# $\{ \underline{x}^2 \notin \underline{x} \}$ :

# Dialectical Ideography

A Contribution to the Immanent Critique of Arithmetic

# Part I. c.

# Prolegomena: Briefings on )H(

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Dialectical Ideography

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Note: This essay is a partially self-exemplifying exposition of, and a record of an ongoing self-critique of, the ideas advanced herein. It is a 'meta-dynamical' and 'meta-evolving' conceptual object. Edition index [self-edit iteration number] and last revision date are stated on the title page; the most recent changes are coded as magenta-colored text. The time sequence of changes in the form / content of this essay is predicted to be both an illustration and an instantiation of the meta-model of ideo-ontological ideo-meta-dynamics that this essay explores, as well as of the 'homeomorphic defect' of that meta-model. We expect that successive editions of this document will document an 'ideo-onto-dynamasis' rather than an 'ideo-onto-stasis'; a 'meta-evolving ideo-ontology'; a 'multi-meta-ontic idea-cumulum'; an expanding, and ever 'thickening', increasingly inter- and intra-connected, 'inter-acted' network of 'inter-implicatory', 'inter-determinate', 'inter-generative' ideas, elaborated on a mounting count of 'metafinite', 'meta-fractal' scales, all exemplifying a "non-standard", Contra-Boolean logic; the ideo-ontologically dynamical logic of the dialectical "law" of cognition signified by the 'ideo-ontological', "pure-qualitative", **Q**-algebraic <u>im</u>equation x<sup>2</sup> <sup>1</sup>/<sub>2</sub> ×.

This writing is an unpublished work, and one which is not sold or exchanged for remuneration or commercial gain of any kind, but is distributed «samizdat» to selected individuals and organizations, on a donation basis, free of charge. This work is a potential contribution to the collective creative property of the Terran human species: assimilate, disseminate, critique, and surpass at will. We, the authors, seek hereby to further neither our monetary riches, nor our public power, nor our personal fame. What we want, money cannot buy. We hope, with your help, to build a better us, and to help do our "infinitesimal" part in building a better universe ["Infinitesimal" differences can matter, as nonlinear dynamics demonstrates]. More monetary wealth will not buy that betterment. More political power cannot impose it. More fame would mainly distract from it. We hope that you have chosen, or will choose, to build a better you. We hold that this choice entails the profoundest consequences for one's life, as well as for the lives of others. We also hold that such choices belong to you alone. We wish to share, with you, the forthcoming conceptual riches. We will rejoice, and we will be compensated, if you teach us in turn, help us to correct our errors, and thus advance the common-wealth of all beyond this offering. We also request our readers' forgiveness in the areas of our many shortcomings, some of which, though determined to strive ceaselessly to overcome them, we will never, in a lifetime, overcome. Others' voices need to be raised -- perhaps your own voice -- to check and balance our biases. We, the authors, are not publicly accessible, but will endeavor to continue private transmittals to you if you indicate publicly, however cryptically, and we recommend that it be cryptically, your desire that we should do so. We want not that our existences, let alone our egos, should be an impediment to that great reverberating propagation of new cognitions, and of emerging new forms of cognition, of which this essay is, at best, an incomplete, imperfect, transitory, and transitional manifestation. We therefore happily forego personal credit, and, by thus renouncing in advance the [remote] possibility of any notoriety resulting thereby, hope also to retain more lifetime for the continuation of this work. Dialectical ideography as set forth herein is interpreted variously as: (1) a calculus of 'quanto-qualitative change', encompassing an explicit, ideographical arithmetic for the dimensional unit[ie]s or metrical "monads" of classical "dimensional analysis", and, thereby, 'semantifying' the "meaningless" singularities [finite-time "infinite" values] of especially the "unsolvable" [in part, because of those very singularities] nonlinear integrodifferential equations and their solution-functions through their metrical as well as ontological 're-qualification' using those new, explicit 'metrical qualifiers' of this 'dimensional arithmetic', as well as 'quantifiable' kinds of ontological

qualifies, concretizing and operationalizing aspects of Plato's «Arithmoi Monadikoi» and Diophantus' n, last extant circa 250 C.E.; (2) an alternative, onto-logical contra-Boolean algebra; (3) an ideographic, 'onto-dynamical' "symbolic logic" for the state-space/control-parameter-space 'meta-space' 'meta-dynamics' of 'meta-finite', conversion-singularity 'self-bifurcation'; (4) A mathematics for modeling the history of mathematical ideas as well as a [psycho-]historical algebra and arithmetic for modeling the 'meta-evolution' of the sciences generally; an ideography for the [psycho-]history of ideas; an ideography of the 'meta-dynamical' logic of conceptual self-innovation and self-development; a 'philosophical algebra' or trans-Leibnizian «characteristica universalis»; an arithmetic and algebra of innovative conception or of the creative conceptual process; (5) a rules-system for an ideographical language of *ontological self-escalation* in self-transcending [meta-]systems; (6) a generic algorithm for the '*meta*' operation regress; for a trans-Hegelian, autopoiesic version of the '*aufheben*' operation; and for a "dynamical", 'temporalized', diachronic, '*meta-evolutionary*' version of the Russellian/Gödelian logical types hierarchy; (7) a model for a 'meta-fractal', non-Cantorian theory of totalities, of 'meta-finite' arithmetics, and of the "foundations" of mathematics; (8) an arithmetic, algebra, geometry, and analysis built on certain "*non-standard natural numbers*", i.e., on the '*Gödelian* '*meta-natural numbers*', a space of '*evolute*' "*meta-numbers*" 'of **2**nd degree', 'made up out of "standard", '1st degree' natural numbers, instantiating those "non-standard models of first order Peano arithmetic" whose possibility is implied by the first-order joint applicability of Gödel's completeness theorem and first incompleteness theorem, as also by the Löwenheim-Skolem theorem, constructing thereby an 'ontologically dynamical', 'de-Parmenideanized' actualization of Plato's "arithmetic of dialectics", the «Arithmoi Eidetikoi». This essay, in addition to that of ideogramic, pictogramic, and phonogramic symbolization, draws also upon the power of neo-mythological, allegorical, and mythopoeic symbolism -- that is, of psycho-historical symbolism -- to aid in the conveyance of its most urgent messages. World-historically consequential universal labor; the evocation of effective psycho-historical force, including individual 'psyche-ological', affective force, requires gspr, requires that its mythopoeic momenta, denoted R, be integrated, indeed, dialectically synthesized, with its Philosophical and Scientific momenta. Dialectical ideography is, we believe, a humble but potent seed. As with the Riemannian, and the other non-Euclidean geometries that arose from the failed attempts to prove the absoluteness of Euclid's geometry, these non-Parmenidean, contra-Boolean, and contra-Cantorian onto-logical and onto-dynamical arithmetics and their algebras of dialectics may bear fruit for humanity only if germinated through the intra- and inter-personal dialogue, and dialectic, of assimilation, critique, refutation, and supersession. We have avoided broadcast publication and indiscriminant distribution of this essay. We wish to base its circulation, and the selection of its recipients, upon our best judgment of its potential value to each candidate recipient. The taking to heart of the ideas "graphed", ideographically, 'pictographically, and narratively, herein, can produce profound transformation in the very identity of the person so taking. Panic in response to perception of the early signs of such transformation in others may elicit, from some perceivers, a violent reaction. In particular, the intimations of the 'meta-human', Ah, implications of the 'cumulum' of human[oid] evolution is profoundly disturbing to some. We are therefore directly transmitting this document only to those whom we perceive, via their own published writings, to be already verging on similar or related conceptions as a result of their own protracted 'self-metaevolution'. We have also decided not to disseminate the most "dangerous" of the results to date. We believe that you are eminently capable of 're'discovering these results, if you have not yet discovered them already. Should you do so, we urge that you treat them, and their dissemination to others, with utmost care. The system, more accurately, the systems, of dialectical ideography glossed herein continue to evolve and 'meta-evolve' rapidly in our research. They burgeon beneath our feet. We expect to exercise a similar restraint and discretion in any future progress reports which we may send your way. We therefore lodge the Omni-Copyright statement above together with this countervailing caveat: we recommend, should you choose to disseminate this document, its ideas, and/or related ideas of your own discovery, that you do so with careful judgment as to the recipients you select. Give the friends of humanity a head start vis-à-vis their adversaries. Dialectics should inculcate humility. "Perfection" is not a final meta-state that can be finally manifested, but an open-ended, 'uncompleteable', asymptotic process, moving from greater to lesser imperfection. We realize that conceptual 'homeomorphic defect' is inescapable for cognizing beings such as ourselves. Even at best, we must always be partly wrong. Even at best, one cannot be finally, completely, and wholly right. One's mental constructs cannot ever be the truth, the whole truth, and nothing but the truth. But one may be right enough for one's time, for one's moment, for one's role, and for one's part; right enough to help one's contemporaries to live through, and beyond, one's time, and thus, potentially, to enjoy the privilege, the pain notwithstanding, of a vital ['life-ful'] and willing participation in the succeeding epoch of imperfection.

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 $\underline{U}_{a}$  as ultimate recession / vanishing-point /'meta-infra-finite' remnant of  $\underline{Q}$  within  $\underline{U}$ .

 $\mu_0$  as ultimate recession / vanishing-point / 'meta-infra-finite' remnant of  $\underline{U}$  within  $\alpha \underline{\mu}$ ?

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#### $[\mathbf{q}_{MU}] \leftrightarrow \mathbf{q}_7$ : Briefing on $_{\alpha}\mu$ ,

Quanto-Qualitative Calculus of Ontologically and Metrically <u>Qualified</u> Quantifiers for Unified, Numerical/Dimensional Analysis and Singularity 'Semantification' ['Re-Qualified Metafinite Analysis'].

The 'Intra-Duality' of 'Quanto-Qualitative' Arithmetic and the Progression from U to au [ and Beyond ].

#### Sketch: Narrative Exposition/Model of the 'Meta-Systematic Dialectic' of U through U M to au.

Thesis -- Self-Unity: Initial, Limited Apperception of U as Ontology-only Quanto-Qualification.

Partial Antithesis -- Self-Difference: Self-Intra-Differentiation to Self-Intra-Opposition of the Self-Unity.

Some Descriptive Limitations / Inadequacies of the <u>U</u> Ideography [Some Aspects of Its 'Homeomorphic Defect']. Metrical Inspecificity -- Ideographic-Arithmetical Inexpressibility of Explicit Metrical Determinations. Restricted Repertoire of 'State-Variables' and 'Control Parameters': Confinement to 'Population Cardinometry'.

Need for Explicit, Ideographic 'Metrical Qualifiers', versus both 'Ontological Qualifiers' and 'Pure Quantifiers'.

Self-Exo-Differentiation of, and Exo-Opposition to, this Self-Unity: Emergence / Formation of the M Ideography.

[ **Q**<sub>M</sub> ] ↔ **Q**<sub>4</sub>: 'Peanic', <u>Un</u>-Quantifiable, '<u>Contra</u>-Boolean' Arithmetic Mapping Onto-Dynamics from a Single Metric/Unit «Arché».

Some Descriptive Limitations/Inadequacies of the  $\underline{\mathbf{q}}_{\mathbf{M}} = \underline{\mathbf{M}}$  Ideography.

Unquantifability.

Confinement to the 'Onto-Dynamics' of a Single "Species" of Metric/Metrical Unit[y].

Ambiguity / Multi-Valence of Division/Decomposition [i.e., of 'Metrical Qualifier Factorization'].

<u>Partial Syntheses</u> -- Partial Solutions: Steppingstones and Half-Way Houses on the Way to Full Synthesis. Progressive Partial Syntheses as also Progressive Partial Antitheses.

[ <u>**Q**\_MN</u> ] ↔ <u>**Q**</u><sub>5</sub>: 'Peanic', *Quantifiable*, '<u>Contra</u>-Boolean' Arithmetic Mapping Multiples of the Metrical Units arising from the 'Onto-Dynamasis' of a Single Metric/Unit «Arché».

[ 𝒁<sub>MO</sub> ] ↔ 𝒁<sub>6</sub>: 'Peanic', <u>Un</u>-Quantifiable, 'Boolean' Units Mapping 'Diophantine Monads' for an Indefinite Multiplicity of Qualitatively/Ontologically Distinct Monadic Species.

<u>Synthesis</u> -- Self-Re-Unity ['Meta-Finite', 'Meta-Fractal', 'Self-Subsumptive' Self-Re-Unification]:  $\underline{a}_{MON}$  or  $\underline{a}_{MU}$  as the  $\underline{a}\underline{\mu}$  Ideography. Some Aspects of 'Quanto-Qualitative Computation' and 'Quanto-Qualitative Modeling' in  $\underline{a}\underline{\mu}$ .

Interpretation of "ut 'Cumula' as Models of 'Meta-System' 'Meta-Dynamics' -- of Sequences of Systems separated by 'Meta-Fractal', 'Meta-Fractal', 'Meta-Frinte', Self-Bifurcation 'Conversion Singularities', Modeled via Unified State-Space/Control-Space 'Meta-Spaces',

describing such 'Meta-Evolution' via Ontological/Dimensional/Axial/Metrical ['Quanto-Qualitative'] Net Self-Expansion of the 'Meta-Space'. The Problem of Zero Division.

The 'Paradox of Singularity' in Dynamical 'Total-Differential' and 'Partial-Differential' Systems. The Paradox of Infinite Error: "Instantaneous" Transition from Micro-Finite Residuals to Infinity Residuals. The Metrico-Ontological 'Fixity' of Dynamical Systems Models -- Corollary of 'The Parmenidean Postulate'? Singularity and 'The Nonlinearity Barrier'.

The Two Components of "Unsolvability".

Differential Equation Fligher Degree / Degree > 1 Nonlinearity ties to Proneness to 'Moveable-Pole' Singularity, due to 'denominatorized' / "negative degree" dynamical finite differences -- time-varying functions minus control parameters.

