, in the form of that of individual numbers, of single, isolated “entries”, had arisen earlier in the history of mathematics than had the “vector” concept, and that the “vector” concept had arisen earlier in that history than had the “matrix” concept.

I began to wonder if, perhaps, the historical progress of mathematics involved the accretion of more and more partly-qualitative features, or “determinations”, such as [geometrical, spatial] direction, to the initially “purely” quantitative, *unqualified* units with which *modern* arithmetic began, or if at least the historical progression of mathematics involved the codification of mathematical objects with ever greater descriptive potential.

And, in high school, I began talking about what I called ‘dialectors’ -- “‘vectors’” whose orientation was not in any direction of physical space, but that pointed into the “‘time direction’”, &/or into various “‘qualitative’” directions of/in *state*[-space]. I began thinking about ‘dialector forces’; “‘forces’” which might describe an ***acceleration of development*** in historical time, or even ***an acceleration of time itself***. Later, I began to think about ‘dialectors’ representing ‘self-forces’, per which an [ev]ent[ity] might act back upon itself so as to ***accelerate its own evolution***.

When, in my college physics courses, I encountered “dimensional analysis”, and mathematical expressions which were no longer “*unqualified*” expressions -- no longer “purely”-quantitative expressions -- but which were “qualified” by “dimensional units”, I began to see that these “dimensional units” -- e.g., the “gm.” unit of mass, the “cm.” unit of length, & the “sec.” unit of temporal duration -- were not only ***no longer “purely”*** quantitative: they were even “purely” qualitative expressions, *in themselves*.

“Dimensional units’ were “quantifiable”, yes. That is, they could, of course, be “‘quantified’”, by, e.g., **R**real number “‘modifiers’”, or “coefficients” -- ‘**10** gms.’, ‘ **π** cms.’, ‘**60** secs.’. But, *by themselves*, as *single* units, i.e., with the [implicit] “‘quantifier’” of just ‘**1**’, they were *qualitative*, primarily.

They represented fundamental, universal *qualities* of our experiences -- time, mass, and length, etc.

Again, using ‘ $\frac{1}{2}$ ’ to signify qualitative inequality:

True, **1gm.** < **2gms.** < **3gms.**, and, also, **1cm.** < **2cms.** < **3cms.**, and, so too, **1sec.** < **2secs.** < **3secs.**

But, *also true*, not only ‘**1gm.** $\frac{1}{2}$ **1cm.** $\frac{1}{2}$ **1sec.**’, or, more simply, ‘**gm.** $\frac{1}{2}$ **cm.** $\frac{1}{2}$ **sec.**’, but, moreover, ‘**1gm.**¹ $\frac{1}{2}$ **1gm.**² $\frac{1}{2}$ **1gm.**³’, and ‘**1cm.**¹ $\frac{1}{2}$ **1cm.**² $\frac{1}{2}$ **1cm.**³’, and ‘**1sec.**¹ $\frac{1}{2}$ **1sec.**² $\frac{1}{2}$ **1sec.**³’.

‘Qualitativity’ had thus “snuck” its way [back] into much of modern mathematics, and into much of modern, mathematical physics, but was almost unnoticed as such, given the prevailing “quant.” mentality.

Already, encountering the “imaginary number” unit, **i** -- or, in this context, **j** -- in high school electronics shop, I had then begun to suspect that there was something more than merely “quantitative”, or more than merely “quantifiable”, about **i**. As I would later put it, I had begun to see that $\pm i \frac{1}{2} \pm 1$, notwithstanding the defining

equation $i^2 = -1$, and, thus also, that $i^2 \frac{1}{2} i$. “Complex” arithmetic, the arithmetic of the number “space”

C, involves two, “mutually perpendicular”, mutually qualitatively different kinds of arithmetical units, **1** and **i**.

Thus, when, after college, I encountered, e.g., the Grassmann hypernumbers, representing geometrical objects of escalating dimensionality when ‘inter-multiplied’, and the Musean hypernumbers units, I was ready for the idea of “qualitative units” [cf. Morris Kline] *in arithmetics*. I later came to view this “stealth” but growing [re-] emergence of “qualitative units” -- of qualitative aspects of arithmetic and of mathematics in general, within later-modern mathematics and physics -- as a “psychohistorical process”, one of initially, to me, mysterious causation, that I later came to name ‘The Re-Emergence of the Arithmetical Qualifiers’ [Re- for reasons that will become clear below].

This [in]equation, $i^2 \frac{1}{2} i$, is contrary to ‘Boole’s law’, which holds for, e.g., the numbers **0** & **1**: $x^2 = x$, i.e., $0^2 = 0$, for the case $x = 0$, and $1^2 = 1$, for the case $x = 1$. Note also that ‘arithmetical spaces’, e.g., the “space” of the so-called “Real” numbers, which is standardly denoted by **R**, and the space of the so-called “Complex” numbers, standardly denoted by **C**, are also ‘contra-Boolean’ mathematical symbols in this same sense, in the context of “self-multiplication” according to the “Cartesian Product” concept --

$$\mathbf{R}^2 \frac{1}{2} \mathbf{R}, \text{ and } \mathbf{C}^2 \frac{1}{2} \mathbf{C}.$$

Mathematical symbols like **R** and **C** are ‘categorical symbols’, in that they are symbols for qualitative entities, i.e., symbols for different kinds of analytical-geometric “spaces”, made up out of, in part, different kinds of “numbers”, even though the “elements” of these “spatial sets”, *are* numbers -- are “pure” “quantifiers” in the case of the “number-space”, or “number-set”, denoted by **R**. in short, $\mathbf{R} \frac{1}{2} \mathbf{C}$.

A clinching & unifying realization, in this regard, arose, for me, when I, still later, encountered the concept of “number” -- the concept anciently named «*arithmos*» [cf. Jacob Klein] -- that had been native to the mentalities of the ancient Hellenistic, Mediterranean civilizations, including those of Greece, Rome, and ancient Alexandria in particular. This ancient mentality was both expressed, and deepened, e.g., in the work of Plato, on his unique «*arithmoi aisthetoï*»/«*arithmoi monadikoi*»/«*arithmoi eidetikoi*» cosmos conception, and of Euclid, and of Diophantus of Alexandria on the «*arithmoi monadikoi*» alone, e.g., in Diophantus’s symbolic-algebra-founding text, the Arithmetica.

The *Arithmetica* was composed in ancient Alexandria, Egypt, some time around 250 C.E., per the scholarly consensus, near the precipice of the gathering Mediterranean civilizational darkness of that era, which formed the prelude to the collapse of ancient Mediterranean civilization, into a ~1,000 year “Dark Ages”.

For these ancients, an «*arithmos*» -- a “number”, in their sense, *not* in our, modern, sense -- was a multitude, or assemblage, of «*monads*», i.e., of units, of units each of which, in themselves, were multi-qualitative, many-featured entities in their own right. Such an «*arithmos*» is the [finitary] ‘qualo-fractal’, “vertical”, or up-scale[d], ‘meta-«*monad*»’ of *its* «*monads*».

These units were *not*, for them, the “purely-quantitative” units which *we* today symbolize by ‘**1**’. Indeed, and therefore, for them, a single such unit was *not* a “number”, did *not* instance “quantity” *at all*. “Quantity”, for their, ancient, mentality, began with *two* units. A single unit, alone, by itself, was a “purely” *qualitative* entity.

Diophantus’s *Arithmetica* represented this concept explicitly, symbolically, and ‘proto-algebraically’. E.g., his symbol for *our 2* was not just ‘ $\bar{\beta}$ ’, *not* a “pure” “quantifier”, but ‘ $\overset{\circ}{\mathbf{M}} \bar{\beta}$ ’, with ‘ $\overset{\circ}{\mathbf{M}}$ ’ denoting a “pure”, *generic* ‘qualifier’, standing generally for *any* ‘qualitative unit’ that his ‘proto-algebra’ might be used to “model”, and with the ‘over-barred’ *second* letter of the Greek alphabet, ‘ $\bar{\beta}$ ’, as the “quantifier”.

However, it was not to be until much later -- not until nearly *forty years* after my ‘dream-vision’ -- that the idea that proved to be key to *our* first and founding dialectical arithmetic, was, for me, to irrupt into consciousness.

