

# Chrono-Empiricism --

Encyclopedia Dialectica's New, Higher Standard of Scientific Empiricism

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**Author's Preface.** The purpose of this third Vignette in the F.E.D. Vignettes series is to make public, for the first time, one of the key, higher-scientific principles that have guided the research efforts of *the Seldon Project* since its inception. In this case, that principle is '*The Principle of Chrono-Empiricism*'.

**A Note about Notation.** The Encyclopedia Dialectica notation and notational conventions, employed throughout this vignette, are described in the five '\*.jpg' images, reachable via the following link --

<http://www.dialectics.org/dialectics/Welcome.html>

-- by clicking on the **09/30/2011** links marked "1st Module" and "2nd Module", on the **10/01/2011** link marked "1st Module", and on the **07/14/2012** links marked "1st Module" and "2nd Module", in the **Prefatories Series** section on that Home Page.

**Background.** The Encyclopedia Dialectica [E.D.] 'Dialectical Theory of Everything' -- our theory of the Universe/maximal Totality -- and the E.D. 'sub-theories' of this Universe's 'sub-universes', are all suffused with a pervasive '*Principle of Irrepeatability*'. This principle may be formulated as follows: '*Absolute, exact 're-petition' of events / actions -- or absolutely "circular" 'cyclicity' -- is impossible, because any 'second -petition' must occur in an environment already altered by -- already partly the result of -- 'first -petition', and so the consequences of 'second -petition' must, in part, be different from the consequences of 'first -petition'.*'

This principle holds that there exists, for this Universe, an ineluctably cumulative aspect to all physical existence/action/process: '*Entities/events/"eventities"' cannot be purely "circular" or "cyclical", but must always exhibit some measurable degree of "spirality" or "helicity".'* Definition of the "'eventity'" concept applied herein is available by clicking on the link for that word on the [www.dialectics.org](http://www.dialectics.org) website's **Glossary Page** -- <http://www.dialectics.org/dialectics/Glossary.html>

This '*Principle of Irrepeatability*', stated above by way of the 'negatory' or 'denialatory' term 'ir-repeatability', can also be re-stated via a 'posit-ory' or 'affirmatory' term: '*Distinct "'eventities"', as such, may be similar to one another, but they cannot be identical to one another.*'

This '*Principle of Similarity*' means that any "two" "'eventities'" in the Universe -- i.e., if they are really "two", not really just "one" -- logically cannot be "one" in the sense of being "identical" -- entirely the same -- since, at absolute minimum, they are different by virtue of occurring in / at different positions in / of space / time / space-time.

This principle is thus one which affirms similarity, but denies 'identicality', as a relation which can prevail between "different" «monads», or units, of the same «arithmos». This principle is also one which denies the entire '*Principle of Identicality*' which is implicit, and endemic, in much of that part of today's scientific reasoning which is vitiated by '*The Modern Ideology*'.

This *'Principle of Similarity'* applies even to the supposed “*quanta*”, or “*quantum particles*”, of linear Schrödinger Equation “Quantum Mechanics”. E.g., any “two” «*monads*» of the cosmological “photons” «*arithmos*»; any “two” «*monads*» of the cosmological “electrons” «*arithmos*», although each pair, respectively, is universally in a mutual relation of “*similarity*”, can never be universally in a mutual relation of “*identity*”; can never be entirely the same and indistinguishable: to be “two”, “different”, “distinct”, “particles”, they will have to have *different* histories of *interaction*, i.e., *different* histories of “*quantum entanglement*”, different [e.g., non-local] “*correlations*”.

Seen in a larger, more *general* context, the universal *'Principle of Irrepeatability'* / *'Principle of Non-Identity'* / *'Principle of Similarity'* is a «*species*» of the E.D. universal *'Principle of Meta-Fractality'*.