The 'Conversion Meta-Dynamic' and Zero Division.

Physical Meanings of [Meta-]Dynamical 'Conversion-Singularity' as Guide to its Mathematical Representation. The «a posteriori», "synthetic", inductive, empirical Principle of 'Metafinity'. Singularity and Onto-Dynamasis.

Pure-Quantitative Zeros versus Pure-Qualitative Zeros versus Quanto-Qualitative Zeros.

The 'Method of [Ontological-Metrical] Re-Qualification' and 'Singularity Semantification'.

Computation of Singularities via 'The Method of Re-Qualification' - Some Illustrations.

The Rocket Equation: «Gedanken» Experiment.

The Newtonian Many-Body Problem.

The Ultraviolet Catastrophe.

The 'Meta-Dynamics' of Stellar 'Meta-Evolution': Conversion Singularity Nucleosynthesis Inter-Epochal Transitions. Transition to  $_{\beta}\underline{\mu}$  and Beyond: Some Descriptive Limitations/Inadequacies of the  $_{\alpha}\underline{\mu}$  Ideography.

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#### Zoom-In Map of Briefings Sub-Section [concluded]

#### $[\mathbf{q}_{\mathsf{MU}}] \Leftrightarrow \mathbf{q}_{7}$ : Briefing on $_{\alpha}\underline{\mu}$ ,

Quanto-Qualitative Calculus of Ontologically and Metrically <u>Qualified</u> Quantifiers for Unified, Numerical/Dimensional Analysis and Singularity 'Semantification' ['Re-Qualified Metafinite Analysis'] [continued & concluded].

Transition to the Next Section: The Precocity of these Briefings and the Work of Part II.

The Scale of Systematic-Dialectical 'Ideo-Meta-Evolution' from N to W to Z to Q to R and Beyond.

The Scale of 'Ideo-Meta-Evolution' from  $\underline{A}_{\tau}$  to  $\underline{$ 

The Psycho-Historical Ideo-Dialectic of N.

#### Meta-Briefing: Briefing on Briefings.

This sub-section is designed to familiarize the reader with certain notational practices, as well as with some conceptual background, that might otherwise be unfamiliar, and which might thereby constitute a barrier to the reader's appropriation of the three *Briefings* which follow.

<u>Potential Notational-Conceptual Unfamiliarities</u>. The notation used in these Briefings may be unfamiliar mainly because it involves a qualitatively expanded arithmetic, algebra, and geometry; including a formulation of, and a mode of calculation with, 'pure <u>qualifiers</u>' as well as with 'pure quantifiers', and also with '<u>quanto-qualifiers</u>' or '<u>qualo-quantifiers</u>'. While we endeavor to make the incremental notation, as far as we are able, consistent with -- indeed, a coherent extension or generalization of -- standard mathematical notation, the meanings of new signs are seldom self-evident from their form alone, without some conceptual introduction -- some explication of the *idea* behind the '*idea-gram*'. We find it best to begin such explication with the 'neo-ideograms' which inaugurate the incremental, <u>qualifier</u> side of mathematics:

• The ideogram or ideographic symbol { denotes the relation of *non-quantitative*, or *qualitative*, *inequality*.

There is an immanent need, even within today's standard mathematics, to make explicit its implicit involvement with relations of inequality,  $\neq$ , that are not equivalent to quantitative inequality,  $\gtrsim$ . The relations 'greater than' and 'less than' do not account for certain meanings of inequality that are already long-extant in mathematical usage. Consider everyday "dimensional analysis", where we have 5[in.] = 3[in.], in that 5[in.]<sup>1</sup> > 3[in.]<sup>1</sup>, but also  $5[in.]^1 \ge 5[in.]^2 = 5[sq. in.]^1$ , and clearly  $5[in.]^1 \pm 5[sq. in.]^1$ , but also  $5[in.]^1 \le 5[sq. in.]^1$ , even though, by some idealizations, there are an infinite number of 1-dimensional line-segments [linear inches] in a 2-dimensional square 'plane-segment' [square inch], so that [in.]<sup>2</sup> >>> [in.]<sup>1</sup>. We say that both line-segments & 'plane-segments' are finite, but dimensionally, qualitatively different, and that a 'plane-segment' is 'meta-finite' relative to a line-segment. Thus, we write:  $[in.]^2 \notin [in.]^1$ . Consider also the mathematical domain of set theory, where distinct "logical individuals" a = b, c, d; b = c, d; c = d, imply {a, b} = {c, d}, yet, {a, b} > {c, d}, & {a, b} < {c, d}, despite the fact that these 2 sets have the same cardinality, 2. We  $\therefore$  write:  $\{a, b\} \notin \{c, d\}$ . Consider the "Complex numbers", wherein  $\underline{i} = +^2 \sqrt{-1}$ , &  $\therefore$  of course  $\underline{i} \neq 1$ , but  $\underline{i} \neq 1$ , & 1 < 1 either. Thus: 1 2 1. Consider also the calculus of "vectors" -- of "quantities" which have both "magnitude" [quantitative], and "direction" [¿ partly gualitative, though measurable in terms of quantitative angular "degrees"?] -- for either its "scalar product rule" [or "dot product" rule], or its "vector product rule" [or "cross product" rule], e.g., of  $\hat{\underline{e}}_1 \cdot \hat{\underline{e}}_1 = \cdot \hat{\underline{e}}_1^2 = 1$ , and of  $\hat{\underline{e}}_1 \cdot \hat{\underline{e}}_2 = 0$ , or  $\hat{\underline{e}}_1 \times \hat{\underline{e}}_1 = \times \hat{\underline{e}}_1^2 = 0$ , and  $\hat{\underline{e}}_1 \times \hat{\underline{e}}_2 = \hat{\underline{e}}_3$ , where either  $\hat{\underline{e}}_1^2 \neq \hat{\underline{e}}_1^1$ , and  $\hat{\underline{e}}_1^2 \notin \hat{\underline{e}}_1^1, \text{ or } \hat{\underline{e}}_1 \times \hat{\underline{e}}_2 \notin \hat{\underline{e}}_1, \hat{\underline{e}}_2, \text{ because } \mathbf{V} \ni \hat{\underline{e}}_1 \notin \mathbf{1} \in \mathbf{R}, \text{ and } \neg [\mathbf{1} \And \hat{\underline{e}}_1], \text{ or } \hat{\underline{e}}_3 \notin \hat{\underline{e}}_1, \hat{\underline{e}}_2, \text{ since } \hat{\underline{e}}_3 \perp \hat{\underline{e}}_1, \hat{\underline{e}}_2, \text{ and } \neg [\hat{\underline{e}}_3 \And \hat{\underline{e}}_1, \hat{\underline{e}}_2]; \text{ and the "space" of } \mathbf{e}_1 \notin \hat{\underline{e}}_2, \hat{\underline{e}}_1, \hat{\underline{e}}_2, \hat{\underline{e}}_1, \hat{\underline{e}}_2, \hat{\underline{e}}_1, \hat{\underline{e}}_2]; \text{ and the "space" of } \mathbf{e}_1 \notin \hat{\underline{e}}_2, \hat{\underline{e}}_1, \hat{\underline{e}}_2, \hat{\underline{e}}_1, \hat{\underline{e}}_2, \hat{\underline{e}}_1, \hat{\underline{e}}_2]; \text{ and the "space" of } \mathbf{e}_1 \notin \hat{\underline{e}}_1, \hat{\underline{e}}_2, \hat{\underline{e}}_1, \hat{\underline{e}}_2, \hat{\underline{e}}_1, \hat{\underline{e}}_2 \end{pmatrix}$ "matrices" or "mumber-arrays" is pervaded by the 2 relation to an even greater degree than is the "space" of vectors.

However, the need for the  $\frac{1}{\xi}$  symbol in <u>Dialectical Ideography</u> is even greater than in the standard mathematics of today. The 'dialectical mathematics' of <u>Dialectical Ideography</u> begins with the formulation of new systems of non-standard arithmetic, systems whose 'meta-numerals' model 'metrical qualifiers' and/or 'ontological qualifiers'. <u>Dialectical Ideography</u> begins with 'meta-numbers' which represent qualities, not [or not only] quantities. Therefore, the typical relation between any pair of distinct 'dialectical numbers' is that denoted by ' $\frac{1}{\xi}$ ', not that denoted by ' $\frac{1}{\xi}$ '. Standard mathematics is pervaded by a "trichotomy principle" which holds that the relation between any pair of numbers is,  $\frac{1}{\xi}$ , i.e., that the possibilities of such relationship are exhausted by the three relations 'disjuncted' in that sign, and contained in the three-element set  $\{=, >, <\}$ . <u>Dialectical Ideography</u> explicitly extends that "trichotomy principle" to a 'tetra-chotomy principle', and that set to [at least] the four-element set  $\{=, >, <, \frac{1}{\xi}\}$ , for which there are two distinct and opposing 'ideo-ontological' 'species' or "'kinds'" of the '[sub-]genus' of inequality:  $\neq$  as  $\frac{1}{\xi}$ , versus  $\neq$  as  $\frac{1}{\xi}$ .

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<sup>•</sup>  $\Delta$ ,  $\underline{\Delta}$ ,  $\& \underline{\Delta}$  denote "[meta-]finite differencing" operations; 'incrementors', of, respectively, 'pure quantity', ( $\Delta$ ), 'pure quality', ( $\underline{\Delta}$ ], and mixed/combined/unified 'quanto-quality', ( $\underline{\Delta}$ ).

Thus,  $\Delta(\mathbf{x}) = \Delta \mathbf{x}$  denotes some standard-increment part of that *«arithmos»* of "quantifier" units -- that abstract, pure, unqualified 'quantifier' value -- for which  $\mathbf{x}$  stands. The expression  $\Delta [\mathbf{x} \ \mathbf{x}] = \Delta \mathbf{x}$ , on the contrary, denotes some 'meta-fractally' higher likeness of that *«arithmos»* of 'qualifier' units -- the abstract, pure, unquantified 'qualifier' value -- for which  $\mathbf{x}$  stands. The expression  $\Delta [\mathbf{x}] = \Delta \mathbf{x}$  denotes a differencing operation involving the 'quanto-qualifier' ['quantified qualifier'] or 'qualo-quantifier' ['qualified quantifier'] for

operation involving the <u>quanto-qualifier</u> [quantified qualifier] or <u>qualo-quantifier</u> [qualified quantifier] for which  $\underline{\mathbf{X}}$  stands.

Since, in these *Briefings*, we describe and instantiate 'arithmetical' calculations and 'algorithms' involving 'qualifier' 'numerals' of **3** distinct types, covering their interactions with one another as well as their interactions with standard numerical 'quantifiers', we use parenthetical cues, different kinds of parentheses, to connote different types of qualifier/quantifier contents and interactions, viz.:

- **[[...]** for 'pure *ontological qualifier*' contents [contents here denoted generically by ellipsis dots '...']. For convenience, in contexts devoid of the 'co-occurrence' of ontological and metrical 'qualifiers', where confusion thus should not arise, we may use **[...]** to enclose pure 'ontological qualifiers';
- [ ... ] for 'pure metrical qualifier' contents;
- <...> for unquantified [or unit-quantified] and explicitly 'mixed' qualifier/qualifier cases -- for 'metrically-qualified ontological qualifiers' or 'ontologically-qualified metrical qualifiers';
- ( ... ) for 'full-multiplicity' [i.e., not confined to the unit interval] 'pure quantifier' contents;
- (...) for 'mixed', 'quanto-qualifier', or 'qualo-quantifier' products-contents, i.e., for 'qualified quantities' or 'quantified qualifier' as expressed via 'qualified quantifier' or 'quantified qualifier' symbols.

Symbols of 'meta-finite', "'revolutionary'" transition, or of dialectical-logical 'followership', are used abundantly throughout --

- denotes 'self-causal implication' or 'temporal becoming' in <u>historical dialectic</u>; movements of external event[itie]s;
- → denotes the self-causation of categorial, ideational progressions in [meta-]sustem-atic dialectic; movements of mind;
- denotes the postulated movement from any given 'meta-numeral' value to its self-«aufheben» self-negation via [self-]squaring, in the context of a 'minimally-interpreted' syntax of a dialectical arithmetic, as yet applied neither for the construction of an historical dialectical model, nor for that of a [meta-]systematic dialectical model;

The relationship between a symbol which denotes an [ontological] "*intension*[ality]" or "*meaning*" for a *universe of discourse* that is to be modeled, and a '*dialectical meta-numeral*', "assigned" to that symbol as its "'*model*" or "*linterpretation*" within <u>Dialectical Ideography</u>, is expressed via a special sign herein --

• - denotes the *relationship* or the *operation* of *'interpretation'* in the above sense. Thus, an expression such

as '<u>humanity</u>  $\Leftrightarrow$   $\hat{\mathfrak{g}}_{256}$ ', asserts that the 'meta-numeral'  $\hat{\mathfrak{g}}_{256}$ , interpreted as an 'ontological qualifier', is <u>assigned</u> to the 'onto' ['<u>onto</u>logical category'] symbol or 'eventity' symbol '<u>humanity</u>', as a model or imperfect -- or with <u>homeomorphic defect</u> -- representation of the 'eventity' thus designated, in a dialectical-ideographic model of the universe of discourse being specified, in part, by that expression.

Dialectical-ideographic models also involve kinds of '<u>containment</u>' that generalize, and differ qualitatively from, those familiar from standard set theory, viz.,  $\in$  [is an element of], and C [is a subset of] --

- □, □ denote relationships of 'sub-system' or 'sub-component' <u>explicit</u> containment at any level, which may hold between intension-symbols, even when, for their extensions, the ∈ and ⊂ relations do <u>not</u> hold.
- I□, □I denote relationships of *implicit containment*, as *embryonic* versus as *extant* or *manifest* possibility.