This key idea was that of a [‘contra-Boolean’] arithmetic and algebra in which every “numeral” stands for a *kind* of “number” that is *qualitatively unequal* to every other such “number” in that arithmetic.

In terms of the “analytical geometry” of this dialectical arithmetic, every “numeral” is represented by what *we* term a ‘dialector’; by a unit-length “directed” line-segment. Each is ‘differently-directed’ than each of its others. Each is perpendicular to each of the others.

Every such “numeral” is interpreted as standing for a “class”, i.e., for an “ontological category” -- e.g., for a «*species*» category, or for a «*genos*» category, etc. Indeed, each such “numeral” represents a “number”, a “number *of units*”, an «*arithmos*» *of* «*monads*». Each one consists of all of the “units”, or “individuals”, or “elements”, or «*monads*» which share the *quality* that defines that “class”, that “*ontological* category”; that *kind* of thing.

Every distinct such “*ontological* category” represents a *quality* which is *qualitatively* distinct from -- which constitutes a different *kind* in relation to -- every other such category.

For example, in modern set theory, the elements of a set, taken together, called the “*extension*” of that set, are used to represent what is called the “*intension*” of that set, the *quality* that all of its elements share in common.

Thus, you are *precisely* correct, in noting that “the dialectical arithmetics” are based upon “operating with *numbers* that represent qualities”! Each *single* “number”, each ‘*meta-unit*’, of *Q*, *our* first dialectical arithmetic, is an «*arithmos*»-symbol that represents *multiple* [“mere”] “*units*” *univocally*.

Each single such “number”-symbol, or ‘meta-numeral’, represents an indefinite, indeterminate “number *of* [“mere”] *units*”, each of which units is a unit of the same *kind*, or of the same *quality*, as are all of the other [“mere”] units *in* that “number”, *in* that ‘*meta-unit*’, *in* that class or ontological category.

Just so, the “*Homo sapiens*” species category represents the entire “number” of “modern” Terran human[oid] beings, all of the “modern human” individuals, that exist or have ever existed on planet Earth, including those that exist today. This species-category name can, thus, stand for the “*kind*”, the “human” *quality*, shared by all of those “individuals”, “elements”, “units”, or «*monads*» -- the «*arithmos*» named humanity, the human *kind*, the “intension” of “humanity”, the *quality* that *we* name “human”; ‘human-ness’-in-general.

Likewise, the genus “*Homo*”, by itself, stands for a much larger category, or «*arithmos*», of individuals, or of «*monads*», than does the species category “*Homo sapiens*”. “*Homo*” stands for a category that implicitly includes the species category “*Homo sapiens*”, but that also implicitly includes other [extinct-]species categories, such as that of *Homo habilis*, and that of *Homo neanderthalensis*: “*Homo*” stands for a category that includes all of the individuals in all three [sub-]categories.

Another key clue, for me, in this quest, was provided by the writings of Denise Schmandt-Besserat, who, *circa* 1978, developed by far, to me, the most convincing theory of the staged “‘psychohistorical’” evolution of human writing, and of human written arithmetic, that I have, so far, ever encountered.

Yes, per her theory, this ‘evolution of writing’ was a ‘*co*-evolution’ of writing *and arithmetic*.

According to her theory, this evolution began, in ancient Mesopotamia, with tangible, three-dimensional fired clay tokens -- ‘micro-icons’ that represented specific *kinds* of goods, or [obligatory] gifts, or “‘tithes’”, by citizens, to the temple priesthood, for redistribution. These 3D tokens, more as what *we* call ‘ideoplasts’ than as “ideographs”, represented such goods/gifts -- such as ‘’, representing a unit [e.g., a “jar”] of oil -- in a *pre*-written, *tactile* as well as *visual*, way.

As the goods-productivity, the ‘goods-populations’, and the human populations of these ancient Mesopotamian city-states and multi-city-state empires rose, the token-based temple records of ‘tithe goods’ contributed, and of goods disbursed/redistributed, were preserved by depositing the fired-clay tokens, representing a given such transaction, into a hollowed-out wet clay spheroid, or “clay envelope”, which was then itself sealed and fired.

This procedure preserved the transaction record. But that record could be “‘audited’” only by first shattering its, opaque, sealed clay-envelope enclosure, thus incurring the labor burden of creating and firing a new clay envelope, if that transaction record were to be preserved further.

The practice developed, later on, of impressing the clay tokens that were, a little later, to be deposited inside the wet clay envelope, onto the wet outer surface of that clay envelope, before those tokens were dropped into it, and before that clay envelope was itself sealed and fired. The contents of the fired clay envelope could then be “read” without incurring the cost of breaking it open, creating the need to laboriously re-enclose its contents.

Thus, “two-dimensional”, ‘proto-ideographical proto-symbols’, generated by impressing three-dimensional fired clay ‘micro-effigies’ of goods into wet clay, came to represent the goods-content of temple “‘tithe’” transactions.

E.g., in the **1**st stage of this new “notational” development, a clay spheroid/envelope containing clay tokens representing ten “units” of oil, ‘’, would bear ten “jar of oil” token-impressions on its outer surface: ‘’,

The next epoch of this ‘meta-evolution’ of writing and arithmetic perhaps coincided with, and owed to, the emergence of ‘proto-money’ from out of the ferment of goods that had become barterable commodities. This *emergence* initially took the form of the popular designation of grain as ‘proto-money-commodity’. In *it*, the 3D token/2D ‘proto-symbol’ that had earlier represented *one* standard unit of grain, ‘’, came to serve as the *universal* ‘[proto-]symbol’ for one standard unit of *any* good or commodity. The 3D token/2D ‘proto-symbol’ that had earlier represented *ten* standard units of grain, ‘’, came to serve as the *universal* ‘[proto-]symbol’ for ten standard units of *any* commodity. The clay-envelope outer representation for a single unit of oil, and of its token, ‘’, thus came to be ‘ ’. The clay-envelope outer representation for ten units of oil, and of its tokens, ‘’, thus came to be ‘ ’, instead of ‘’,

The symbolization of the ‘ontological *quantifier*’, ‘’ or ‘’ -- of the ‘kind of commodity *quantifier*’ -- had thus become ‘explicitized’; separated out from its former ‘co-implicitude’ with the ‘ontological *qualifier*’ -- the ‘*kind* of commodity *qualifier*’ -- in the earlier forms of representation, i.e., of ‘’, and, later, of ‘’.

In the next stage of this ‘evolution by disambiguation’, separate symbols for the standard units of measure involved in a given transaction came into separate ‘explicititude’. The steps that eventuated in cuneiform were already well underway.

‘One unit of oil’ was no longer represented by ‘’, or by ‘’, or even by just ‘’, but by ‘’, in which the ‘proto-symbol’, ‘’, represented the ancient standard volumetric *unit* known as the ‘*sila*’.

Thus, this early ‘proto-writing’, or ‘pre-writing’, came to account for ‘*unit quantifiers*’, for ‘ontological *unit qualifiers*’, and for ‘metrical *unit qualifiers*’, each *separately*, and *explicitly*, by means of three separate kinds of ‘proto-symbols’ -- of ‘proto-ideograms’. Opaque, hollow *clay envelopes* eventually became superfluous, replaced by ‘*unhollow*’ *clay tablets*.

This early ‘proto-writing’ was also, simultaneously, a ‘proto-arithmetic’ -- a ‘proto-arithmetic’ that *needed* ‘ontological *unit qualifier* symbols’, and also ‘metrical *unit qualifier* symbols’, as well as ‘[metrical unit] *quantifier* symbols’, to more adequately serve its accounting -- and accountability -- purposes.

Thus, the *ancient*, and the earliest-*modern*, of the *written* arithmetics, each featured their own special, disparate styles of [proto-]arithmetical [proto-]symbols. However, they did so in marked contrast to our later-*modern*, ‘*quantifier only*’, standard arithmetics. They did so *all the way from* their *ancient* inscriptions, e.g., their ‘two

silas of olive oil’ inscription, ‘’, as an arithmetical, accounting ‘proto-symbology’ of *ancient* Mesopotamia, *circa* 3,000 B.C.E., *all the way to* the earliest-*modern* ‘’ arithmetical symbology*, which is a ‘proto-algebraic’, and a still “syncopated”** , symbology from earliest-*modern* Alexandria, Egypt, *circa* 250 C.E., by way of Diophantus’s *Arithmetica*. *But* both “styles” included explicit symbols *for arithmetical qualifiers*, as well as symbols *for “quantifiers”*, *not* just symbols for “pure” *quantifiers* alone.