The usual mathematical concept of a *'fractal'* envisions a static, synchronic, ‘spatial’ [e.g., **2-D** “geometrical”], hyper-idealized self-similarity structure, with an “*actually infinite*” regress of ever-diminishing size-scales -- e.g., of length-scales, of area-scales, of volume-scales, etc.

The E.D. concept of *'meta-fractality'* encompasses also realistic, actually-observed, or actually-constructible, including *'meta-finite'* similarity regresses.

These include synchronic-slice similarity regresses with ‘*qualitative* scaling’ [in terms of *qualitative* determinatenesses] -- ‘*qualo-fractals*’ -- as well as with “*quantitative* scaling” [thus, taken as a whole, as a “‘unity’”, with ‘*qualo-quantitative* scaling’].

They also include «*species*» of *diachronic*, *chronological*, “*longitudinal*” *'meta-fractals'* in which “‘*temporal acceleration*’” is an aspect of ‘*qualo-quanto-fractal* diachronic scaling’, as well as synchronic, diachronic, and ‘*diachronico-synchronic*’ sub-«*species*» of the «*species*» of ‘*qualo-quanto-fractals*’, for which the scaling ‘moment’ of the «*genos*» of *'meta-fractality'* is relaxed, at least in regard to *quantitative*, **3-D** physical-spatial “size” [e.g., in terms of the u dimensional-dialectical arithmetic, to the  $|V| = |L|^{+3} = \text{cm.}^{+3} = \frac{\hat{0}}{\underline{+3}} \hat{3}$  dimensional *unit* / *'metrical unit-qualifier'*]. For example, an adult human person is *self-similar*, rather than *self-identical*, through time, not exhibiting much size-scaling [post-adulthood; post-maturity/post-majority].

The *'ontological-categorical progressions'* generated by E.D. *Dyadic Seldon Function* dialectical ‘meta-models’ of *'physio-onto-dynamics'* generally both instantiate, and model, ‘diachronico-synchronic’, *temporal-acceleration*-exhibiting, *'meta-finite meta-fractals'*, in the form of ‘*qualo-quanto-fractals*’.

The *'meta-finite'* character of all of these *'meta-fractal'* «*species*» -- meaning that they may encompass *qualitative*, *ontological* change/expansion between their pairs of scales, but that their scale-regresses *remain finite* in scales-count -- is in alignment with E.D.’s *'Principle of Metafiniteness'*, which asserts that *'Infinity is non-actual.'*, i.e., that *'Infinities are empirically unmanifest in this universe.'*

The *generic* *'Principle of Irrepeatability'* has a *specific* corollary, the *'Principle of Historical Irreversibility'*. That is, not only is it impossible to exactly repeat “‘*eventities*’” in the forward sense of time, relative to past-occurring “‘*eventities*’”, but, likewise, it is impossible to “*run time in reverse*”: to exactly repeat past “‘event[ities]’” in reverse chronological order.

Unfortunately, “*time reversibility symmetry*” is a *contra-experiential*, *non-objective*, *contra-empirical*, and therefore *'contra-scientific'* feature exhibited by many of the supposedly reality-modeling equations of Standard modern Physics.

If a model of a deterministic process, or dynamic, is *time reversible*, then the *time-reversed*, *'ana-chronic'*, *'anti-temporal'* process -- as [*falsely*] modeled by that model -- *satisfies the same model equation* as the true, *'pro-verse'*, *'pro-time'*, *'pro-chronological'*, *actually-observed* process. This model-behavior constitutes a form of model-equations *unrealism*, or *'homeomorphic defect'*, also known as “*time-reversible dynamics*”.

“**Time reversible dynamics**” means, in general, that the model equations are “symmetric” -- “invariant” -- under a change in the sign of **t** -- the “time variable”, as “universal independent variable” -- from **+t** to **-t**.