We use 3 ideograms for 3 aspects of each present's vision of the 'Ultimate Arithmetic', always receding, in response to our advance, into ever-higher 'meta-fractal' layers of 'ideo-ontology' as we approach it, per 'The Gödelian Ideo-Meta-Dynamic', or 'The Gödelian Dialectic':

)H(, )H(, )H(, )H() denote the <u>current</u> horizons of (1) the ultimate space or "set" of 'standard <u>meta-numbers'</u> [starting with  $i = +\sqrt{-1}$ ]; (2) the ultimate space or "set" of 'non-standard/dialectical <u>meta-numbers'</u>[starting with  $\hat{\mathfrak{g}}_1$ ], and (3) the ultimate rules-system for the arithmetics, +, of both the former and latter.

We follow a practice of recent mathematics in denoting, by univocal symbols, whole "spaces" or [potentially-infinite] "sets" of numbers of various "species", thus forming, as a conceptual object, and directing readers' attentions to, the common essence, "intension", or totality of a given, entire such "species" as a subject-matter of discourse.

For example, '**N**' standardly denotes the so-called "<u>**N**</u>atural" numbers "set" or "space", namely, {1, 2, 3,...}, and **R**, the "ir<u>ratio</u>nal" plus "<u>ratio</u>-nal" -- the so-called "<u>**R**</u>eal" -- numbers. We go further here, denoting, by the <u>underscoring</u> of such 'number-space' or 'number-set' symbols, the total 'rules-system', including various axiomatizations, of the arithmetic of that 'number-space', viz. **N** & **R**.

Since we use  $\underline{\mathbf{Q}}$  to denote the 'number-space' of the 'meta-numbers' interpretable as <u>Ontological</u> Qualifiers, to help distinguish it from  $\mathbf{Q}$ , which traditionally denotes the "Quotient" or "<u>ratio</u>-nal" numbers, we use  $\underline{\mathbf{Q}}$  to denote the *rules-system* of '*pure-qualifier*' *arithmetic*. Single-underscored number-space symbols indicate "second-order" and "'higher-order" specifications or axiomatizations of such arithmetics.

Paradoxically, double-underscored number-space symbols here denote "'first-order'" specifications or axiomatizations of such arithmetics. We foment this notational paradox to subliminally remind the reader, and ourselves, that the "'first-order'" rules-systems encompass more arithmetic content, including so-called "non-standard" versions of those arithmetics, than do the higher-order specifications [as implied by the conjunction of the Gödel [semantic] completeness and [syntactic] <u>in</u>completeness theorems for "'first-order'' systems, a conjunction which does not pertain for "'higher-order'' systems, for which the completeness theorem does not hold, but only the <u>in</u>completeness theorems]. Specifically, the "'first-order'' *rules-systems* encompass "The Standard/Non-Standard Models <u>intra-duality</u>. The 'meta-systematic dialectic' generated by/expressive of that 'intra-duality' is the central focus of the Briefings which follow. Also, we use these rules-system symbols not as passive, nounic labels or designators, but as dialectical operators; as 'self-«aufhebens' self-sublators, e.g.:

### $\underline{\mathbf{N}} \leftrightarrow \hat{\mathbf{g}}_{1}; \ \underline{\mathbf{N}} \rightarrow \mathbf{\mathcal{O}} \underline{\mathbf{N}} = \ \underline{\mathbf{NN}} = \ \underline{\mathbf{N}}(\underline{\mathbf{N}}) = \ \underline{\mathbf{N}}^{2} = (\underline{\mathbf{N}} \oplus \underline{\Delta\mathbf{N}}) | \underline{\Delta\mathbf{N}} \stackrel{2}{+} \underline{\mathbf{N}}, \& \underline{\Delta\mathbf{N}} = \ \underline{\mathbf{Q}} \leftrightarrow \hat{\mathbf{g}}_{2}.$

A brief catalogue of our symbols for some of the various "standard" arithmetics encountered in these Briefings is given below [for fuller detail, see Postscripts, Glossaries, Glossary of Ideograms] --

- N = {1, 2, 3, ...}, the one-dimensional space or 'consecuum' of the so-called "Natural" Numbers;
- W = {0, 1, 2, 3, ...}, the one-dimensional space or 'consecuum' of the so-called "Whole" Numbers;
- Z = {..., -1, -2, -3, 0, +1, +2, +3, ...}, the 1-D space or 'consecuum' of the "'Integral" Numbers, or "Integers";
- Q = {..., -4/3, ..., -1/2, ..., 0, ..., +1/2, ..., +4/3, ...}, 'contiguum' of the "Quotient" Numbers, or "Ratio[-nal]" Numbers;
- **R** = {...,  $-\pi$ ,..., -e,...,  $-\sqrt{2}$ ,..., 0,...,  $+\sqrt{2}$ ,..., +e,...,  $+\pi$ ,...}, so-called "*continuum*" of the so-called "**R**eal" Numbers;
- **C** = {  $\mathbf{R}\mathbf{r} + \mathbf{R}\mathbf{r}\mathbf{i}$ },  $\mathbf{r} = unit[y]$  [of the <u>real numbers</u> = +1;  $\mathbf{i} = \mathbf{i}_1 = unit[y]$  of the <u>imaginary numbers</u> =  $+^2\sqrt{-1}$ ; the 2-D space of "<u>**G**</u>omplex" Numbers;
- H = { Rr + Rri1 + Rri2 + Rri3 }, the 4-D [four-dimensional] space or "continuum" of the Hamilton Quaternions;
- O = { Rr + Rri1 + Rri2 + Rri3 + Rri4 + Rri5 + Rri6 + Rri7 }, the 8-D space of Cayley/Graves "Octonions" or "Octaves";
- V = {  $\mathbf{R} \stackrel{\circ}{\underline{e}}_1 + \mathbf{R} \stackrel{\circ}{\underline{e}}_2 + \mathbf{R} \stackrel{\circ}{\underline{e}}_3 + \dots$ }, the n-dimensional space or "*continuum*" of the Heaviside/Gibbs/'quasi-Grassmannian <u>V</u>ectors.

We use '<u>pre-subscripts</u>', such as the **u** in  $\prod_{u}^{n} Q_{u}^{2}$ , which specifies the <u>universe of discourse</u> which the Q have been applied to model in the case at hand, as well as the usual '[<u>post-]</u>subscripts', such as the  $\tau$  in the same compound-ideogram symbol. We also employ '<u>pre-superscripts</u>', such as the **n** in  $\prod_{u}^{n} Q_{u}^{2}$ , which specifies the ordinal-numbered *taxonomic level* within **u**, which the Q have been applied to model, in addition to the usual '[<u>post-]</u>superscripts', such as the power or exponent **2** in the same symbol-complex [for more on these conventions of notation, please see <u>Part I. a.</u>, sub-section entitled Higher Level [Sub-]Universe-Models].

We also employ -- in contexts where the **3** major 'application-domains' of the  $\underline{Q}$  dialectical arithmetic require rigorous distinction -- distinct but mutually similar notations for the 'generic *dialectical self-movement*', or 'generic <u>onto-dynamical «autokinesis</u>»'. That is, we employ --

(1) for the generic, *minimally-interpreted* **Q** arithmetic:

# $\mathbb{I} \forall \hat{x} \in \mathbb{N} \mathbb{Q} \mathbb{I} \hat{x} \longrightarrow \mathbb{I} \hat{x} \mathbb{I} = \hat{x} \otimes aufheben \otimes \mathbb{I} \hat{x} \mathbb{I} = \hat{x} \underbrace{auf}{\mathbb{I}} \mathbb{I} \hat{x} \mathbb{I} = \hat{x} \mathbb{I} \hat{x} \mathbb{I} = \hat{x}^2 = \mathbb{I} \hat{x} \boxplus \mathbb{I} \mathbb{I} \hat{x} \mathbb{I} \hat{x} \mathbb{I};$

(2) for that arithmetic interpreted for historical dialectic, or "dialectic of [both pre-human and human] nature":

 $\langle \forall \underline{\hat{x}} \in {}_{\mathsf{N}}\underline{\mathsf{Q}} \rangle \langle \underline{\hat{x}} \to {}_{\mathsf{P}^{4}} \langle \underline{\hat{x}} \rangle = \underline{\hat{x}} \langle aufheben_{\mathsf{P}} \langle \underline{\hat{x}} \rangle = \underline{\hat{x}} \langle \underline{\hat{x}} \rangle = \underline{\hat{x}} \langle \underline{\hat{x}} \rangle = \underline{\hat{x}}^{2} = \langle \underline{\hat{x}} \oplus \underline{\Delta} \langle \underline{\hat{x}} \rangle \rangle \stackrel{\stackrel{\circ}{\leftarrow}}{\overset{\circ}{\leftarrow}} \underline{\hat{x}} \rangle;$ 

(3) for that arithmetic interpreted for meta-system-atic dialectical, categorial-progression, idea-systems-progression idea-exposition:

## $(\forall \underline{x} \in \underline{NQ})(\underline{x} \rightarrow e^{-1}(\underline{x}) = \underline{x} \quad aufheben \gg (\underline{x}) = \underline{x} \quad auf(\underline{x}) = \underline{x}(\underline{x}) = \underline{x}^{2} = (\underline{x} \oplus \Delta(\underline{x})) \neq \underline{x}).$

The above expressions each assert, among other principles, one which holds that each  $\hat{X}$  is *its own* 'auf' -- its own *self-«aufheben» operator*, its own 'meta-evolutionary', 'meta-dynamical', 'meta-finite', 'meta-monadic' *dialectical self*-negation/*self*-transformation operation.

Herein we may, for typographical convenience, drop the 'A' symbol-element, or 'ideographical diacritical mark', [which signifies the <u>unit</u>-status [e.g., modulus equal to unity, etc.] of those 'dialectical meta-numbers' which bear it], where the presence of other, contextual cues so allows. Also for typographical convenience, we may use standard [] parentheses, or "brackets", instead of, e.g., **L...1**, **(...)**, or **(...)**, to enclose <u>un</u>interpreted **Q** "pure", <u>unquantifiable</u> 'ontological qualifiers', the  $\hat{\mathbf{q}}_n$ , the  $\hat{\mathbf{q}}_n$  'quantifiable ontological qualifiers' of **U** arithmetic, and the  $\hat{\underline{\mu}}_{\mathbf{u}}$  'metrical qualifiers' of the  $_{\mathbf{a}}\mathbf{\mu}$  ['alpha-mu'] arithmetic, where context permits this without confusion.

We may also use the standard '+' sign in place of the 'B' sign of the minimally-interpreted  $\underline{Q}$  arithmetic, the ' $\Phi$ ' sign of the  $\underline{Q}$  arithmetic interpreted for <u>historical exo-dialectic</u>, and the ' $\Phi$ ' sign of that arithmetic interpreted for categories-progression/<u>systems</u>-progression '[<u>meta-]system-atic</u> <u>ideo-dialectic</u>', in contexts where the generalization of '+' to encompass such operations of superposition, aggregation, or "addition", including their '<u>non-amalgamative</u>', as well as their idempotent, or '<u>super-amalgamative</u>' aspects, is clear.

Along with the above **3** variants of the signs for the analogue of ordinary-arithmetic's operation of *addition* in the '*pure qualifier*' arithmetic of  $\underline{\mathbf{Q}}$ , and beyond, we have also a corresponding **3** variants of the signs for the nearest analogues of ordinary arithmetic's operations of *multiplication*, *subtraction*, and *division*:

- . 🖾 , 🗞 , 🕸 ""multiplication" / proliferation / 'multiplicitation' of ontological, metrical, etc., qualities / of ontological, metrical, etc., 'qualifier dialectors';
- . □, ♦, "subtraction" of ontological, metrical, etc., qualities / of ontological, metrical, etc., 'qualifier dialectors';
- E, 🔄 , 😌 "'division'" of ontological, metrical, etc., qualities / of ontological, metrical, etc., 'qualifier dialectors'.

The latter two analogous operations -- the  $\underline{Q}$ -and-beyond analogues of *subtraction* and *division* -- first become fully definable only in  $\underline{Q}$  and  $\underline{zQ}$ , respectively, but are not comprehensively meaningful in  $\underline{Q}$ , where the **3** progressive variants of the  $\underline{Q}$  arithmetic just referenced are defined as follows:

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#### Potential Conceptual/Terminological Unfamiliarities.

Plato's term «Dianoia» ["The [human faculty of] Understanding"; cf. Hegel's «Verstand»], names, in our
usage herein, those human factor(s), faction(s), and institutions upholding exclusively the mode and
"instrumentality of thought'" [or «organon»] of reductionist, atomistic-analytical, mechanical/formal
logic. This logic initially holds, at the beginning of its history, that the axioms, primitives, base definitions,
and rules of inference of mathematics, and of formal logic itself, are unique and fixed in perpetuity; are
immutable, timeless, changeless, eternal truths.

But it also holds that these ideas cannot be accounted for or justified formally; that they must arise/be discovered *outside*, external to, the axiomatic systems resulting from the applications of formal logic; that there is no formal-logical means for arriving at these ideas; that formal deduction/rules of inference provide no justification, no method for arriving at, no formal account of, these starting points -- the points from which all else is deduced. It offers only the essentially *authoritarian*, *dogmatic*, and *doctrinaire* principle that may be voiced as follows: "I am an expert; I have tried and experienced the consequences of <u>every possible</u> relevant alternative; I therefore know that this starting point is optimal -- the best of all possible starting points -- so first just accept these "STANDARD" postulates. All else that I have promised -- the best possible results -- follow from them. <u>Iust trust me</u> [on pain of ridicule, ostracism, ..., death, etc.]".