It was not until the 1500s C.E., in the time of the European Renaissance, and of its *revival of arithmetic*, and of an emergent ideographic-symbolic *algebra* as well -- a revival which was inspired, in part, by the re-discovery and renewed circulation of Diophantus’s *Arithmetica* -- that an ideographical arithmetic and algebra of “pure”, ‘unqualified’ “‘quantifiers’” came into dominance, e.g., via the work of Simon Stevin. This development, we hold, reflected the “‘psychohistorical’” emergence of a new Western mentality, after the Dark Ages, and with the rediscovery of the philosophical and scientific wealth of the -- by then long-since fallen -- *ancient* Mediterranean civilizations. I began to view this development as a “‘psychohistorical process’”, again, initially, of unknown causation, of what I later came to name ‘The *Elision of the Arithmetical Qualifiers*’.

Thus, the meaning of the phrase ‘two silas [standard volumetric units] of olive oil’ has taken on the following sequence of ‘qualo-quantitative’, ‘proto-ideographic’, arithmetical expressions, in the arithmetical languages, and in the ‘psychohistorical stages’, with which we are now acquainted, including by way of the discussion above --

 →  →  →  → ...  → ... “‘2k cm.³ of olive oil’”

-- [wherein $k \in \mathbf{R}$, i.e., for k a “**R**real” number, and such that k stands for the conversion factor from cubic centimeters to silas].

*[again, using the ‘barred *second* Greek letter’, ‘’, to denote the “‘quantifier’” “two”].

**[with ‘’ abbreviating, or “syncopating”, the ancient Greek word «*Monad*», here denoting *any* unit of Diophantus’s ‘trans-Platonian’ «*arithmoi Monadikoi*», by placing the *second* Greek letter of that word, ‘*o*’, above the *first*, ‘*M*’].

In R, our 7th dialectical arithmetical system, per our “slow”, primer presentation of our ‘meta-systematic dialectical’ progression of the axioms-systems for our dialectical arithmetics, which is a progression of dialectical-mathematical *languages* of increasing descriptive/predictive power, this becomes [given $k = k$] --

$$2 \otimes k \otimes \left(\frac{\hat{\mu}}{1 \hat{u}_3} \right)^3 \otimes \frac{\hat{\mu}}{w} = \left(2k \frac{\hat{\mu}}{3 \hat{u}_3} \right) \otimes \frac{\hat{\mu}}{w} = 2k \frac{\hat{\mu}}{3 \hat{u}_3 \oplus w} = 2k \frac{\hat{\mu}}{w \oplus 3 \hat{u}_3}$$

-- wherein we assign [‘ $\hat{\mu}$ ’] the basic metrical unit qualifiers as follows: sec. $\hat{\mu} \rightarrow \frac{\hat{\mu}}{1 \hat{u}_1}$, gm. $\hat{\mu} \rightarrow \frac{\hat{\mu}}{2 \hat{u}_2}$, and

cm. $\hat{\mu} \rightarrow \frac{\hat{\mu}}{3 \hat{u}_3}$, so that ‘ $\frac{\hat{\mu}}{1 \hat{u}_3}$ ’ is assigned to the ‘quantifiable metrical unit qualifier’ for the [linear] centimeter

“dimensional unit”, “cm.¹”, so ‘ $\frac{\hat{\mu}}{3 \hat{u}_3}$ ’ is the ‘quantifiable metrical unit qualifier’ for the cubed cm., or “cubic

cm.”, “dimensional unit[y]”, i.e., “cm.³”, the centimeter unit raised to the third power, to the power 3; and

wherein ‘ $\frac{\hat{\mu}}{w}$ ’ [with $w \in \mathbf{W}$, i.e., for w a “Whole” number, denoting the *ordinal number* assigned to the “olive oil” category] represents the

‘metrico-quantifiable ontological qualifier unit’ for the ‘ontological category’ of “olive oil”, with ‘ \otimes ’ standing for a [dialectically-]generalized, “convolute” version of the *multiplication* operation, and with ‘ \oplus ’ standing for a [dialectically-]generalized, generally “non-amalgamative” [cf. Musès], version of the *addition* operation.

The ‘meta-numeral’ ‘ $\hat{\mu}$ ’, ‘unsubscripted’, represents a *generic* ‘quantifiable qualifier’, with the ‘o’ [omicron] “headdress” signifying its ‘quantifiability’, *a la* Diophantus’s ‘ $\overset{\circ}{M}$ ’. The caret, ‘^’, atop that omicron signifies the ‘unit’ nature of ‘ $\hat{\mu}$ ’. That symbol’s underscore alerts to its ‘contra-Boolean’ character. What *specific* kind of ‘quantifiable qualifier’ is to be represented using it depends upon the subscript applied to this *generic* symbol. If the subscript is a “whole number”, the resulting symbol represents an ‘*ontological* unit qualifier’, e.g., a ‘*state-variable* qualifier’, here ‘olive oil’. If the applied subscript is a constituent of the NU space of our ‘third system of dialectical arithmetic’, then the resulting symbol represents a ‘metrical unit qualifier’, e.g., (one) sila’. If the subscript is a “non-amalgamative sum” of a “whole number” and an NU number, as above, then the resulting symbol represents a combined, ‘metrico-ontological qualifier’, as does the phrase ‘(one) sila of olive oil’. If the quantifier of any of these three types of qualifiers is the ‘nullifier’, ‘empty zero’, ‘0’, then the resulting product is, by postulate, ‘full zero’, \bullet , which leads to tractable and meaningful forms of division by zero*.

My findings, from all of this, included the following, with regard to our first, Q, ‘Qualifiers ideography’:

“‘Ontological categories’” [i.e., ‘ontological «*arithmoi*»] -- or the «*monads*» that they represent -- typically combine.

Moreover, such categories -- or the «*monads*» that are their real agents [‘proto-]subjects’] -- [even] ‘self-combine’.

In either case, categorial combination yields back the combining categor(y)(ies) (itself)(themselves), again, but also “plus” [‘ \oplus ’] new categories, representing new, “combined” *kinds* of «*monads*»; new *kinds* of being -- new “Qualities”. I came to “model” such “*categorial-combinatoric*” processes, and “*monadic-combinatoric*” processes, using -- in this new, ‘contra-Boolean’, dialectical arithmetic of ontological categories, Q -- an analogue of the *multiplication* operation; of the “*product*” operation, that inheres in ordinary arithmetic.

However, this story -- the story of how our first dialectical arithmetic was discovered and developed -- belongs to my response to your second question.

*[E.D. Editors -- For more background on division by zero in the context of the F.E.D. *seventh dialectical arithmetic*, RU, see the www.dialectics.org Applications Page, at -- <http://www.dialectics.org/dialectics/Applications.html>, and the entry entitled ‘Empty Zero’ versus ‘Full Zero’ & the ‘Semantification’ of Singularity.]

Karl Seldon, Interview **#2**. A mathematics of “*the qualitative*”, Part **2** of **2**.

Background. The text presented below is an edited excerpt, selected from out of many years of extended dialogue, between Karl Seldon, the co-founder of **Foundation Encyclopedia Dialectica [F.E.D.]**, and a long time monitor of the www.dialectics.org web site, who is also a personal friend of **our** co-founder. This excerpt constitutes Part **2** of the **2** parts of this *second* [published] interview ever granted by Karl Seldon.

The *first* published interview is available to you via --

http://www.dialectics.org/dialectics/Blogs_%26_Interviews.html

http://www.dialectics.org/dialectics/Blogs_&_Interviews_files/Edited_First_Interview_with_F.E.D._Co-Founder_Karl_H._Seldon,29DEC2012,re-edited_02APR2013.pdf.

The two questions catalyzing this interview, with the corresponding responses broken out separately to form its two parts, are the following --

1. We typically think of arithmetic as dealing with quantities or numbers. Yet the dialectical arithmetics seem to be operating with numbers that represent qualities. What was the fundamental breakthrough that led you to realize that an arithmetic of qualities was possible?