The model-equations of classical mechanics, for example, and of classical optics, are “**time-reversible**”. Contemporary Quantum Mechanics is not quite “**time-reversible**”, exhibiting, instead, a richer symmetry, called “**Charge-Parity-Time Symmetry**”, or “**CPT Symmetry**”, for short -- a symmetry which is deeply-related to Lorentz Invariance [cf., for example, *Wikipedia* entries on “Time reversibility” and “CPT symmetry” --

[http://en.wikipedia.org/wiki/Time\\_reversibility](http://en.wikipedia.org/wiki/Time_reversibility) [http://en.wikipedia.org/wiki/CPT\\_symmetry](http://en.wikipedia.org/wiki/CPT_symmetry) ].

When an **Encyclopedia Dialectica** ‘dialectical definition-equation’, which constitutes that encyclopedia’s definition for a given dialectical ‘**nature**-al’ progression, is supplied with a negative temporal argument -- a minus-signed parameter-value, such as the value  $\tau = -1$  -- for **E.D.**’s **NQ** dialectical ‘meta-model’ of the “**meta-evolution**” of the **cosmological totality** --

$$\langle \downarrow_{\nu}^1 \rangle_{\tau_{\nu}=-1} = \langle \downarrow_{\nu}^1 \rangle^{2^{-1}} = \langle \downarrow_{\nu}^1 \rangle^{1/2} = \sqrt{\downarrow_{\nu}^1}$$

-- this means that the «**arché**» of that progression, in this case  $\downarrow_{\nu}^1$ , denoting that **primordial** cosmological «**arithmos**» which has sub-**nuclear** “particles” as its «**monads**», is “raised” to the “power”  $2^{-1} = 1/2$ , i.e., that taking the “square-root” of the «**arché**» **qualifier**,  $\downarrow_{\nu}^1 \mapsto \mathbb{Q}_1$ , is indicated. The resulting generic equation --

$$\langle \downarrow_{\nu}^1 \rangle^{1/2} = \sqrt{\downarrow_{\nu}^1} \mapsto \mathbb{Q}_1^{1/2} = \sqrt{\mathbb{Q}_1}$$

-- constitutes an **unsolvable equation** within the “Gödelian incompleteness” of the axioms-system of the **NQ** dialectical arithmetic [for any version thereof which uses an “**evolute**” **product rule** for its Axiom §9; only the ‘**meta-heterosis convolute product rule**’ would render square-root taking possible in its version of **NQ**, but still **not** in this case; still **not** in the case of the «**arché**»,  $\mapsto \mathbb{Q}_1$  ].

Square roots **can** be meaningfully taken for **NQ un**interpreted, generic arithmetical values, and for **interpreted, applied**, algebraic values, e.g., for/of the ‘multi-**qualifier cumula**’ that result from  $\tau > 0$  values of such **Dyadic Seldon Function** dialectical ‘**meta-models**’. They yield their immediate-predecessor epoch’s cumulum as the value of their square-root, e.g. --

$$\sqrt{\langle \downarrow_{\nu}^1 \rangle^{2^{+1}}} = \sqrt{\langle \downarrow_{\nu}^1 \oplus \downarrow_{\nu}^1 \rangle^{+1}} = \downarrow_{\nu}^1 \mapsto \sqrt{\mathbb{Q}_1^2} = \sqrt{\mathbb{Q}_1 \boxplus \mathbb{Q}_1} = \mathbb{Q}_1$$

However, such values do **not** arise for **any** minus-signed value of a  $\tau \in \mathbf{Z}$  epoch-parameter / temporal independent variable of a **Dyadic Seldon Function**.

Instead, the epochal-time values  $\tau = -2, \tau = -3, \tau = -4$ , etc., result, respectively, in the  $(1/4)^{\text{th}}$  power (or the  $4^{\text{th}}$  root) of the «**arché**» **qualifier**, in the  $(1/8)^{\text{th}}$  power (or  $8^{\text{th}}$  root) of the «**arché**» **qualifier**, and in the  $(1/16)^{\text{th}}$  power (or  $16^{\text{th}}$  root) of the «**arché**» **qualifier**, etc., which are, again, values which do **not** exist in the **NQ** number-space. Therefore, **Dyadic Seldon Function**, dialectical ‘meta-model’ equations written in the language of the **NQ** dialectical ideography, do not support the “**time reversibility symmetry**” which compromises the scientific, empirical fitness of so many of the “natural law” equations of Standard modern Physics.