• Plato's term «Dialekticós» [or «Dialektiké», cf. Hegel's «Dialektik», and «Vernunft», for "[Dialectical] Reason"], in our usage herein, names an «organon» that includes: (1) mental instrumentalities for the immanent critique of existing axiomatizations; (2) for finding -- and optimizing/justifying, relative to known alternatives -- axioms, definitions, primitives, & rules of inference, for emergent axiomatizations, and; (3) for accounting, "psycho-historically", for the order of 'meta-evolution' of systems of axioms, definitions, primitives, & rules of inference across human-historical time. This includes comprehending and modeling, reconstructively, and even predictively, the empirically/'psycho-archaeologically' observable patterns of that 'meta-evolution'. Even before the discovery of the Non-Euclidean Geometries; even before Gödel's formalization of the logical phenomenon of "undecidability" or "axiomatic independence", the Platonic dialectical tradition held that, in a given universe of discourse, there is usually no single, unique, optimal system of axioms, definitions, primitives, and rules of inference; that trade-offs and options exist, even abound -- that 'alternativity abounds' -- for framing qualitatively, 'ideo-ontologically' different, differentially useful, differentially advantaged-and-dis-advantaged axiomatic systems. Moreover, the «organon» of 'dialectics' is a thought-tool whose users are, by their use of it, brought to notice, through their own 'psycho-historical'/'psycho-archaeological' observation of human history, that even mainline, "standard" logical/mathematical/scientific axiomatic systems 'meta-evolve', i.e., change qualitatively, expanding and progressing in the 'ideo-ontology' they imply, along with the general progress of humanity. They may thus discern patterns, 'ideo-meta-dynamics', meta-"laws" of this 'ideo-ontological expansion'; of this mapping of what we call 'The Gödelian Ideo-Meta-Dynamic' onto human history.

The heart of the dialectical tradition thus centers upon the collective, pluralistic, democratic, social principle of ever-present, living, open, collective self-questioning; the Socratic/Platonic principle of continual social self-interrogation [no longer limited, as within the horizons of the ancient Greek epoch of human society, to democratic deliberation restricted to the slave-holding/eligible citizen-elite, excluding the rest of society], as opposed to the monolithic, dictatorial, tendentially totalitarian, dogmatic, doctrinaire, and consequently typically sub-optimal impositions of received authority.

This *«Dialectics»* is the standpoint of this essay, and the name of the movement to which it belongs. As a result, we do not confine our concerns to the discussion of, e.g., **N**, **W**, **Z**, **Q**, **R**, **& C** as if fixed and final/pre-completed *Number-Spaces*, nor to that of their *rules-systems*, denoted **N**, **W**, **Z**, **Q**, **R**, **& C**, respectively, as if they were fixed, eternal, immutable systems-of-truths, nor to that of their usual *pedagogical* interconnexion or [*meta-*]*system-atic* <u>order-of-exposition</u>, e.g., **N**  $\rightarrow$  **W**  $\rightarrow$  **Z**  $\rightarrow$  **Q**  $\rightarrow$  **R**  $\rightarrow$  **C**, nor to that of their <u>*historical*</u> progression and <u>order-of-discovery</u>, which is, per our Hypothesis, for occidental humanity at least: **N**  $\rightarrow$  **Q**  $\rightarrow$  **R**  $\rightarrow$  **R**  $\rightarrow$  **R**  $\rightarrow$  **R**  $\rightarrow$  **C**  $\rightarrow$  **H**  $\rightarrow$  **O**  $\rightarrow$  ...  $\rightarrow$  **V**  $\rightarrow$  ..., wherein **R**, denotes **R** exclusive of **0** and "negatives numbers", and wherein **R** denotes the same, but inclusive of *positive* <u>infinitesimals</u>.

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We are also concerned here, as in the Briefings which follow, with their 'ideo-meta-dynamics' or "ideo-meta-system transitions" in the direction of 'contra-Boolean', dialectical 'quantifier/ qualifier' arithmetics, such as:

# $[\underline{\mathbf{W}}] \to [\underline{\mathbf{W}} \oplus \underline{\mathbf{Q}}] \to [\underline{\mathbf{W}} \oplus \underline{\mathbf{Q}} \oplus \underline{\mathbf{U}} \oplus \underline{\mathbf{M}}] \to [\underline{\mathbf{W}} \oplus \underline{\mathbf{Q}} \oplus \underline{\mathbf{U}} \oplus \underline{\mathbf{M}} \oplus \hat{\mathbf{g}}_{\underline{\mathbf{MN}}} \oplus \hat{\mathbf{g}}_{\underline{\mathbf{MQ}}} \oplus \hat{\mathbf{g}}_{\underline{\mathbf{MQN}}} \oplus \underline{\mathbf{M}}].$

I.e., we also address the '*ideo-ontodynamasis*' of the arithmetical '*meta-system*', or '*ideo-meta-fractal*' sequence of systems of arithmetic, in that direction of conception which encompasses dialectical ideography as developed herein and to-date, and as outlined in these Briefings.

We conduct, in these **Briefings**, an exposition of this 'ideo-metasystem' of dialectical ideography by means of a 'metasystematic-dialectical' "categorial progression" method of presentation and of dialectical derivation of each successive system of arithmetic as 'idea-system', 'rules-system', or 'category'/"species'" of ideography. We do so using the  $\Omega$  arithmetic itself -- which is also one of the systems of dialectical arithmetic arising in this progression of 'Peanic' [or] arithmetical systems -- to model the whole progression: for the dialectical derivation of each system in the sequence, <u>itself included</u>. Denotations of our symbols for the first seven of these 'ideo-ontological' categories-of-arithmetics in that 'metasystematic-dialectical' order, starting from **W**, not from **N**, as «arché», are:

ĝ <sub>1</sub>		W	⊐	{0, 1, 2, 3,} = Any rules-system whose objects obey the "first-order" Peano postulates [the first 4 of the 5];
ĝ2	**	wQ		$  \underline{\mathbf{Q}} = \{ \mathbf{q}_0, \mathbf{\hat{q}}_1, \mathbf{\hat{q}}_2, \mathbf{\hat{q}}_3, \dots \}, \text{ space of } \underline{unquantifiable } \underline{\mathbf{Q}} \text{ ualifier meta-numbers', typically interpreted as 'ontological'} $
				qualifiers'; able to model the 'metafinite', 'meta-fractal' structure of 'multi-ontic cumula', but only qualitatively, or pure-ontologically;
â <sub>3</sub>	⇔	<u>"U</u>	⊐	$\underbrace{U}_{\mathbf{w}} = \{ \underbrace{\mathbf{u}}_{\mathbf{u}}, \underbrace{\mathbf{w}}_{\mathbf{u}}, \underbrace{\mathbf{w}}_{\mathbf{u}}, \underbrace{\mathbf{w}}_{\mathbf{u}}, \underbrace{\mathbf{w}}_{\mathbf{u}}, \ldots \}, \text{ space of } \underbrace{quantifiable}_{qualifiers' modeling 'multi-population meta-distributions';}$
		-		of the first of the arithmetics able to model the 'multi-ontic cumula' of 'meta-evolving' universes 'quanto-qualitatively';
ĝ <sub>4</sub>	⇔	w <sup>M</sup>	⊐	$\underline{\mathbf{M}} = \{ \mathbf{m}_{0}, \mathbf{\hat{m}}_{1}, \mathbf{\hat{m}}_{2}, \mathbf{\hat{m}}_{3}, \ldots \}, \text{ space of 'unquantifiable qualifiers' interpreted as the ontology of a 'metrical unit qualifier';}$
Â5	÷	w <sup>q<sub>MN</sub></sup>	⊐	{ m <sub>0</sub> , W <sup>6</sup> <sub>1</sub> , W <sup>6</sup> <sub>2</sub> , W <sup>6</sup> <sub>3</sub> , }, space of 'quantifiable qualifiers' interpreted for 'populations of metrical qualifiers';
â <sub>6</sub>	⇔	<u>w<sup>q</sup>mo</u>	⊐	$\{ \hat{m}_{q}, \hat{m}_{s}, \hat{m}_{s}, \hat{m}_{s}, \hat{m}_{s}, \dots \}$ , space of ' <u>un</u> quantifiable' ontologies of additively & multiplicatively idempotent 'qualifiers';
ĝ <sub>7</sub>	**	<sup>w′α</sup> <sup>μ</sup>	⊐	$_{\underline{\alpha}\underline{\mu}} = \{ \mu_0, \{ (\mathbf{W}) \boxtimes [\stackrel{\hat{\underline{\beta}}}{\underline{\mu}}_{\underline{j}}] \boxtimes [\![ \stackrel{\hat{\underline{\beta}}}{\underline{\mu}}_{\underline{j}}] ] \}, \{ (\mathbf{W}) < \stackrel{\hat{\underline{\beta}}}{\underline{\mu}}_{\underline{j}} \boxtimes \stackrel{\hat{\underline{\beta}}}{\underline{\mu}}_{\underline{j}} > \}, \{ \mathbf{W} \stackrel{\hat{\underline{\beta}}}{\underline{\mu}}_{\underline{j}} \stackrel{\hat{\underline{\beta}}}{\underline{\mu}}_{\underline{j}} \}, \{ \mathbf{W} \stackrel{\hat{\underline{\beta}}}{\underline{\mu}}_{\underline{j}} \stackrel{\hat{\underline{\beta}}}{\underline{\mu}}_{\underline{j}} \}, \dots \},$

space of 'quanto-qualitative' or 'qualo-quantitative' meta-numbers' which are doubly qualified; of quantifiers qualified both ontologically and metrically, able to model the meta-system succession of a given 'meta-finite', 'meta-fractal multi-ontic cumulum' in a 'quanto-qualitative' & 'multi-metrical' way, and in terms of any spectrum of metrics; used to characterize the state-variables and control-parameters of the 'meta-evolving', 'meta-dynamical' statespace/control-space 'unified meta-space' of each successive system of the diachronic 'meta-system', encompassing 'metafinite self-bifurcation singularities', for evolving and 'meta-evolving' universes of discourse in general.

In the above-listed systems-progression,  $\mathbf{W}$  is taken as conceptual «arché» [ever-present origin; evercontrolling source; initial condition] of number-in-general, while  $\mathbf{W}$  denotes the «arché» of the dialectical ideographies, of the <u>explicitly</u> dialectical arithmetics presented herein. In the notations for the 'meta-numerals' of these dialectical arithmetics, we employ the underscore ideogram element, or "ideographical diacritical mark", '\_\_', to signify those 'meta-numbers' or 'meta-scalar' operators whose 'unit-qualifier' self-multiplication is '<u>strongly</u> contra-Boolean', i.e., whose 'self-product-tion' is 'ontologically' or qualitatively 'meta-potent', whether 'evolute' or 'convolute'. Such 'ontology self-multiplications' have the form  $\mathbf{X} \cdot \mathbf{X} = \mathbf{X} \times \mathbf{X} = \mathbf{X} [\mathbf{X}] = \mathbf{X} \mathbf{X} = \mathbf{X}^2 = \mathbf{r} \mathbf{X} \blacksquare \square \mathbf{X}$ , such that  $\square \mathbf{X} \stackrel{3}{\leftarrow} \mathbf{X}$  and  $\square \mathbf{X} \stackrel{3}{\leftarrow} \mathbf{q}$ . We employ the "hat" ideogram-element, 'A', for 'meta-numerals' interpretable as ontological qualifiers, to signify <u>qualifier</u> "unities": "units", "monads", "forms of unity", "Non-Standard" forms of 1, i.e., transcendental operators of 'meta-modulus' "unity" [of "length" "one unit"; of "unit length"], in short, to designate '<u>dialector</u> unit-qualifiers' in the tradition of the traditional "unit <u>vectors</u>", herein denoted  $\mathbf{\hat{X}}, \mathbf{\hat{Y}}, \mathbf{\hat{Z}}$ ,

Or  $\underline{\hat{e}}_1$ ,  $\underline{\hat{e}}_2$ ,  $\underline{\hat{e}}_3$ , .... We sometimes, when contextual cues allow, omit the "hat" component for typographical convenience. We similarly employ the 'b' 'headdress' ideogram-element to signify <u>quantifiable</u> unit qualifiers [reprising Diophantus' "syncopated" symbolization of the abstract, generic homogeneous units, or «monads», of the Platonic+ «arithmoi <u>monad</u>ikoi», via  $\hat{\mathbf{x}}$  in the proto-algebraic notation of his circa 250 C.E. work, the «<u>Arithmetica</u>».]

The philosophical term "Ontology" is employed herein in a non-reductionist mode, perhaps a mode rarely encountered in explicit form. For example, if we suppose that molecules are the immediate 'meta-<u>units</u>' or 'meta-<u>«monads</u>»' of atoms -- 'meta-atoms', each made up out of a heterogeneous multiplicity of atoms -- constructed via densified/intensified mutual interactions of atoms after localized atomic populations within the 'meta-evolving' cosmos attain sufficient multiplicity and density, we nevertheless conceive the ontological category of molecules as a "tertium quid"; as holding an independent ontological status vis-à-vis that of atoms if we find that the 'behavioral qualities', the 'types of action', the "emergent properties" evident in the phenomenology of molecules 'qualitatively exceed' and add to those manifest in atomic matters which were, or which remain, without any organization at the molecular level. We then, in that case, do not say that molecules are "just" "collections" of atoms. We do not "reduce" molecules to atoms simply because molecules "contain" atoms, or constitute a 'self-subsumption' of atoms. We see the self-movement of the 'meta-evolving' cosmos, from a 'meta-state' containing atoms but <u>no molecules</u> to one containing both -- to one containing 'atoms **(definitions)** - as one in which the cosmos adds new ontology to itself; as an ontology expansion; as a 'meta-dynamical process' and also as an 'onto-dynamical' self-movement, an 'onto-dynamasis'; as an 'onto-auto-kinesis' and as an 'auto-onto-kinesis'.