2. Did development of your first dialectical arithmetic precede recognition of its core application?

-- **E. D.** Editors, *Special Council for the Encyclopedia*.

Part 2 of 2.

Q2: Did development of your first dialectical arithmetic precede recognition of its core application?

R2: The short answer to your question is, simply, “Yes.”

For me personally, given the ‘dream-vision’ that inspired my quest, the ‘*dialectical “theory of everything” equation*’ -- the ‘*dialectic of Nature as a whole*’ equation -- is, and has always been, the “core application”.

Others of the ‘dialectical meta-equation meta-models’ that we have derived, and, at least partially, solved, so far, since my discovery of the **NQ** ‘first dialectical arithmetic’ -- the ‘**Natural**’ numbers-based arithmetic of ontological-categorical **Qualifiers** -- on April 7th, 1996, have more importance for others, both inside of, and outside of, **our Foundation**.

These include those ‘meta-models’ of human history, *within* the history of Nature as a whole, that **we** have come to call ‘the psychohistorical dialectical equations’. These ‘meta-models’ include **(1)** the ‘*meta-equation of human ideology\knowledge meta-evolution*’; **(2)** the ‘*meta-equation of human social formation[s meta-evolution]*’; **(3)** the ‘*meta-equation of human-societal self-reproductive social relations meta-evolution*’, and **(4)** the ‘*meta-equation of the meta-evolution of the human-societal self-reproductive social self-force*’.

Each one of them is “core” for some of **our** members, and/or for others, outside of **our Foundation**.

For example, ‘meta-equation’ (3), when **we** solve for **its** 32nd term/social-relations-of-social-reproduction category, intimates, for **us**, the outlines of the higher successor system to **our** present ‘socio-econo-political’ system, one which, to **our** lights, should materialize a positive solution to the most devastating and potentially ‘sociocidal’ problems of **our** present system, converting **our** present ‘sociotaxis’ toward a tail-spinning descent toward a new, and, this time, likely **Final Dark Age**, into “‘escape velocity’” for an ascent into the first **Global Renaissance** in recorded human history.

For another example: ‘meta-equation’ (4), when **we** solve for **its** final terms, which represent the human appropriation of the «**monads**» of the oldest known ontological categories of our «**kosmos**» -- i.e., of the earliest-generated ontological categories of the ‘*dialectic of Nature as a whole meta-equation*’, representing the earliest-irrupted of the known «**monads**» of our «**kosmos**» -- indicates the “‘social energy’” natural resources [the new technologies] requisite to the sustenance and continual advancement of that **Planetary Renaissance**, into a **Solar-System-wide Inter-Planetary Renaissance**, and **beyond**.

The capability of the **NQ** arithmetic to anchor a ‘**universal algorithmic heuristic method**’ is the core utility for still others. This **method** is both a **method of scientific hypothesis discovery** and a **method of scientific hypothesis presentation**, for actualities viewed both **syn**chronically and **di**achronically, i.e., via both **systematic** cross-sectional “‘snapshots’”, and **chronologies**.

Thereby, the **NQ** method functions as an actualization of some viable aspects of Leibniz’s dream: his dream of a “‘**characteristica universalis**’”, or “‘**universal character language**’” [“‘**universal algebra**’”].

Diffusion of this **NQ** method resides at the heart of the mission of **Foundation Encyclopedia Dialectica**.

Our core mission is to disseminate this breakthrough “‘mind tool’”, this advanced cognitive instrumentality, this dialectical “‘new «**organon**’””, or “‘tool of thought’”, humanity-wide. All this is to help foster **better thinking** humanity wide -- especially the transcendence of **radically dualistic thinking**, of the **imprisoning traps** of purportedly **irreconcilable dualities & oppositions** -- e.g., transcendence of **dualisms** via the **NQ** methodology of “‘**dialectical synthesis**’”.

The planet-wide diffusion of standard “natural” arithmetic, beginning in ancient times, and of its «**sequelae**», fostered “better thinking” humanity-wide [although vitiated, in part, by the one-sided, “purely” quantitative «**mentalité**» inculcated by its burgeoning praxis of “the exchange-value” -- by the era of “universal alienation”, including of working-class “self-alienation”, i.e., of **universal selling**, including ‘**self-selling**’ [e.g., **wage labor** and **salaried labor**]].

Materialization of ‘**0-1 Boolean arithmetic**’, and of “Boolean algebra”, e.g., in the form of digital computers, and of digital logic circuits generally, has further fostered that “better thinking” [though, in part, similarly vitiated].

Likewise, we hold that the world wide dissemination and materialization of the new «**organon**» of the **NQ** ‘**contra-Boolean arithmetic**’, **et seq.**, with **their** associated ‘**restoration of the arithmetical qualifiers**’, will play a part in a crucial proliferation of “‘**better thinking**’”, and, consequently, of “‘**better practices**’”, throughout Terran humanity.

This dissemination and materialization is intended to help catalyze the “**eu**catastrophic” “‘psychohistorical revolution’” in individual self-identity that is inherent to our times: the transition of billions of human beings from the “‘**formal operations phase**’” of adult cognitive development, to the “‘**dialectical operations phase**’”.

Such a transition is crucial to **our** prospects for averting the otherwise impending plunge into a **Final Dark Age**, and for **our** rising, instead, into **Global Renaissance**.

So, in short, I always *recognized* ‘the dialectic of Nature as a whole’ as the “core application”, *for me*, for a ‘mathematics of dialectics’.

However, my discovery, and earliest development, of **our** ‘first dialectical arithmetic’, **nQ**, *preceded* the further discovery that it could be used as a language in which to formulate a ‘dialectical meta-model’ of **our cosmos** as a whole, a single [meta-]equation that summarily reconstructs, in outline, the total known story of **our cosmos**, and that, as well, “‘decipherably’” predicts, or ‘pre-constructs’, at least one further epoch of *its* future story: **our** next epoch, that of ‘**meta-humanity**’.

This “core application”, the ‘dialectical “theory of everything” equation’, begins with the ‘pre-/sub-**n**uclear’ “particles” as the «**arché**» ‘cosmo-ontological’ «**arithmos**»-of-«**monads**». That is, **our** “‘theory of everything’” ‘dialectical meta-model’ begins with and from the *non*-composite bosons and fermions [e.g., “gluons” and “quarks”], which **we** denote by **n**, and which **we** assign [‘**E**→’] to the **nQ** *first* generic ‘meta-numeral’, \mathbb{Q}_1 : **nE**→ \mathbb{Q}_1 .

[**We** are at work on updated versions of this [meta-equation], e.g., versions which take “**Dark Energy**” as their «**arché**» *ontology*, and “**Dark Matter**” as *its first* ‘**contra-ontology**’. Such versions develop via the dialectical opposition of the space-time *expansionary force* of “**Dark Energy**”, as ‘**Unknown-Source** [hence “Dark”] **Anti-Gravity**’, versus the ‘*contractionary*’ *force* of “**Dark Matter**” as ‘**Unknown-Source** [“Dark”] **Gravity**’. But the progress of this work is hampered by the present dearth of data regarding the empirical actualities that the terms “Dark Energy” and “Dark Matter” attempt to name.]

Let’s limit the present, partial presentation of the pre-/sub-**n**uclear’-“particles”-as- «**arché**» version of **our** ‘Dialectic of Nature meta-equation’ to its epoch **τ = 4**, i.e., up to the irruption of the “**p**rokaryotic” [i.e., of the ‘**p**re-eukaryotic’] living cells ‘cosmo-ontology’.