**Overview of Briefings.** Let us characterize these first **7** arithmetics in more detail, as a preview of what is to come:

- Menotes the category or concept [intension[-ality]] of that rules-system regarding idea-objects known as "numbers", i.e., that system of arithmetic, which is the arithmetic of 'Matural' numbers as specified by "first-order" propositions / rules / axioms, such as the first four Peano Postulates, <u>only</u>. "First-order" axioms involve assertions about 'logical <u>individuals</u> -- here, about individual numbers-as-idea-objects -- only; but <u>nol</u> assertions about sets of such individuals/numbers. The rules system of the arithmetic of numbers grasped as exoterically as "'pure/generic, <u>un</u>qualified quantifiers'''.
- $\vec{\mathbf{g}}_{\underline{\mathbf{Q}}} = \underline{\mathbf{Q}} \text{ denotes a system of arithmetic whose units/«monads» are 'Peanic' [compliant with the first-order Peano Postulates]$ but 'contra-Boolean' in self-multiplication, and interpretable as "pure", i.e., '<u>unquantifiable ontological</u> unit-<u>Qualifiers'</u>[in polar contrariety to <u>N</u> interpreted as a system of arithmetic of "pure", i.e., of "abstract" or '<u>unqualified' quantifiers'</u>], $i.e., with each <math>\hat{\mathbf{q}}_n$  'meta-number' as a non-additive/'non-addable' [additively idempotent] 'ontological qualifier'.
  - Image: Image:
- Image: Market Market
  - denotes a system of arithmetic whose units / qualifiers are 'quantifiable' as well 'Qualo-Peanic' and self-multiplicatively 'contra-Boolean', interpretable as [metrical qualifiers], and which thus combine 'metrical qualification' with its opposite, "'quantification'", but only for one single «arché» species of metric/metrical unit/dimension/dimensional unit at a time.
  - denotes a system of arithmetic of 'Qualo-Peanic', hybrid, Q-subscripted, still unquantifiable qualifier <u>units</u>/<u>«monad</u>»<u>s</u> which yet exhibit the '<u>Boolean</u>, "idempotent" self-multiplication' which is also characteristic of the units of the classical arithmetic of the Diophantine monads [which Diophantus denoted by the "syncopated" abbreviation **Å**], and of Plato's «Arithmoi Monadikoi», but still partially interpretable as an arithmetic of <u>metrical</u> qualifiers, and which, via its Q-subscripting, first surfaces the 'principle of rules-system subsumption' and the 'principle of dis-entanglement' of "'fundamental units'" needed for a full-fledged arithmetic of dimensional analysis, and encompassing, for the first time, though in a 'pre-vestigial' fashion, multiple «arché» for multiple species of "'fundamental''' metrics.

 $\hat{\mathbf{A}}_{\underline{\mathsf{MON}}} = \hat{\mathbf{A}}_{\underline{\mathsf{MON}}} = \underbrace{\mathbf{A}}_{\underline{\mathsf{MON}}} \det \text{denotes a system of arithmetic whose quantifiers are explicitly both 'metrically and ontologically qualifiable'. 1.e., its explicit, combined, but 'disentangle-able' 'metrical qualifiers' are quantifiable, and its 'ontological qualifiers' are 'metrically <u>quanto-qualifiable'</u>, its quantifier unit, and 'metrical and ontological qualifier units', are 'Peamic', its quantifier unit[] is 'Boolean' in self-multiplication, its 'metrical and ontological qualifier' units are 'contra-Boolean' in self-multiplication, and 'addable' /additively <u>non-</u>idempotent. Also, its 'metrical quantifier' sub-arithmetic instantiates a full-fledged, ideographical-algorithmic arithmetic of dimensional analysis, encompassing, in unified fashion, multiple «arché» for multiple species of "fundamental" metrical <u>units</u> (monadas), and its zero division or additive-identity-division operation is well-defined/determinate. Consequently, the "singularities" of dynamical models can be calculated and 'semantified' as meaningful, accurate '[meta-]finite' values, thereby overcoming a key cause of "'The Nonlinearity Barrier'', given the inherent connexion of degree >1 values of state-function unknowns in rate-of-change equations to finite-time, moveable pole, zero-division$ 

singularity. Each  $\hat{\mathbf{g}}_{MON} = \hat{\mathbf{g}}_{MU} = _{\alpha}\underline{\mu}$  'meta-number' is thus able to express the momentaneous value of a '<u>state-variable</u>' or a '<u>control-parameter</u>' of a [nonlinear] dynamical system, with the '<u>ontological</u> qualifier' "'factor'' denoting the 'vector component qualifier', the "kind", of the metric in question, with the '<u>metrical</u> qualifier' "'factor'' denoting the dimensional/metrical unit of the metric in question, and with the 'quantifier' "factor'' denoting the momentaneous number of dimensional/metrical units of that metric manifest by the system in question, at the temporal moment in question.

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The key to the 'succession-logic' or 'progression-logic' of the above pedagogical order of presentation for this progression of systems of arithmetic is the pedagogical decision that the increment to 'concept-ontology' produced by the 'self-reflexion' of  $\Omega$  – of the first-order *rules-system* of '<u>ontological</u> qualification' -- is  $\underline{M}$ , the *rules-system* of <u>Metrical</u> qualification and of an 'ideo-ontological meta-evolution' of '<u>metrical</u> qualifiers' which is analogous to, or a special case/species of, <u>ontological</u> qualification and of the 'meta-evolution' of '<u>ontological</u> qualifiers'.

The first *Briefing* presents the  $\underline{Q}$  arithmetic. The second *Briefing* presents the  $\underline{U}$  arithmetic. The third and final *Briefing* presents the  $\hat{\mathfrak{g}}_{\underline{MQN}'}$   $\hat{\mathfrak{g}}_{\underline{MU}'}$  or  $_{\alpha}\underline{\mu}$  arithmetic, including the build-up toward it via the successive conceptual superposition of the  $\underline{M}$ ,  $\hat{\mathfrak{g}}_{\underline{MN}'}$  and  $\hat{\mathfrak{g}}_{\underline{MQ}}$  arithmetics.

#### Mathematical Logic, Dialectical Logic, and 'The Gödelian Ideo-Meta-Dynamic', or 'Gödelian Dialectic'.

Mathematical Logic is about 'evolving' a given mathematical system by deductively proving and thus "'birthing" an ever greater 'population of theorems' of/within that system. The truth of such theorems is never absolute. It is always a truth from and relative to the axioms or postulates of that system; for the logical individuals/undefined primitives of the universe of discourse of that system -- for its postulated "ontology". It is also a truth arrived at by using the rules of inference of that system. All three major assumptional components of this relative truth -- axioms, individuals/primitives, and rules of inference -- are traditionally held to be fixed for all time. I.e., they are assumed to form a Parmenidean/early-Platonic 'ideo-onto-stasis', never an 'ideo-onto-dynamasis'.

Dialectical Logic encompasses this deductive methodology of formal logical, but also goes beyond it, picking up where it leaves off. Dialectical Logic is about 'meta-evolving' a progressive succession of increasingly-adequate axiom-sets and their corresponding mathematical 'ideo-systems'. The axioms, primitives, and rules of inference are not deduced. They are <u>unproven assertions</u>. In the beginning, they were held to be "self-evident", hence non-arbitrary. But, subsequently, this position has become untenable, at the very least since the discovery of the equi-consistency of Non-Euclidean Geometries vis-à-vis Euclidean Geometry, i.e., with the discoveries of formally independent/undecidable and mutually contrary competing candidate axioms, starting with the Euclidean Parallels Postulate, and its Non-Euclidean alternatives, and even more so with the systematization of the theory of independent/undecidable propositions by Gödel and Cohen. Given that we have options -- given a spectrum of two or more candidate, mutually contrary, alternative axioms -- how does one "elect" the "best" candidate? It is this question -- one that Mathematical Logic leaves unaddressed -- that Dialectical Logic addresses. Even in the ancient days when "self-evidence" seemed like a tenable argument for justifying prevailing [e.g., the Euclidean] postulations, the Platonic dialectical tradition was not taken in:

"These conclusions point in particular towards that aspect of the *dialectic* which lay at the *forefront of Plato's concern*, He insisted upon two fundamental ideas: (1) that a starting point for rational argumentation cannot be merely assumed or postulated, but must itself be justified, and (2) that the modus operandi of a justification can be dialectical. Plato accordingly mooted the prospect of rising above a reliance on unreasoned first principles. He introduced a special device he called "dialectic" to overcome this dependence upon unquestioned axioms. It is worthwhile to see how he puts [this point - F.E.D.] in his own terms: There remain geometry and those other allied studies which, as we have said, do in some measure apprehend reality; but we observe that they cannot yield anything clearer than a dream-like vision of the real so long as they leave the assumptions they employ unquestioned and can give no account of them. If your premiss is something you do not really know and your conclusion and the intermediate steps are a tissue of things you do not really know, your reasoning may be consistent with itself, but how can it ever amount to knowledge?... So ... the method of dialectic is the only one which takes this course, doing away with assumptions....Dialectic will stand as the coping-stone of the whole structure; there is no other study that deserves to be put above it. Plato's writings do not detail in explicit terms the exact nature of this crucial enterprise of *dialectic*. Presumably we are to gain our insight into its nature not so much by way of explanation as by way of example - the example of Plato's own practice in the dialogues. And what emerges is pretty much the sort of dialectical process envisaged in our present discussion: the comparative "cost-benefit" analysis of pros and cons of the proposed starting point in the face of competing alternatives". [Nicholas Rescher, Dialectics: A Controversy-Oriented Approach to the Theory of Knowledge, State University of New York Press [Albany, New York: 1977], pp. 48-49, bold italic emphasis added by F.E.D.].

In addressing the question of the systematic optimization of axiomatic election, neglected by Mathematical Logic, Dialectical Logic also demurs from the tacit 'Parmenidean Postulate' of eternal 'ideo-onto-stasis'. It admits the actuality of, and thereby discovers the unavoidable, inescapable necessity of, 'ideo-onto-dynamasis': that axioms-systems change with time, and also that they change due to psycho-historical causes, not just due to "eternal"-ideal/formal causes, and not just due to initial oversight and error in the "perception" of "absolute, eternal, immaterial truth". It is not enough to 'evolve' a single axiom-system via deductive derivation of new theorems, until, if ever, that axiom-system's axiom-set is exhausted of its implications. This 'evolution' will inevitably encounter, e.g., syntactically-correct but semantically transcendent unsolvable diophantine equations within undecidable propositions concerning the unsolvability of these equations [per Gödel's First Incompleteness theorem]. That is, this 'evolution' will encounter 'conceptual singularities', that can only be resolved favorably by, not only a change of axioms, but by a cumulative, progressive, «aufheben»-'evolute' expansion of the axioms-set, as well as of its implied 'ideo-ontology'; that can only be resolved by adjunction of additional axioms which encompass the existential assertion and behavioral definition of, e.g., new kinds of numbers [which render ] the "unsolvable" equations solvable in all higher systems I, and the undecidable propositions about their unsolvability decidable/provable, for that predecessor system, in all subsequent, higher systems, and] which higher kinds of numbers are 'modelable' as sets of higher "logical type", sets 'meta-fractally', 'evolutely', «aufheben»-containing, and thereby escalating beyond, the 'meta-fractal', 'auanto-qualitative' "scale" of, the "[logical] types" of sets previously existentially asserted and described, by the previous axioms-set [per Gödel's Second Incompleteness theorem]. This 'exo-empirically', externally observed and 'intro[-in-spectively]-empirically', internally observed psychohistorical phenomenology is one which we term 'The Gödelian Ideo-Metadynamic', or 'Gödelian Dialectic '. Gödel described this "formal" 'meta-system'this "sequence", succession, or, in truth, «aufheben»-'progression-cumulum' of axiomatic [rules-]systems -- as follows:

"Let Z be the formal system that we obtain by supplementing the Peano axioms with the schema of definition by recursion (on one variable) and the logical rules of the restricted functional calculus. Hence Z is to contain no variables other than variables for individuals (that is, natural numbers), and the principle of mathematical induction must therefore be formulated as a rule of inference [thereby maintaining Z as a <u>first-order</u> formal theory – F.E.D.]. If we imagine that the system Z is successively enlarged by the introduction of variables for classes of numbers, classes of classes of numbers, and so forth, together with the corresponding comprehension axioms, we obtain a <u>sequence</u> . . . of formal <u>systems</u> that satisfy the assumptions mentioned above, and it turns out that the <u>consistency</u> . . . of any of these <u>systems</u> is <u>provable</u> in <u>all subsequent systems</u>. Also, the undecidable propositions constructed for the proof of Theorem 1 [the "First Incompleteness Theorem" – F.E.D.] <u>become decidable by the adjunction of higher types</u> [higher logical types of sets, i.e., sets of the sets of lower logical type - F.E.D.] and the corresponding axioms; however, in the higher systems we can construct other undecidable propositions by the same procedure...To be sure, all the propositions thus constructed are expressible in Z (hence are number-theoretic propositions); they are, however, not decidable in Z, but only in higher systems, for example, in that of analysis [i.e., in that of **R** – F.E.D.] [Kurt Gödel, On Completeness and Consistency (1931a), in J. van Heijenoort, ed., <u>Frege and Gödel</u>: Two Fundamental Texts in Mathematical Logic, Harvard U. Press [Cambridge: 1970], p. 108, bold italic <u>emphasis added</u> by F.E.D.].

<u>Summary</u>: 'Psycho-archaeological' observors of the historical record and of the historical phenomenology of the axiomatic praxis will observe not a single axioms-system for each initial universe of discourse that has been so formalized, but a <u>sequence</u> of axioms-systems. That is, they will observe, for each sufficiently matured, developed such formalized subject-matter, an axioms-'<u>meta</u>system'. They will observe, accompanying the 'dynamic' of deductive, '<u>theorem</u>-etical <u>evolution</u>', an ongoing 'meta-dynamic' -- the episodic, punctuated irruption of 'axiomatic revolutions', of axiomatic-systems '<u>meta-evolution</u>'. This is the fundamental 'psycho-empirical', 'psycho-archaeological', and ''psycho-historical'' finding of Dialectics as 'Meta-Axiomatics'.

#### Historical Dialectics, Systematic Dialectics, 'Meta-Systematic Dialectics', and Dialectical Ideography.

Consider the context of Hegel's works. Therein, what we mean by '<u>system-atic dialectics</u>' is exemplified in the ideational-necessitarian exposition of the progression or 'progressive evolution' of categories and categorial transitions <u>within</u> the major 'systems'/divisions of the Hegelian 'Meta-System' - «Logik», «Natur», and «Geist» [Spirit]. What we mean by '<u>meta-system-atic dialectic</u>' is exemplified, if imperfectly, by the 'meta-evolutionary' transitions <u>"without</u>", and beyond/between, each of those divisions, from «Logik» to «Natur», and from «Natur» to «Geist» [plus, putatively, circularly from «Geist» back to «Logik»].

Consider also Marx's theory of human-social evolution-and-'<u>meta</u>-evolution'/'social-relations <u>revolution</u>'. Therein, what we mean by 'systematic dialectics' is exemplified by the "'meta-anatomical/synchronic" categorial progressions and transitions <u>within</u> the System of Kapital, e.g., from Commodity to Money to «Kapital» as forms of Value, with each such form -- if we grasp human society itself as the collective subject/causal agent and also as the primary object/material of its own activity [hence an activity which can be characterized as a <u>self</u>-production/<u>self</u>-development] -- grasped as a human-<u>social relation of</u> [human-societal <u>self-[re-]]production</u>. These categorial progressions provide a conceptual 'meta-anatomy' or categorial 'meta-physiology' of the capital-centered society; of a synchronic "'slice/cross-section" of the system of self-reproduction of «Kapital(s)». That is, they account for, primarily, the capacity for [an historically transitory] 'self-causation' or self-reproduction of the 'System of «Kapital(s)»', of the «Kapital(s)» social formation. These progressions should also locate the 'self-duality', or 'intra-duality' of the «Kapitals»-system, including the 'essence-ial', internal, inherent, immanent grounds for its <u>finality/entelechy</u> as its ultimate, self-destined 'self-dis-causation' or 'self-dis-reproduction'/ potential self-transcendence. But 'systematic dialectics' involves primarily a 'synchronic', "'slice-in/of-time''' exposition of a [transitorily] self-reproducing system.

#### Dialectical Ideography

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What we mean by '<u>metasystem-atic</u> dialectics' is exemplified by the "'psycho-historical", 'meta-evolutionary', and 'revolutionary'/'catastrophic', or singularity-like and human-social-ontology-expansive or "qualitative"/'meta-finite' diachronic transitions to outside/<u>without</u>/beyond/between social systems; from the systems of human-<u>social relations of</u> [human-societal self-re-] <u>production</u>] of primitive-communal/kinship-based societies to those of servile [slavery/serfdom-based] societies, and from those of servile societies to those of "modern", capital-/wage-labor/sold-labor/alienated labor-centered societies, all as driven by the internal, endogenous self-growth of the "<u>social forces of production</u>"; of the level/magnitude of the human-social force of expanding human-societal self-re-production, that is, the self-induced growth of human-societal self-productivity; of the <u>rate</u> of [growth or of self-expansion of the] self-[re-]production of human society, including of 'memetic matter'; of 'human-socio-matter', of 'human-socio-mass', or of 'human-social negentropy'. It is so exemplified when this 'diachronic meta-system' is presented as a conceptual, systems-progression as categorial-progression pedagogical exposition.

In summary, a "'system-atic dialectical"' theory dialectically 'exposits' a categorial progression comprehending primarily the self-reproduction of a system/sub-totality. A 'meta-system-atic dialectical' theory dialectically 'exposits' a 'meta-system', e.g., an historical or temporal progression of systems, as a categorial progression, both locating and scrutinizing the moment of non-self-reproduction or of self-non-reproduction of each system in that sequence; the moment where each such "self-organizing system" intrinsically passes over into a 'self-dis-organizing system' and into a qualitatively -- i.e., ontologically -- self-expanding 'self-re-organizing system'. Whereas "systematic dialectics" emphasizes the momentaneous/synchronic "Being" of a given system, 'meta-systematic dialectics' emphasizes the moment of any given system's diachronic "Becoming", including of its eventual, 'self-un-Becoming', locating its moment of immanent self-revolution; of progressive, 'self-supercessive' self-dissolution / self-transformation; of self-transcendence; i.e., of "meta-system [self-]transition" [cf. Turchin]; of 'self-bifurcation', of '[self]-conversion singularity'; of 'meta-finite', 'meta-fractal', 'metadynamical', 'meta-monadic', 'meta-ontic', and 'meta-evolutionary' «autokinesis», or self-locomotion. Such a theory also theoretically anticipates/predicts and scrutinizes the transition-process itself: its transient, transitory phenomena, and their "laws". Each such "qualitative leap", or 'ontological leap', involves 'categorial change', that is, 'ontological change'; 'ontology-gain'. By 'ontological change', 'ontological growth', or 'ontology-change' we mean 'meta-finite', 'evolute'-helical, or «aufheben»-cumulative ontology net-expansion for successor systems vis-à-vis their predecessor systems within the total diachronic, or 'synchronicodiachronic', 'meta-system', or categorial-progression model of 'systems-progression'. Interior to the domain of 'human-social meta-systems', this ontology net expansion includes net expansion of the corresponding and accompanying "psycho-historical" "universe of discourse". That is, it includes ideo-ontic expansion as well as expansion of the metrical repertoire necessary for adequate human [self-]descriptions of humanity's thusexpanded societal ontology and its phenomenology. Dialectical Ideography endeavors to discover/engineer a 'meta-system' of arithmetics fit to encode models of "historical dialectics", "systematic dialectics", and 'meta-systematic dialectics' alike, as illustrated herein.

#### The Plot-'Line' Of This Story.

- The Plot Thickens. The <u>N</u> arithmetic is related to, though not identical to, the Platonic / Diophantine model/theory of the «Arithmoi Monadikoi», the arithmetic of «Dianoia», of «Verstand», of "The Understanding". The <u>Q</u> arithmetic is related to, though not identical to, the Platonic «Arithmoi Eidetikoi», the arithmetic of the «Eide», of «ιδεα», of the ideas/concepts/categories of Reason; the arithmetic of «Vernunft», the arithmetic of "Higher Reasoning", the arithmetic of «Dialektiké». In this progression, <u>N</u> is the implicitly dialectical «arché» [origin; controlling source; initial condition] of all rules-systems of number, and <u>Q</u> is the «arché» of the explicit dialectical ideographies; of the explicitly dialectical arithmetics presented herein.
- The Plot Thickens Again. All of the systems of arithmetic in this 'meta-system' or sequence of systems of arithmetic, starting with Q, are "Non-Standard" Models of the first-order Peano axioms for the Standard Natural Numbers, N. All are 'Peanic' in that their 'unit-qualifier' bases all conform to the first-order Peano axioms. Thus it appears that the 'dialectical ideography' implementation of the *«Arithmoi Monadikoi»* corresponds to the "Standard", outward, "'explicate''' face, and that the 'dialectical ideography' implementation of the *«Arithmoi Eidetikoi»* corresponds to the inward, occult or hidden, "'implicate''', "Non-Standard" face, of the Janus-faced first-order rules-system of the "Natural" Numbers, which rules-system we denote by the symbol N.

The Plot Thickens Even More. Each of these "Non-Standard" "Natural" arithmetics also is or contains a contra-Boolean Arithmetic, and, hence, a contra-Boolean Algebra, i.e., each contains 'contra-Boolean' units <u>u</u><sup>2</sup> ≠ <u>u</u>, whether quantifiable [e.g., <u>u</u><sup>2</sup> ≠ <u>u</u>] or not [e.g., <u>g</u><sup>2</sup> ≠ <u>g</u>]. Since Boolean Algebra is an algebra that models standard formal logic, this suggests that these "Non-Standard" Arithmetics might also model new, non-standard logics, qualitatively distinct from, and alternative to, Standard/Boolean/Aristotelian/- Formal logic. Should we not then expect that such alternative logics would turn out to be, or would include, precisely, <u>dialectical</u> logic(s)?

The Plot Grows Thicker Still. The Zermelo-Fraenkel Axioms for Set Theory are widely regarded by
mathematicians as the foundation of "Standard" Mathematics. Work by Kurt Gödel and Paul Cohen circa
mid 20th-century C.E. has established that the <u>Generalized</u> Continuum Hypothesis, a generalization of
Georg Cantor's Continuum Hypothesis regarding transfinite cardinal quantities, is "independent" of/undecidable from the Axioms of Zermelo-Fraenkel Set Theory [just as Euclid's Parallels Postulate is
"independent" of the other postulates of Euclidean Geometry], as is also the Zermelo-Fraenkel Axiom Of
Choice, from the remaining axioms:

"The two independence results [of Gödel and Cohen -- F.<u>E.D.</u>] mean that in the Zermelo-Fraenkel system *the axiom of choice* and *the continuum hypothesis* are *imdecidable* [in the full Gödelian sense -- F.<u>E.D.</u>]...*There are then many mathematics*. There are numerous directions in which set theory (apart from other foundations of mathematics) can go...As for *the continuum hypothesis*, here one ventures into the unknown and, whether one affirms or denies it, *significant consequences are not known as yet*...Just as the work on the parallel axiom led to the parting of the ways for geometry, so Cohen's work on these two axioms about sets leads to *a manifold parting of the ways for all of mathematics based* especially on set theory, though it also affects other foundational approaches. *It opens up several directions that mathematics can take but provides no obvious reason for preferring one over another.*" [Morris Kline, <u>Mathematics</u>: The Loss of Certainty, Oxford U. Press [NY: 1980], pp. 268-270, *emboldened italics emphasis* added by F.<u>E.D.</u>]

Both the Generalized Continuum Hypothesis and the Axiom Of Choice share a conceptual underpinning which can be characterized as 'reductionist', 'point-atomistic', or 'dimensionality-denying'. Joining the Set Theory Axioms with each consistent alternative to the 'Cantor Axiom' of the Generalized Continuum Hypothesis [not to mention with each consistent alternative to the Axiom Of Choice] yields yet a new, "Non-Standard", 'Non-Cantorian' Set Theory and Mathematics. Each such neo-mathematics is equally self-consistent, yet qualitatively different from, the existing mathematics, just as the several Non-Euclidean Geometries differ qualitatively but self-consistently from Euclidean Geometry. Hypothesis: At least one of these Alternative Mathematics contains wherewithal for 'The Nonlinearity Breakthrough'. In Part III., we explore alternative foundations based upon a 'non-reductionist', 'non-point-atomistic' candidate replacement for the Generalized Continuum Hypothesis, which we term the 'Generalized Cumulum Hypothesis', for reasons which will emerge.

#### • Pure-Quantitative Arithmetics, 'Pure-Qualitative Arithmetics', and 'Quanto-Qualitative' Arithmetics.

These "Non-Standard" "Natural" Arithmetics begin, with  $\underline{O}$ , by bringing back the missing, little noticed, and neglected "half" of arithmetical and mathematical ideography, the qualitative "half", the "pure" 'qualifier' as opposed to the "pure" 'quantifier' "half". From there, they continue to burgeon, bringing about a redintegration of quantitative and qualitative ideographic language, of quantitative and qualitative computation, in the form of an «organon» of ontologically and metrically <u>qualified quantifiers</u>: of metrical and ontological <u>qualifiers quantified</u>, which we call 'Quanto-Qualitative Analysis' or 'Qualo-Quantitative Analysis', and, for reasons which will emerge, also 'A Posteriori Analysis', 'Synthetic Analysis', 'Realistic Analysis', or 'Re-Qualified Metafinite Analysis'. What these epithets point to is a species of mathematical analysis that respects the inductive, "a posteriori", "synthetic", and 'realistic' 'Principle Of Metafinity', and its implications; the principle which holds that 'infinity is non-empirical', or that 'only finite metrical values ever manifest'. It supports the 'semantification' of zero division and, therefore, of the "singularities" of especially the <u>nonlinear</u> dynamical systems' total [and partial] integrodifferential equations-models, and the rectification of the infinite error -- of the 'infinity residuals' -- that arise from the attempted interpretations of such singularities in Standard, '<u>Un</u>realistic' and '<u>Un</u>qualified' Analysis.

#### Our 'Meta-Systematic' Dialectic of **N** and the Historical Dialectic of the «Arché» of Written language.

Denise Schmandt-Besserat, in the late 1970s, offered a theory of the 'proto-poiesis' and early 'meta-evolutions' of a prehistoric proto-writing technology, a theory that that combines conceptual coherence, subtle 'psycho-historical' insight, and rather massive empirical, 'psycho-artefactual' archaeological evidence. She sums up her theory in the following terms:

"In 1964, Pierre Amiet, conservateur en chef du department des Antiqités Orientales au Musée du Louvre, identified in the archives of Susa an archaic system of recording dating from the second half of the IVth Mill, B.C., and slightly predating the earliest tablets. The system consists of small clay tokens of geometric shapes mostly in the form of spheres, discs, cones, and tetrahedrons, found enclosed in [*opaque* – F.<u>E.D.</u>] clay envelopes in the shape of hollow clay balls (called *bullae* ...). The surface of the *bullae* usually bear seal impressions and sometimes marks indicating the number of tokens enclosed. Pierre Amiet interprets such bullae as representing a transaction, the tokens inside indicating the kinds of goods exchanged by their shapes and the quantity by their size and number. In the course of my recent study on the earliest uses of clay in the Middle East, I found that geometric tokens identical to those identified by Pierre Amiet in the bullae are found loose in most Middle Eastern sites of the IXth to the IId Mill, B.C. I have been intrigued by the striking similarity of the shapes of the tokens with some of the abstract signs from the Uruk tablets. In the present paper I will discuss four stages in the evolution of an early recording system based on the tokens which may have led to writing.