Our τ = 4 solution [‘**E**≡’] takes the form of the following ‘finitary qualo-fractal’, ‘multi-scale’ expression, via a cosmological [‘**1**’] interpretation of this algebraically-expressed **16**-dimensional ‘**contra-Boolean**’ space --

$$\begin{aligned}
 \mathbb{1}_{\mathbb{V}} \mathbb{X}_4 &= \mathbb{1}_{\mathbb{V}} \mathbb{n}^{2^4} = \\
 \langle \mathbb{1}_{\mathbb{V}} \mathbb{n} \rangle^{2^4} \vdash \equiv & \mathbb{1}_{\mathbb{V}} \mathbb{n} \oplus \mathbb{1}_{\mathbb{V}} \mathbb{s} \oplus \mathbb{1}_{\mathbb{V}} \mathbb{a} \oplus \mathbb{1}_{\mathbb{V}} \mathbb{m} \oplus \mathbb{1}_{\mathbb{V}} \mathbb{p} \\
 & \oplus \mathbb{1}_{\mathbb{V}} \mathbb{sn} \oplus \mathbb{1}_{\mathbb{V}} \mathbb{an} \oplus \mathbb{1}_{\mathbb{V}} \mathbb{as} \oplus \mathbb{1}_{\mathbb{V}} \mathbb{asn} \\
 & \oplus \mathbb{1}_{\mathbb{V}} \mathbb{mn} \oplus \mathbb{1}_{\mathbb{V}} \mathbb{ms} \oplus \mathbb{1}_{\mathbb{V}} \mathbb{msn} \oplus \mathbb{1}_{\mathbb{V}} \mathbb{ma} \oplus \mathbb{1}_{\mathbb{V}} \mathbb{man} \oplus \mathbb{1}_{\mathbb{V}} \mathbb{mas} \oplus \mathbb{1}_{\mathbb{V}} \mathbb{masn}
 \end{aligned}$$

The ‘natural-historical’ sequence of the primary natural formations represented by the solution above is --

- $\mathbb{1}_{\mathbb{V}} \mathbb{n} \mathbb{E} \rightarrow \mathbb{Q}_1$ for the ‘pre-/sub-**n**uclear’ “particles” ontological category [stipulated/“given”], from **τ = 0**;
- $\mathbb{1}_{\mathbb{V}} \mathbb{s} \vdash \equiv \mathbb{Q}_2$ for the ‘pre-/**s**ub-atomic’ “particles” ontological category, extant from epoch **τ = 1**;
- $\mathbb{1}_{\mathbb{V}} \mathbb{a} \vdash \equiv \mathbb{Q}_4$ for the **a**tomic nuclei ontological category, extant from epoch **τ = 2**;
- $\mathbb{1}_{\mathbb{V}} \mathbb{m} \vdash \equiv \mathbb{Q}_8$ for the **m**olecules ontological category, extant from epoch **τ = 3**, and;
- $\mathbb{1}_{\mathbb{V}} \mathbb{p} \vdash \equiv \mathbb{Q}_{16}$ for the “**p**rokaryotic” [i.e., the ‘**p**re-eukaryotic’] living cells ontological category, from **τ = 4**.

So, for example, \downarrow_{as}^1 , per **our** standard solution, represents, primarily, **our** universe's first generation stars, in which, primarily, only normal "Hydrogen ions", normal "Hydrogen nuclei", i.e., neutron-less, electron-less, 'plasmic' *naked protons*, which thus *re-inhere*, as such, into the 'pre-/sub-atomic' "particles" category and 'qualo-fractal' scale, denoted by $\downarrow_{\text{b}_2}^1 \text{S} \vdash \equiv \downarrow_{\text{b}_2}^1$, were 'ontologically converted', primarily, into and by Helium **a**tomic nuclei -- that is, by cosmologically-produced, or by earlier-stellar-conversion-produced, *Helium nuclei*, that also catalyzed the 'ontological conversion' of yet more proton 'pre-/sub-atomic' "particles" into yet more *Helium a*tomic *nuclei*. Similarly, **we** solve the 'algebraic-combinatoric', potential category-representing term \downarrow_{ma}^1 , as connoting, primarily, the conversion of,

e.g., early, proto-planet-borne **a**tom, into **m**olecules, catalyzed by the first-born **m**olecules *themselves*. Those original **m**olecules were produced in the 'self-conversion' of primordial, "stellar-nursery" "**a**tom *clouds*", into "**m**olecular *clouds*". From those *clouds*, new stars, and, eventually, new stellar-planetary systems, were born, and still are being born. Stars with planets were born, and still are being born, after *their* sufficient enrichment with products of later stellar generations' 'higher-**a**tom-species-from-lower-**a**tom-species' **a**tom-making, via fusion; "stellar nucleosynthesis", e.g., via increasing "metalization" of those "**m**olecular/**a**tom *clouds*". Secondly, $\downarrow_{\text{ma}}^1 \text{E} \rightarrow \downarrow_{\text{b}_{12}}^1$ connotes also

$\downarrow_{\text{am}}^1 \text{E} \rightarrow \downarrow_{\text{b}_{12}}^1$, the 'retro-conversion' of **m**olecules back into their constituent **a**tom, catalyzed by, e.g., hot, **m**olecules-bombarding **a**tom.

The key principle of progression in this "core application", universal 'dialectical equation' -- as, typically, in most of our other dialectical-equation-applications, to 'sub-universes' of **our** total universe -- is that of '«aufheben» **meta**-«**monad**»-ization'. This process is the general mode of formation of each next, new, higher level of organization, each higher [finitary] 'qualo-fractal scale', each higher 'neo-ontological' «**arithmos**». We typically interpret terms of form \downarrow_{xx}^1 as signifying the formation, by units of **x**, of a meta-**x** units' neo-«**arithmos**».

A **proton**, as a 'pre-/sub-atomic' "**particle**", is a '**meta**-"**particle**"', a '[self-]**meta**-"**particle**"-ization', of some of the former 'pre-/sub-**n**uclear' "**particles**", or «**monads**», of *its* predecessor ontological «**arithmos**», i.e., a **proton** is made up out of a heterogeneous multiplicity of **gluons** and **quarks**: $\downarrow_{\text{nn}}^1 \text{E} \rightarrow \downarrow_{\text{b}_{1+1}}^1$; **proton** = «aufheben» of

gluons and **quarks** = «aufheben» «**gluons; quarks**». Similarly, a typical **a**tom nucleus is a '**meta**-pre-/sub-atomic' "**particle**", a '**meta**-**S**' «**monad**», i.e., is made up out of a heterogeneous multiplicity of 'pre-/sub-atomic' "**particles**", that is, of **protons** and **neutrons**, so that --

$\downarrow_{\text{ss}}^1 \text{E} \rightarrow \downarrow_{\text{b}_{2+2}}^1 \text{A} \rightarrow \downarrow_{\text{b}_4}^1$; **a**tom nucleus = «aufheben» of **protons** and **neutrons** =

«aufheben» «**protons; neutrons**». This **pattern**, of **dialectical**, or «aufheben», '**meta**-«**monad**»-ization', i.e., of '**meta**-unit-ization', or of '**meta**-**holon**-ization' [cf. Arthur Koestler], characterizes the entire 512-term -- that is, the entire 512 **dimensional** -- '**contra**-Boolean', 'qualo-fractal', **finitary** expression for **our** prediction of **our** next cosmological epoch,

epoch $\tau = 9$: the expression $\downarrow_{\text{v}}^1 \text{n}^2$. *It* does so *all of the way from our* «**arché**» ontological category, of 'pre-/sub-**n**uclear' "**particles**", *all of the way through* the ontological category of '**human**[oid]**ities**', *all the way to our* prediction of a **future**, epoch 9 irruption of multi-planetary '**meta**-**humanity**s', each made up out of a heterogeneous multiplicity, or "'federation'", of democratic 'planetary poli' -- of '**planetized** **humanity**s'. In **our** '**unified theory of universal dialectics**', **we** recognize, indeed, two distinct kinds of «aufheben» '**meta**-unit-ization', and two distinct directions, or dimensions, of simultaneous *and expanding* finitary 'qualo-fractality': "'**horizontal**'" and "'**vertical**'". The **former** term describes the emanations of later categories, of 'meta-units', from out of prior categories' [mere] units. The **latter** describes the *implicit* «aufheben» containment of *multiplicities* of more **specific** category-units in a *single* more **general** category-unit.

The fact that the discovery and early development of the **NQ** arithmetic, and of its algebra, preceded its core, for me, and “‘cosmological’” application, does not, however, mean that this discovery and early development proceeded “abstractly”, in the absence of *any and all* applications. In fact, that discovery and development “‘co-evolved’” via the stimulus of a -- very surprising -- application, an application that would not be expected to lead to such a discovery and development. At least, this catalytic application, given its nature, was surprising and unexpected *for me*.

I will soon, below, recount that discovery and development, together with the application that catalyzed it, to the degree of specificity that the **F.E.D.** General Council, and the *Special Council of Psychohistorians*, consider appropriate for the present timing of publication of this interview.

Before I do so, however, I will provide, immediately below, an overview of my response to your second question, one that also bridges that response to my response to your first question.

The examples covered in my response to your first question -- except, *perhaps*, the first of these examples, that of the ‘dream-vision’ equation itself* -- all involve ‘quantifiable’ arithmetical qualifiers’.

They all involve instances of combined, “‘hybrid’”, ‘quanto-qualitative’ expressions.

They all involve counter-examples that “‘break through’” the idea that any arithmetic can only ever be “‘purely’” quantitative.

But they all fall short of describing the crucial breakthrough to the **NQ** ‘meta-number *space*’ concept.

That is, *none* of those examples instantiated even the possibility, *not* just of a “‘hybrid’”, ‘quanto-qualitative’ arithmetic, but of the extreme opposite to the “‘purely’” quantitative arithmetics that many believe constitute the *only possible* kind of arithmetic. These examples did not address the breakthrough to ‘an arithmetic of “‘pure’”, unquantifiable arithmetical qualifiers’ -- to a “‘purely’” qualitative arithmetic.

Yet, it was the discernment of the possibility, and, indeed, of the ‘dialectical conceptual necessity’, and, then, of the actuality, of that opposite extreme that provided the “‘fundamental breakthrough’” to a dialectical “‘arithmetic of Qualities’”.

It was the sudden discovery of this possibility -- the possibility of ‘an arithmetic of unquantifiable arithmetical qualifiers’ -- that opened the door to our ‘first dialectical arithmetic’, or ‘first arithmetic of dialectic’, to the **NQ** arithmetic. Discernment of that possibility also opened the door to the entire dialectical progression of our dialectical arithmetics; the door to ‘the dialectic of the dialectical arithmetics’ themselves.

This is *not* at all to say that we ever sought, or that we presently advocate, or have ever advocated, preference for development of an arithmetic, or of arithmetics, of “‘qualities’” -- of ‘ontological qualifiers’ represented by [meta-]numbers -- as something to be pursued forever apart from, or in preference to, or to the exclusion of, that of arithmetics of quantifiers, or that of arithmetics of metrical qualifiers, or that of “‘hybrid’”, ‘quanto-qualitative’ arithmetics, or ‘qualo-quantitative’ arithmetics, in some kind of puritanical, *one-sided* abandonment of that of the “‘purely’” quantitative arithmetics, and/or of that of the ‘quanto-qualitative’ arithmetics.

A dialectical “‘development’”-*qua*-*presentation* of such systems of dialectical arithmetic means that all three varieties of arithmetic should be encompassed in that presentation, in a systematic sequence of presentation.

*[The example of the “‘Gödel Formula’” was an example of ‘quanto-qualitativity’ only in a special sense. The “‘ideographical’” symbols within that formula all, except for components of the argument ‘(n, 13, n)’, represent ‘non-quantifier’ ideas, but *each* of those symbols, and even the *entire* expression that they, together, form, is mapped to a specific, unique composite “‘Natural’” number, by means of the “‘Gödel-prime-numbering’” method.].

In **our** case, in the case of **our** standard, “slow” presentation, the “purely” quantitative extreme is presented **first**, with then the “purely” qualitative, opposite extreme presented **second**, as a counter-example [cf. Imre Lakatos] to the **first**, which is then followed by the first of the many ‘qualo-quantitative’, “hybrid” arithmetics, presented **third**.

Presentation of these first three dialectical arithmetics is then succeeded by presentation of an alternation of “purely” qualitative and ‘qualo-quantitative’ arithmetical-algebraic dialectical languages, of ever-increasing descriptive specificity, until that specificity exceeds **our** present needs for describing any presently-known phenomenon of Nature.

But, to be presented -- to be presentable; to have anything to present -- this dialectical progression of dialectical arithmetics must first be discovered, and, to some degree, developed. Therefore, **our** method of inquiry into the domain of dialectical arithmetics encompassed inquiries into all three varieties of arithmetics. It did so despite the emphasis, early on, on developing the **N**, “purely” qualitative, arithmetic. **Its** discovery, as an extreme, ‘Lakatosian’ counter-example to the “purely” quantitative arithmetic of the “**1st order Natural numbers**”, denoted herein by **N**, was the needed key to discerning the dialectic of dialectical arithmetics in the first place.

That is, rather than one-sidedly affirming and developing, e.g., only one of these three varieties of arithmetics, it is rather that the dialectical presentation-derivation of the dialectical progression of these dialectical arithmetics should begin with, and from, our presently-prevailing ideology of arithmetic. That is, it should begin with, and as, an immanent critique of the ideology of the, supposedly “purely” quantitative, “**Natural**” arithmetic, **N** -- the ideology of the four, “first-order” Peano axioms -- as **our** «*arché*», **our** “*cell form*”, “*seed form*”, or ‘*ultimate ancestor*’ system/category, in the dialectical “systematics” of modern arithmetics.

This “first order axioms only” arithmetic, **N**, is an even simpler core for “purely” quantitative arithmetic than is the far richer axioms-system of the first *and second* order axioms of “**Natural**” number arithmetic, which we denote by **N**. Both the four-axiom **N** axioms-system, and the five-plus axioms **N** axioms-system, are rooted in a core “set”, or “space”, of numbers. For our purposes, **we** define this “space” as that of the *finitary* “**Natural**” numbers, which **we** denote by \mathbb{N} -- **N** with a ‘*pre*-subscript’, ‘ \mathbb{N} ’ -- such that $\mathbb{N} \equiv \{1, 2, 3, \dots, \mathbb{N}\}$, and such that ‘ \mathbb{N} ’ denotes, typically, the maximal “**Natural**” number representable within, e.g., the “word size” of the computer that **we** are currently using to facilitate **our** research and/or **our** discourse.

The reason we use a *single* underscore in our symbol for the *higher-order* “**Natural**” numbers axioms-system, **N**, and a *double* underscore in our symbol, **N**, for the *first-order-only* “**Natural**” numbers axioms-system, is to underscore the fact that **N** has a far more vast realm of “models”, or “interpretations”, than does **N**.

Thus, starting from **N**, by immanent critique of that **N**, i.e., by its ‘self-critique’, denoted by **N**(**N**) = **N**², i.e., by dialectical, or «*aufheben*», *internal* criticism of the **N** system, we jump -- that is, we evoke, out of the very ‘ordinality heart’ of that **N** system itself -- the most extreme opposite system of arithmetic to the **N** system, **but as a “non-standard model” of the four N axioms themselves, and, therefore, compliant with those four axioms.**

This second system **we** call the **N** system. It is **our** **N**-based axioms-system for ‘ontological **Q**ualifiers’.

We model it as an arithmetic of “pure”, **not only** “*unqualified*”, but ‘*unquantifiable*’, ‘arithmetical *category*al qualifiers’, or ‘*arithmos*» qualifiers; ‘qualifier meta-numbers’ -- “numbers”, “that represent qualities”.

That is, the **N** ‘meta-numerals’, generically representable by $\mathbb{Q}_{\mathbb{N}}$, for all $n \in \mathbb{N}$, implicitly represent numbers, but as “numbers” **of units, of elements, of individuals**, that are all of a given *kind*, or **Quality**. That is, they are ‘meta-numerals’ that can represent “*ontological categories*”, or ‘*ontological* ‘*arithmoi*»’.

From there, a dialectical combination, “‘hybridization’”, ‘complex unification’, or “‘synthesis’” of these first two, diametrically opposite systems -- of **N** and/versus **NQ** -- is called for, and is called forth, in the form of the **NQ** system. We solve [‘ $\vdash \equiv$ ’] the term **NQ** as representing a *combined* axioms-system of arithmetic, one with *both* ‘qualifiers’ and “‘quantifiers’”; one of ‘quantifiable *«monad»-ic* qualifiers’, **U**: **NQ** $\vdash \equiv$ **U**.

In *it*, we model each ‘quantified qualifier meta-number’ as representing a population units count, a number of individual ‘**U**nits’, of *«monads»*, that are extant, that inhere in a given ontological category, for the value of the time index in question. This dialectical, *«arithmos»/«monads»* arithmetic, still lacks, among its other descriptive-capability deficiencies, the capability for arithmetical ‘metrical unit *qualification*’ [and hence also for arithmetical ‘metrical unit *quantification*’]. I.e., it can express, ‘**5 olives**’, but *not* yet ‘**5 ounces** of olives’.