1. Ca. 8500 B.C. A three-dimensional system of recording is based on tokens.

2. Ca. 3250 B.C. Clay containers or bullae hold the tokens of a particular transaction.

Ca. 3250 B.C. Signs are impressed on the surfaces of the bullae [e.g., on their wet-clay, via tokens used as stamps, before firing - F.E.D.].
 Ca. 3250-3100 B.C. Clay tablets [='meta-«bullae»', solid, no-longer-hollowed-out clay slabs -- F.E.D.] bear impressed and incised signs." [Denise Schmandt-Besserat, On The Origins of Writing, in Early Technologies, vol. 3, Undena Publications [Malibu, CA.: 1979], p. 42].

Schmandt-Besserat's 'psycho-archaeologically' reconstructed evolution and 'meta-evolution' of this putative recording system instantiates a 'psycho-historical dialectic' of 'quanto-qualification' that is deeply related to,

though strikingly different from, the 'meta-systematic dialectic' of  $\underline{N}$  exposited in these Briefings, and, in greater detail, in <u>Part III</u>., The Arithmetic of Meta-Evolution. The following passage from her book provides a brief immersion in the 'psycho-historical milieu' of the "cradle of civilization" as reconstructed through her discoveries:

"The content of these envelopes demonstrates that the Uruk VI accountants indicated quantities (how many) in a way radically different from ours. They did not show, as we do, "5" by a numeral. Instead, "5 jars of oil" were translated by five tokens, each standing for "1 jar of oil", as illustrated here.

# ....

Literally, the set of tokens meant "jar of oil, jar of oil". The token system had no symbols for abstract numbers such as "5"...When tokens were replaced by their images impressed on the surface of an envelope or tablet, the resulting signs were already "more abstract" than the previous clay counters. Compared to three-dimensional clay counters, the two-dimensional markings represented commodities in greater abstraction since they could no longer be grasped in the hand and manipulated [mental "grasping" superseding manual "grasping" -- F.E.D.]. . . The alignment of the markings on the face of a tablet also contributed to decontextualizing the data. Semantically, however, the impressed markings were identical to tokens: Each ideogram still fused together the concepts of nature/quantity (i.e., measure of oil and the number 1). . . The accountants of Uruk IVa about 3100 B. C. invented the first numerals - signs encoding the concept of oneness, twoness, threeness, abstracted from any particular entity. This was not a small feat, since numerals are deemed to express some of the most abstract thoughts our minds are able to conceive. After all, "two" does not exist in [external, extra-mental - F.E.D.] nature, but only groups of two concrete items, such as two fingers, two people, two sheep, two fruits, two leaves, or even sets of heterogeneous items such as one fruit + one leaf, and so on. "Two" is the abstraction of the *quality* of twoness shared by such sets. The accountants of Uruk IVa can be credited with creating numerals and by doing so revolutionizing accounting and data manipulation. In fact, the Uruk IVa accountants devised two types of signs: numerals (symbols encoding abstract numbers) and pictographs (expressing commodities). Each type of sign was traced by a different technique pictographs were incised, whereas numerals were impressed, clearly standing out from the text. For example, a tablet from Uruk features two accounts of "5 sheep" shown by the pictograph for "sheep" (a circle with a cross) and "5" appearing as five impressed wedges... The notion of number was finally dissociated from that of commodity. The numerals of the Uruk IVa tablets constitute the first evidence for the use of abstract counting and the creation of modern arithmetic. . The first numerals were not symbols specifically created for representing abstract numbers. Instead, they were the impressed signs formerly indicating units of goods [i.e., they began as constituents of the same «arché» ontological category or 'ideo-onto' as the later, original "ideographs" or "pictographs": primitive undifferentiated unities of 'ontological qualifier', 'metrical qualifier', and of 'unit-quantifier', plus of whatever else is implicit in such unitary symbols - F.E.D.], such as measures of grain, endowed with a new numerical value. The wedge, which originally meant a small quantity of grain [a metrical unit of grain quantity then known as the "ban" -- F.E.D.], now stood for 1; the circle, which represented a larger quantity of grain [a metrical unit of grain quantity then known as the "bariga" - F.E.D.], was 10; the large wedge, punched wedge, and large circle were greater numbers. .. "

"In fact, the impressed signs that came to represent numerals never lost their primary meaning. Instead, according to the context, they had either an abstract or a concrete value. For example, the wedge preceding a pictograph was read "1" ..., but alone it stood for a measure of grain. ..This proved confusing to Sumerian accountants, who eventually eliminated the ambiguity by introducing a pictograph in the shape of an ear of grain (ATU 111/ ZATU 511). Abstract numbers, therefore, derived from the plain cones, spheres (cylinders and lenticular disks?) that were the most ancient tokens. The reason why these particular symbols became the first numerals can only be hypothesized. David E. Smith has remarked that in a number of societies the words for expressing numbers derived from concrete numerations of particularly frequent use. He cites languages that expressed "one, two, three" by number words that meant literally "one grain, two grains, three grains" or "one stone, two stones, three stones" or, like the Niues of the southern Pacific, "one fruit, two fruit, three fruit". It may be argued, therefore, that the first Sumerian abstract numbers derived from the grain and animal numerations because they were the most commonly used in Mesopotamia.

<u>Grain, in particular, was not only the main staple but also the most usual means of exchange</u> [key 'psycho-historical' insight: the primacy of the praxis of the emerging 'proto-money' or money-commodity in the splitting-off/ separation / bifurcation of 'pure quantifiers', and in the increasing polarization of human mentality as a whole toward the quantitative side throughout the epochs of increasing intra-social alienation; of the increasing ne-foundation of social metabolism and social reproduction on "universal alienation" or universal selling - F.E.D.</u>]. <u>Furthermore, grain metrology constituted a unique gamut of signs of increasing magnitude that could be easily converted to signify units of abstract counting</u> such as 1, 6(?), 10, 60, 180. The invention of numerals made a breach in but did not put an end to the age-old principle of one-to-one correspondence. It was a major break with the past that pictographs encoding commodities were no longer repeated as many times as the number of units involved. One-to-one correspondence continued governing the use of numerals, however. "Nine" was represented by nine wedges, fifty by five circles, and so on. For instance, the tablet of Godin Tepe Gd.73.295. . .bearing the notation "33 jars of oil" displayed a single pictograph standing for "jar of oil" and expressed "33" by three impressed circles (10 + 10) and three wedges (1 + 1 + 1). This archaism, in turn, was perpetuated for centuries in the Sumero-Babylonian arithmetical system. In fact, one-to-one correspondence persisted in all numbering systems, including those of Greece and Rome, until the invention of the so-called arabic numerals in India about 700 B. C."

[D. Schmandt-Besserat, Before Writing, vol. I, From Counting to Cuneiform, U. of TX. Press [Austin, TX: 1992], pp. 190-193, emphasis added by F.E.D.].

Schmandt-Besserat abstracts the multi-century 'meta-evolution' of this 'meta-system' of systems of proto-writing, in most concentrated fashion, in the following passage: "It was not by chance that the invention of pictography and phonetic writing coincided with that of numerals; instead, both were the result of abstract counting. The abstraction of the concept of quantity (how many) from that of quality, which merged inextricably in the token prototypes, made possible the beginning of writing. Once dissociated from any notion of mumber, the pictographs could evolve in their own separate way. The symbols formerly used for keeping accounts of goods could expand to communicate any subjects of human endeavor. As a result, items such as "the head of a man" or "mouth" that never had a token were expressed by a picture. True pictography, that is to say, concepts represented by their images, thus was the outcome of abstract counting. After pictography, writing crossed several new thresholds about 3000 B.C. in the Uruk III period. The abstraction of [continuous - F.E.D.] quantity (how much) [continuous metrical units 'qualification'; counting of 'spatially' discrete ontological «monuls» or units - F.E.D.] followed that of [discrete - F.E.D.] number (how many) ['cardinometry'; counting of 'spatially' discrete ontological «monuls» or units - F.E.D.]. Note, for example, that in Uruk VI it took one token to indicate one jar of oil, or presumably, "one sila of oil." In Uruk IVA, the same was written with two signs, namely, "1" and the pictograph "sila of oil" [or, as we would hold, "V"

for '1 sila of' or, more generally, for '1 standard metrical unit of whatever follows', and ', for "oil" - F.<u>E.D.</u>]. In Uruk III, however, each notion "1", "sila", "oil" was expressed separately, requiring a sequence of *three* signs.







Finally, symbols could function phonetically, representing not objects but, in particular cases, sounds. The incentive to resort to phonetics was seemingly prompted by *new administrative requirements* for recording the <u>names</u> of donors/recipients of goods on the tablets. Individuals' names were transcribed by symbols meant to be read phonetically as a *rebus*. This was the point of departure for a *syllabary* -- symbols standing not for commodities or concepts but simply for the sounds they brought to mind. Pictography led to a syllabary, which was the true takeoff of writing. In the ancient Near East writing emerged from a counting device. It is the main outcome of the invention of abstract counting. Tallying in one-to-one correspondence was superseded about 8000 B.C. by tokens of many shapes suited for concrete counting. Finally, writing emerged when abstract counting dissociated the concept of numbers from that of the commodity accounted. Writing resulted from a new way of handling data with an unprecedented [degree of] abstraction. <u>Tallying</u> in one-to-one correspondence conting with tokens was related to the rise of agriculture and an economy based on <u>hunting and gathering</u>. Concrete counting with tokens was related to the rise of agriculture and an economy of <u>redistribution</u>. Complex tokens, envelopes, and impresed tablets were the consequences of <u>urban development</u>, the rise of <u>industry</u>, and the formation of the <u>state</u>. Pictographic and phonetic writing, about 3100 to 3000 B.C., however, seems independent of any socio-economic event. It was the outcome of a new <u>threshold</u> in <u>cognitive development</u>; abstract counting." [D. Schmandt-Besserat, *ibid.*, pp. 194, emphasis <u>added</u> by F.<u>E.D.</u>].

We have illustrated this 'historical-dialectical meta-evolution' of the ancient Mesopotamian proto-writing language-praxis in the 'gram-ics' or 'graph-ics' which follow. Those graphics treat variously underscored versions of the three symbols cited above as 'archaeograms' and '«arché»-grams' [indeed, as cognitive "'psy-glyphs'" [cf. Musès]] representative generically of the entirety of the three emergent symbol-categories, conceptual-categories, and symbolization <u>sub-rules-systems</u> noted in the quoted passage, rather than as symbols with the specific denotations described therein.

The singly-underscored symbols  $\widehat{\bigtriangledown}$ ,  $\checkmark$ , and  $\bigvee$ , denote and, by a kind of ideogramic *«synecdoche»*, 'epitomize' for us, <u>respectively</u>, the entire 'spaces' or sets of *ontological qualifier symbols*, *metrical qualifier symbols*, and *abstract quantifier symbols* as a whole in the Uruk III epoch ancient Mesopotamian proto-writing system, whereas their 'underscoreless' counterparts,  $\widehat{\bigtriangledown}$ ,  $\checkmark$ , and  $\bigvee$ , denote, respectively, *oil*, the *sila* unit of fluid volume measurement, and the abstract numeral 1, as of that epoch.

Likewise, in the end, 'U' denotes the rules-system of the category of pure quantifier symbols in general, 'V' the

*rules-system* of the category of *kind of entity* or pure '*ontological qualifier*' *symbols* in general, and ' $\checkmark$ ' the *rules-system* of the category of pure '*metrical qualifier*' *symbols* or *units-of-measurement* ["*dimensional*"] symbols in general. An anomaly in this graphic representation is that the symbol ' $\underline{\nabla}$ ' stands, at first, for a *rules-system* which presupposes a primitive undifferentiated unity of *quantifier* and '*metrical qualifier*'

symbols in general, and later for one of *pure quantifier symbols* in general, after the splitting off of  $\checkmark$  to denote a *rules-system* of *purely metrical qualifier symbols* in general. It would be *notationally* preferable to have three separate symbols, one for the *primitive undifferentiated unity* of *quantifiers* and *metrical qualifiers*, a different symbol for the post-bifurcation category of *pure quantifier symbols*, and yet another symbol for the post-bifurcation category of *purely imetrical qualifier* symbols, but such would be untrue to the actual historical, empirical 'psycho-archaeological sequence' we are modeling. Note how the *historical dialectic* of this *proto-writing praxis* differs markedly from the '*meta-systematic dialectic*' of the Natural Numbers, **N**, "standard" and '*dialectical-nonstandard*', as recounted in these *Briefings*. The '*meta-systematic dialectic* of "Natural" arithmetic, initially apprehended only as an arithmetic of *pure quantifiers*. The *historical dialectic* of *Mesopotamian proto-writing* takes, as its *«arché»*, representations which are not yet even "*two-dimensional*" marks, cut into wet clay, but rather *three-dimensional iconic*-tactile symbols; fired-clay *micro-effigies* [e.g., of a

jar of oil], herein denoted collectively by ". Nevertheless, these two distinct dialectical progressions, both

involving concepts of 'qualifier' symbols versus 'quantifier' symbols, may prove mutually illuminating. Despite the marked differences between these two dialectical progressions, we may interpret the  $\underline{\Omega}$  arithmetic so as to model this *historical dialectic*, and to *calculate its 'ideo-onto-dynamics*', via the following assignments:

 <sup>g</sup><sub>2</sub> ↔ <u><u></u> = The scribal *rules-system* for, *initially*, the proto-written representation of *generic metrical unit qualifiers*, for the proto-written, "2-dimensional ", wet-clay impression-representation of *primitive* undifferentiated *unit*[ie]s of *metrical dimensions* or *'metrical unit-qualifiers*', and "*dimensionless*" *unit quantifiers* = <u><u></u><sup>g</sup>\_;

</u></u>

q



The calculated symbols above, interpreted as 'ideo-onto-computationally-derived' rules-systems, are defined as follows, via a method that we call 'qualitative factorization', 'ontological factorization' or 'intensional factorization' --



<u>qualifiers</u>' already split off, e.g., for names of unique, «sui generis», "singleton", or 'self-categorial' human individuals [a development which is outside of and beyond the scope of this narrative, but which is believed to have prototyped and catalyzed the formation of syllabaries and, eventually, the phonetic revolution, via the rebus strategy].