Thus, this ‘dialectic of the arithmetics of dialectic’ does not end with this *third*, **U** system.

The *next, fourth* system of dialectical arithmetic is a system for *unquantifiable metrical* qualifiers, named **M**.

Thereafter, further systems of dialectical arithmetic are elicited, in ‘meta-systematic’ dialectical format and order, after these initial *three*, through the “‘internal critique’” [immanent critique, or “‘self-critique’”] of the **NQ** system, then through “‘external critique’” of the **N** system, of the **NQ** system, and of the **U** system, by the resulting *fourth*, **M** system, and through the critique of *M itself*, by *M itself*, the **M** system being *the net new-system result* of the “‘internal critique’” of the **NQ** system, and so on.

But we will leave the details of that presentation to another venue*.

Suffice it to say, in keeping with our present focus, that the axioms-systems of arithmetic, or of predominantly-*ideographical* language, that emerge *after* these *first three* or *four* systems in *our* standard, “‘slower” method of presentation of these systems of *ideographical* dialectical language, are dialectical language-systems of ever richer descriptive power. They alternate between “‘purely” qualitative, ‘unquantifiable’ languages, and “‘hybrid’”, ‘qualo-quantitative’ languages. No further “‘purely” quantitative languages arise, in this dialectic progression, after the *first*, the *«arché»*, the **N**, ‘unqualified quantifiers-*only*’, *ideographical* arithmetical/-algebraic language-system, or ‘character-language’.

Since the progression of the axioms-systems of *our* dialectical arithmetics is itself a dialectical progression -- that is, is an ‘*oppositions* \rightarrow *resolutions*’ progression -- it too can also be modeled by our **NQ** ‘first system of dialectical arithmetic’, a system which is also a part of that very, also dialectical, systems-progression.

That language-system, the **NQ** *ideographical* language-system, can be used to model that dialectical systems-progression in which *it* is included -- a part partially describing a whole in which and of which it is a part.

The outline of *our* presentation of this dialectical progression can be generated by solving the following ‘**NQ** meta-equation’, $\mathbb{H}_{s\uparrow} = (\mathbb{N})^{2^{s\uparrow}}$, out to some *finite* value of its *s*tep-of-presentation variable, which is $s \in \mathbb{W} \equiv \{0, 1, 2, 3, \dots, \mathbb{N}\}$, an element of the *finitary* “‘**W**hole” numbers, and given the mutual assignment [‘ \Leftrightarrow ’]: $\mathbb{N} \Leftrightarrow \mathbb{Q}_1 \in \mathbb{NQ} \equiv \{\mathbb{Q}_1, \mathbb{Q}_2, \mathbb{Q}_3, \dots, \mathbb{Q}_{\mathbb{N}}\}$.

*[The forthcoming volume **1** of *our* multi-volume treatise entitled *A Dialectical Theory of Everything* -- of which volumes **0** and **2** have been published as of the date of this transcript -- is now charged with the detailed exposition of this ‘dialectic of the **F.E.D.** arithmetics of dialectic’. -- **E.D.** Editors.].

Therein, **N** denotes the 1st-order-only, “Peano postulates” axioms-system for the *finitary* “Natural” numbers:

$$\mathbb{N} \equiv \{1, 2, 3, \dots, \infty\}.$$

For the **s**-value of **s** = 2, this ‘equation-valued *meta*-equation’ becomes a *single* equation, describing a systems-of-arithmetic-interpreted, 4-dimensional, ‘*contra*-Boolean’ space, viz. --

$$\mathbb{H}_2 = (\mathbb{N})^2 \vdash \mathbb{N} \oplus \mathbb{N} \oplus \mathbb{N} \oplus \mathbb{N}$$

-- per *our* solution [‘ \vdash ’], such that **N** stands for *our* category, or system of arithmetic, for a “purely” qualitative, generic ‘*Metrical unit qualifier*’, and such that ‘ \oplus ’ denotes an **NQ**-arithmetical dialectical operation of the “non-amalgamative” addition [‘ \oplus ’] of opposites [‘ \oplus ’]; of the “summing” or “superposition” of *qualitatively opposing* category-symbols, or system-symbols: an operation of ‘*oppositional addition*’ [‘ \oplus ’ “plus” ‘ \oplus ’], given that each successor system of arithmetic “opposes” itself to all of its predecessor systems of arithmetic, and *opposes their very inter-mutual oppositions themselves*, viz. --

$$((\mathbb{N} \oplus \mathbb{N}) \oplus \mathbb{N}) \oplus \mathbb{N}$$

So, how did *our* discovery of the **NQ** arithmetic arise?

The discovery of *our*, “purely”-qualitative, ‘first arithmetic for dialectic’, **NQ**, arose out of my professional [paid] work in what I then called ‘applied mathematical criminal psychology’.

For a major client, I was investigating the history, and the potential ‘detectability’, and preventability, of a spiraling bundle of criminal *Modi Operandi*, that were costing this client tens of millions of dollars annually.

In charting the historical development of this bundle of *Modi Operandi*, I saw a pattern of ‘content-structure’ which connected with something in the “extracurricular” readings that I was then engaging, pursuant to my ‘dream-vision’ life-quest.

In particular, there were a series of two diagrams of -- separately conceived and applied -- “Boolean spaces”, of differing dimensionalities, in Stuart Kauffman’s *The Origins of Order: Self-Organization and Selection in Evolution*, on pages 38 [Figure 2.1; 4-dimensional] and 42 [Figure 2.2; 3-dimensional].

I noticed that the historical “evolution” of these criminal *Modi Operandi* might be well-modeled by a succession of such “Boolean spaces”, each successor space of higher dimensionality that its predecessor space, with a 1-D “Boolean space”, succeed by a 2-D such space, in turn succeeded by a 3-D such space, in turn succeeded by a 4-D such space, etc.

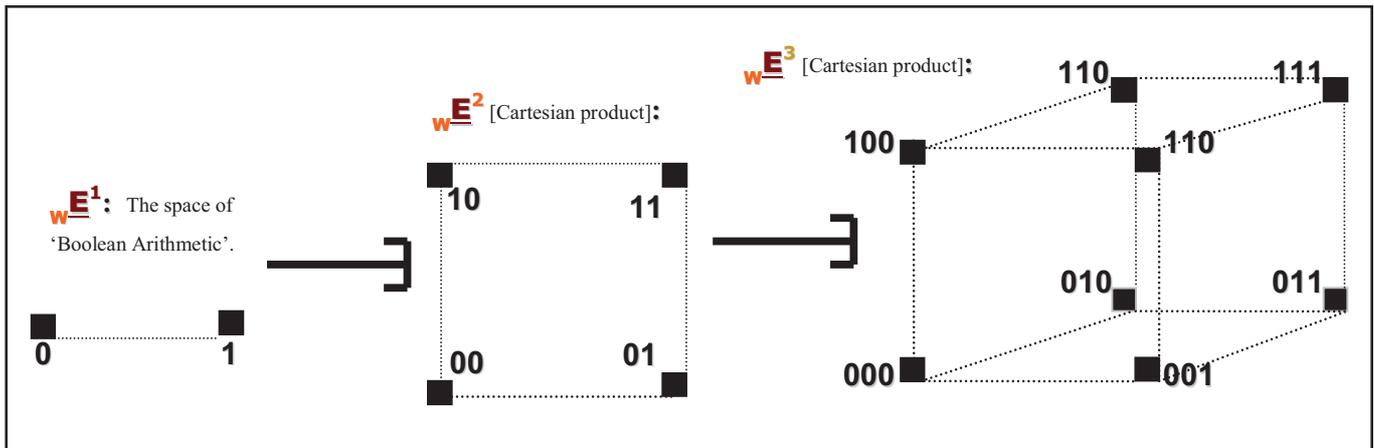
But “Boolean spaces” were *statical* and of *fixed* dimensionality, and *isolated*, *disconnected* from one another. Such a *dynamical* progression of ‘*dimensionally-escalating*’ spaces, or of ‘*dimensionality-dynamical*’ spaces -- of ‘logical analytical geometries’ of ever-higher dimensionality -- therefore constituted a ‘*contra*-Boolean’ medium for ‘logico-mathematical modeling’.

I had always expected to discover the mathematical language that could formulate a real-world version of my dream-envisioned ‘everything equation’ through my efforts to mathematically model *evolutionary* sequences.

Instead, and to my great surprise, I first discovered such a mathematical language in an effort to model the “*de*-evolutionary” or “degenerative” sequence of the history of a domain of criminal *MO*.

With the insights gained via this ‘*contra*-Boolean model’, my team and I were able to develop systems that, against this bundle of criminal *MO*, and against related others, eventually saved multiple major clients hundreds of millions of dollars per year in losses that might have otherwise accrued.

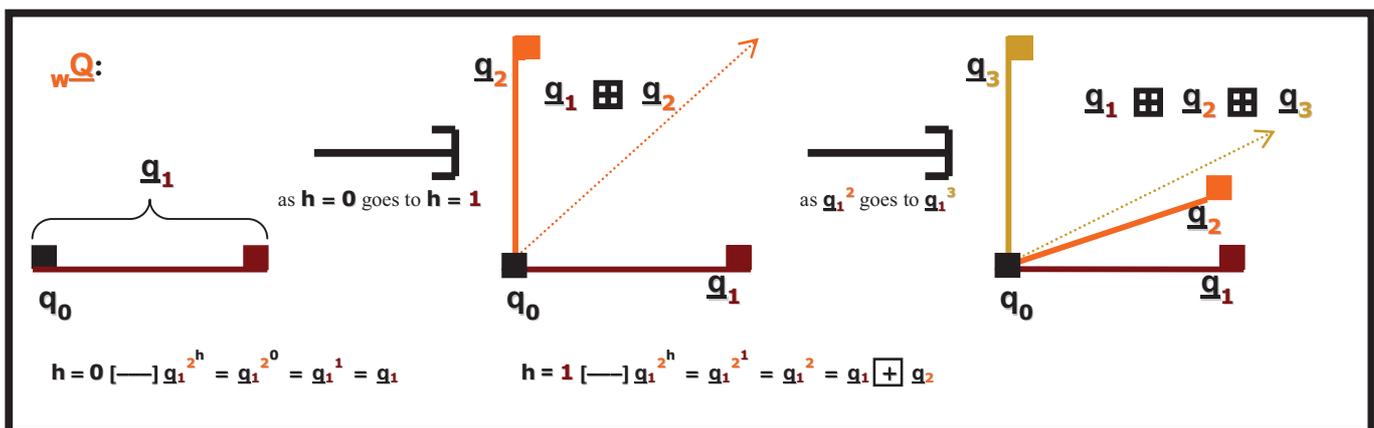
But the *contra*-Boolean' spaces-sequence, as a sequence of models, lacked the 'algebraic fluency' that I had long been seeking. The *multiple*-spaces sequence --



-- was thus soon replaced, in my thinking, by a *single*, 'dimensionally self-expanding analytical-geometrical space' of mutually-perpendicular unit-length line segments, or 'dialectors'. This space is made up out of unit-length line-segments. It involves no "points", with the partial exception of the 'relative infinitesimality' of the $\mathbb{Q}_{1,0}$ "origin" itself. This $w\mathbb{Q}$ space is an «*aufheben*» 'meta-unit-ization' of the ' $w\mathbb{E}$ space' of 'Boolean arithmetic'.

The $[2^0 = 1]$ 1-dimensional *initial space* reacted upon *itself* to become a *space* of *two* $[2^1 = 2]$ such dimensions, which *next* reacted upon *itself* to form a *space* of *four* $[2^2 = 4]$ such dimensions, which *next* reacted upon *itself* to form a *space* of *eight* $[2^3 = 8]$ such dimensions, and so on. Each unit 'dimension', each individual 'dialector', in this 'dimensionally self-growing space', was interpreted so as to represent a qualitatively different «*arithmos*», ontological category, or system -- a different kind of "extensionality", and of 'existentiality'.

All of these categories, or systems, shared a common *origin*-category -- generically denoted by $\mathbb{Q}_{1,1}$ -- and, thus, a common 'meta-evolutionary meta-genealogy', all of them tracing their ancestry to the «*arithmos*» assigned to that *initial, single dialector* dimension, $\mathbb{Q}_{1,1}$, representing their «*arché*» category, or «*arché*» system --



Using the arithmetic and algebra corresponding to the above-depicted 'meta-evolving analytical geometry', I began to discover applications of this $w\mathbb{Q}$ 'dialectical ideography' beyond the initial application: that of the modeling of the history of the degenerative 'de-evolution' of the criminal *MO* whose study had elicited the initial discovery.

The second application to be developed was a rudimentary form of the 'dialectic of Nature meta-equation' itself, the "core application" for which I had ever been searching, ever since the 'dream-vision' of my eleventh year.

Next came the early stumbles toward today's 'psychohistorical-dialectical meta-equation' (3), which is our 'meta-model' describing the [psycho]historical 'dialectical meta-evolution' of the "social relations of production" --

Raw Appropriations of Nature's Products, $\mathbf{A} \rightarrow \mathbb{Q}_1$; **Goods/Gifts**, $\mathbf{G} \rightarrow \mathbb{Q}_2$; *barterable*
Commodities, $\mathbf{C} \rightarrow \mathbb{Q}_4$; **Monies**, $\mathbf{M} \rightarrow \mathbb{Q}_8$; and **Capitals themselves**,
 $\mathbf{K} \rightarrow \mathbb{Q}_{16}$.

Then came progress toward today's 'psychohistorical-dialectical meta-equation' (1), the 'meta-model' describing the [psycho]historical 'dialectical, «aufheben» meta-evolution' of the fundamental forms of human ideology/**K**nowledge --

Mythopoeias, $\mathbf{M} \rightarrow \mathbb{Q}_1$; **Religions**, $\mathbf{R} \rightarrow \mathbb{Q}_2$; **Philosophies**, $\mathbf{P} \rightarrow \mathbb{Q}_4$;
Sciences, $\mathbf{K} \rightarrow \mathbb{Q}_8$; and **Psychohistories themselves**, $\mathbf{\Psi} \rightarrow \mathbb{Q}_{16}$.

Then came progress toward today's 'psychohistorical-dialectical meta-equation' (2), the 'meta-model' describing the [psycho]history of human-social formation(s) -- **bands**, $\mathbf{b} \rightarrow \mathbb{Q}_1$; **campes**, $\mathbf{c} \rightarrow \mathbb{Q}_2$; **villages**,

$\mathbf{v} \rightarrow \mathbb{Q}_4$; **chiefdoms**, $\mathbf{f} \rightarrow \mathbb{Q}_8$; **city-states**, $\mathbf{s} \rightarrow \mathbb{Q}_{16}$; **multi-city-**
state empires, $\mathbf{e} \rightarrow \mathbb{Q}_{32}$, ..., and **nation-states**, $\mathbf{n} \rightarrow \mathbb{Q}_{64}$.

Finally, for this series, came progress toward today's 'psychohistorical-dialectical meta-equation' (4), the 'meta-model' mapping the core of the [psycho]history of the 'meta-evolution' of the human "social forces of production" -- the ever-deeper **h**uman **A**ppropriation of the [past-arisen] ontology of Nature, as the primary "energy-**R**esources" powering expanding human social reproduction --

1. The human social community/band as primary hunting & gathering power/productive force Resource, $\mathbf{R}_h \rightarrow \mathbb{Q}_1$;

2. Social animals & plants as primary power/productive force Resource for agriculture,

$\mathbf{R}_l \rightarrow \mathbb{Q}_2$;

3. Enslaved individual multicellular, 'meta-biotic' biological organisms as primary power/productive force Resource for large-scale agriculture and manufacture [e.g., "horse power", and the productive power of human slaves, reduced to

"animal-like" chattel], $\mathbf{R}_b \rightarrow \mathbb{Q}_4$;

4. Unicellular eukaryotic micro-organisms as secondary power/productive force Resource [e.g., "fermentation"

technologies of food preservation -- leavened "daily bread", beers, wines, chutneys, pickles, jerkies, yogurts, kefirs, etc.], $\mathbf{R}_e \rightarrow \mathbb{Q}_8$;