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Denoting by  $\underline{L}_{t}$  this sequence of proto-literate/proto-writing  $\underline{L}$ inguistic *rules-systems*, our {  $\underline{L}_{t} \leftrightarrow \underline{Q}_{t}$  } progression can, to its third epoch, be summarized as follows, with  $\underline{L}_{n} =$ 

<u>L</u> , =	$\left[\underline{L}_{0}\right]^{2} =$	[] <sup>2</sup> =	[ ● ◆ ◆ △ ້ [ ● ] ]	⇔ ⊑ ĝ <sub>1</sub> ⊞ ⊞ ĝ <sub>2</sub> , ₪	= <u>Q</u> ,
<u>L</u> <sub>0</sub> =	$[\underline{L}_0]^{2^0}$ =	[ ] <sup>20</sup> -	$\left[ \underbrace{\bullet}{\bullet} \right]^1 = \left[ \underbrace{\bullet}{\bullet} \right]$	⇔ ⊑ ĝ <sub>1</sub> 1	= <u>Q</u> ;
<u>L</u> <sub>1</sub> =	$\llbracket \underline{L}_0  bracket^{2^1}$ =	[ ] <sup>2<sup>1</sup></sup> =	[ <b>●</b> ] <sup>2</sup> = [ <b>● ◆■</b> ]	$\Leftrightarrow \mathbb{I} \stackrel{\circ}{\mathfrak{g}}_1 \boxplus \stackrel{\circ}{\mathfrak{g}}_2 \mathbb{I}$	= <u>Q</u> <sub>1</sub> ;
<u>L</u> <sub>2</sub> =	$\left[ \underline{L}_{0} \right]^{2^{2}} =$	[ <u>]</u> ] <sup>2<sup>2</sup></sup> =	$[\underbrace{\bullet}]^4 = [\underbrace{\bullet} \oplus \underbrace{\bullet} \oplus \underbrace{\bullet} \oplus \underbrace{\bullet}_{\bullet} \oplus \underbrace{\checkmark}]$	$\Leftrightarrow \mathbb{I}  \widehat{\mathfrak{g}}_1 \boxplus \widehat{\mathfrak{g}}_2 \boxplus \widehat{\mathfrak{g}}_3 \boxplus \widehat{\mathfrak{g}}_4  \mathbb{I}$	= <u>Q</u> ;
$\underline{L}_3 =$	$[\underline{L}_0]^{2^3} =$	[ <b>]</b> ] <sup>2<sup>3</sup></sup> =		<sup>♠</sup> Ŷ↓ <sup>♠</sup> Ŷ↓↓ <sup>♠</sup> Δ[ <u>↓</u> ]]	↔ <u>Q</u> _;

The detailed 'psycho-historical calculation', or 'computational psycho-archaeological reconstruction', of this linguistic 'meta-evolutionary sequence', per this model of it, and per the «aufheben» evolute product "multiplication" rule [and its non-distributive meristemal principle for heterogeneous multi-term products in  $\underline{\Omega}$ : that only the most -+-advanced operator term need operate upon each 'legacy' operand term], goes like this [epoch 0 to epoch 1] --



$$\begin{bmatrix} \mathbf{0} + \mathbf{V} + \hat{\mathbf{0}} & \mathbf{V} + \hat{\mathbf{0}} & \mathbf{V} &$$

In the above 'qualitative calculations' or 'ideo-ontological calculations', we are employing interpreted  $\underline{\Omega}$  as what we term an 'heuristic intensional calculus'. That is, we apply the arithmetical rules-system, the 'algorithmics' of  $\underline{\Omega}$ , to the "intensions" or meanings of the interpreting symbols, whose 'extensions' are not explicitly specified.

An <u>historical dialectic</u> like that of the **arché** is, as we shall see in the sequel, best exposited "pedagogically" using term-by-term, step-by-step sequences-of-onto-symbols, which we notate as:

$\underline{\mathbf{H}}_{1} = \left[ \begin{array}{c} 0 \\ 0 \end{array} \right] = \left[ \begin{array}{c} 0 \\ 0 \end{array} \right]^{T}$	↔ <b>[ 9</b> <sub>1</sub> <b>1</b> ; pre-proto-writing iconics;
$\underline{\mathbf{H}}_{2} = \left[ \textcircled{} \Leftrightarrow \underline{\underline{\mathbf{V}}} \right] = \left[ \textcircled{} \right]^{2}$	↔ I 🛱1⊞Ŷ2 I; proto-written 'metrico-quantifiers' emerging;
$\underline{\mathrm{H}}_{3} = \left[ \underbrace{}_{\mathbf{\Phi}} \oplus \underbrace{\underbrace{\P}}_{\mathbf{\Phi}} \oplus \underbrace{\underbrace{\P}}_{\mathbf{\Phi}} \right] = \left[ \underbrace{}_{\mathbf{\Phi}} \right]^{3}$	↔ [ \$1,23,223, "metrico-quantified ontological qualifiers' emerging;
$\underline{\mathbf{H}}_{4} = \left[ \underbrace{\textcircled{0}}_{\mathbf{\Phi}} \oplus \underbrace{\underbrace{\underbrace{\underbrace{\underbrace{\underbrace{\underbrace{\underbrace{\underbrace{\underbrace{\underbrace{\underbrace{\underbrace{\underbrace{\underbrace{\underbrace{\underbrace{\underbrace$	$\Leftrightarrow \[\hat{\mathbf{g}}_1 \boxplus \hat{\mathbf{g}}_2 \boxplus \hat{\mathbf{g}}_3 \boxplus \hat{\mathbf{g}}_4 \]; distinct 'metrical qualifiers' emerging [\underline{\uparrow}]:$
$\underline{\mathbf{H}}_{s} = \left[ \underbrace{0}_{s} \oplus \underbrace{\mathbf{V}}_{s} \oplus \underbrace{\mathbf{V}}_{s}$	↔ I a1⊕a2⊕a3⊕a4⊕a5 I; 'qualifier' combining rules emerging;
$\underline{\mathbf{H}}_{\mathbf{s}} = \left[ \underbrace{0}_{0} \Phi \underbrace{\mathbf{V}}_{0} \Phi \underbrace{\mathbf{V}}_{0} \Phi \underbrace{\mathbf{V}}_{0} \Phi \underbrace{\mathbf{M}}_{0} \Phi \underbrace{\mathbf{M}}_{0} \Phi \underbrace{\mathbf{M}}_{0} \right] = \left[ \underbrace{0}_{0} \right]^{6}$	$\Leftrightarrow \mathbb{I}  \widehat{\mathfrak{g}}_1 \boxplus \widehat{\mathfrak{g}}_2 \boxplus \widehat{\mathfrak{g}}_3 \boxplus \widehat{\mathfrak{g}}_4 \boxplus \widehat{\mathfrak{g}}_5 \boxplus \widehat{\mathfrak{g}}_6  \mathbb{I};  `metrical qualifier' quantifying \underline{\uparrow};$
<u>H</u> <sub>7</sub> = [ <b>○</b> ↔ <b>¥</b> ↔ <sup>ĝ</sup> ★ <b>û</b> ↔ <sup>ĝ</sup> ★ <b>û</b> ↓ ↔ <sup>ĝ</sup> ★ <b>V</b> → <sup>ĝ</sup> ★ <b>V</b> ]= [ <b>○</b> ]	$^{7} \leftrightarrow \mathbb{I} \hat{\mathfrak{g}}_{1} \boxplus \hat{\mathfrak{g}}_{2} \boxplus \hat{\mathfrak{g}}_{3} \boxplus \hat{\mathfrak{g}}_{4} \boxplus \hat{\mathfrak{g}}_{5} \boxplus \hat{\mathfrak{g}}_{6} \boxplus \hat{\mathfrak{g}}_{7}  \mathbb{I};  \textit{full 'pre-phonetics' } \underline{\uparrow}.$

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Hypothesis. The at least seemingly most questionable sub-transition in this model may be the second one, i.e., the assertion that  $r^{4}\underline{V} = \underline{V} = \underline{V}^{2} = \underline{V} \Leftrightarrow \underline{V}$ ; that the *praxis* of the *sub-rules-system* for '*pure metrical qualifiers*',  $\underline{V}$ , arises directly from the '*self-reflexion*' and '*self-reflexion*' of the *praxis* of the sub-*rules-system* of '*metrico-qualo-quantifiers*',  $\underline{V}$ . The case for this model is aided by noting that  $\underline{V}^{2} = \underline{\Delta} \bigoplus \bigoplus \underline{\Delta} [\Delta \bigoplus]$ ,

i.e., that  $\underline{V}^1 = \Delta[\underline{0}]$ , so that  $\underline{V}$  is also  $\underline{\Delta}^1 \underline{0}$ , and so that  $\underline{\vee}$  is also  $\underline{\Delta}^2 \underline{0}$ . The *«arché»* is immanent and pervasive throughout all of its later, higher-degree 'self-iterations'. It aids further to recall that  $\overline{V}$  originally denoted not an abstract pure quantifier, but a *'primitive undifferentiated unity'* of *'unit-quantifier'*, *'metrical* 

qualifier', and '<u>ontological qualifier</u>', i.e., "one ban of <u>grain</u>". Moreover, in this specific instance or application, when the ultimate, incised 'ontological qualifier',  $\nabla$ , and the 'metrico-quantifier', 'metrical quanto-qualifier', or 'metrical qualo-quantifier',  $\nabla$ , bifurcated from one another, a boundary between two 'ideo-ontologically' distinct epochs in the 'meta-evolution' of this proto-written *rules-system* was congealed in the process, as evidenced in the 'psycho-archaeological horizon', or 'socio-sedimentary layer', denoted, in the passage quoted above, as "Uruk IVa". With this split, the former primitive undifferentiated unity of quantifier, 'metrical qualifier', and 'ontological qualifier', for example , meaning, "one sila of <u>oil</u>", split into 'pure-ontological qualifier'  $\nabla$ , meaning "oil", and , meaning "one sila". Thus, the symbol , after this conceptual bifurcation, initially denotes, at once, "univocally", "both" what we would now term the 'metrical «monads', metrical unit, metrical quantifier, "<u>one</u> [anything]". That is, after this first 'ideo-ontological' bifurcation, denotes a ""primitive undifferentiated unity" of 'unit-quantifier' and 'metrical qualifier' -- metric, metrical unit, unit of measure, ""dimensional unit" of 'unit-quantifier' and 'metrical qualifier' -- metric, metrical unit, unit of measure, ""dimensional unit" of 'unit-quantifier' and 'metrical qualifier' -- metric, metrical unit, unit of measure, "idimensional unit" of 'unit-quantifier' and 'metrical qualifier' -- metric, metrical unit, unit of measure, ""dimensional unit" of 'unit-quantifier' -- which it adopts 'chameleonically' from its operand, based upon the extant metrology convention, e.g., connoting "one sila" when its operand is  $\nabla$ , "one head" when its operand is the 'ontological qualifier' for sheep, etc., etc.

Thus  $\bigvee$  denotes, when in juxtaposition with  $\bigvee$ , the <u>conventional</u> "quantum" of oil, the <u>sila</u>, and <u>also</u> counts as "<u>one</u>" that conventionalized quantum or unit -- counts <u>a</u> sila -- and therein denotes a primitive undifferentiated unity of <u>quantifier</u> and 'metrical <u>qualifier</u>'. Thereby, the next ripening conceptual-semantic 'intra-duality', and the next 'self-bifurcation', will involve the splitting-off of "pure" quantifier from 'metrical qualifier', e.g., the

split of  $\nabla$  into  $\nabla$  and  $\sum [P^2 = \underline{\nabla}^2 = \underline{\nabla} \oplus \underline{\sum}$ ]; the *«aufheben»* self-negation / 'self-bifurcation' of  $\underline{\nabla}$ . Thus, a "re-use economy/parsimony" of historical choices recorded in these 'psycho-artefacts' contributes some ambiguity here, because  $\nabla$  initially denotes one ban of grain, a primitive undifferentiated unity of 'ontological <u>qualifier</u>', 'metrical <u>qualifier</u>', and <u>quantifier</u>, then later [in most contexts] denotes a 'metrical qualo-quantifier', but then, later still, [in most contexts] denotes a pure quantifier. Similarly,  $\bigcirc$  and <u>impressed</u>  $\nabla$  initially denote

primitive undifferentiated unities of 'ontological qualifier', 'metrical qualifier', and quantifier, but, later, incised  $\sqrt{}$ 

denotes a pure 'ontological <u>qualifier</u>'. The case for this semantification of  $\mathbf{v} \to \mathbf{v} \to \mathbf{v}$  is further clarified if we consider 'psycho-archaeologically' the non-arbitrariness of the choice of  $\mathbf{v}$  from among all of the initial "primitive undifferentiated <u>unit[ie]s</u>" as the basis for the eventual <u>impressed</u> symbol for the "pure, dimensionless" unit quantifier: "Grain, in particular, was not only the main staple but also the most usual means of exchange" [ibid.].