**Definition.** The meaning(s) of the term '**chrono-empiricism**' is (are) also known, within **F.E.D.**, by the 'syno-names' '**time-empiricism**', '**temporal empiricism**', and '**historical empiricism**'.

These words / phrases name the new, higher standard of scientific empiricism offered by **E.D.**, as an included moment of its Marxian paradigm of '**psychohistorical materialism**'.

That paradigm centrally includes the view that the human phenome, human memes, human "ideas" in general, are "idea-**matter**" -- that they are "**material**", **inter-subjectively objective**, and **causative** moments in the social self-production and self-**re**-production of human societies; in the self-production of human [**psycho**]history, and in the historical interaction of the planetary[⊕] **patch** of '**human[-ized] nature**'; of '**humanity's laborious self-objectification in nature**', enveloped, from without *and from within*, by enviroing **extra-human nature**.

The principle of '**chrono-empiricism**' holds that scientific theories that abstract from natural history; that embody only '**natural-historical genericity**'; that fail the test of "'**natural-historical specificity**'" [cf. Marx]; that offer only "'**supra-historical**'" categories, or '**meta-temporal summarizations**', and which exhibit the "**time reversibility symmetry**", e.g., in their mathematical models, represent an insufficient degree of fitness to the **historical content** -- to the **temporal ordinality content** -- of the scientific, empirical data of objective nature. In short, such models **fail to fit the temporal data of nature**.

An example of a mathematical model exhibiting the "'**supra-historical**'", 'historically abstract' -- *abstracting from natural history* -- 'meta-temporal summarization' characteristic is the "black body" **Temperature/Radius /- Luminosity** relation, asserted as an approximate "model" of stellar evolution:  $L = 4\pi R^2 \sigma T^4$ . As presented, this mathematical, purely-quantitative relation represents a **dis**-ordered -- 'de-ordinalized', 'de-temporalized', and 'de-historicized' -- essentially **random set** of **Luminosity** values, some of which may arise for combinations of **Radius** and **Temperature** values actually encountered in the historical self-development of various classes of stars, but providing no indication as to which **{<L, R, T>}** values those are, or in what temporal-ordinal -- historical -- sequence those values actually occur per empirical observation/reconstruction. A partial fixing of such sub-empirical historical abstractness might be by a model  $L(c,m,t) = 4\pi R(c,m,t)^2 \sigma T(c,m,t)^4$ , which *modeled the actual timed trajectory* of the **L(c,m,t)** "dependent variable" as a function of those of the **R(c,m,t)** and **T(c,m,t)** "independent variables", with all three being functions of **time**, of stellar **mass** [including of *birth-mass*], and of stellar **composition** [including of *birth-composition*], i.e., in terms of star type/class/«**species**».

That is, this principle holds that truly scientific theories must, as part of their most central explanatory content, "'**reproduce the temporal data**'" of the actual historical "'**order of appearance**'" [cf. Chardin] of the different «**gene**» and «**species**», etc., of «**monads**» that constitute the multiple 'physio-ontological', and/or 'ideo-ontological', categories, or «**arithmoi**» -- the '**kinds** of "'**numbers**'" [of «**monads**»/units] -- that they invoke, as this **order of emergence** is reconstructed, from the data effectively "materially recorded", in human "'**historical present-presents**'", by/from "'**historical past-presents**'", human and pre-human.

The **E.D.** principle of '**chrono-empiricism**' holds that scientific theories must model and explain the **necessary** "'**temporal ordinality**'", or "'**historical logic**'" -- the "'**what follows from what, and why**'" -- of the [**qualo**-Peanic] sequence, or '**consecuum**' -- of the **succession** and, more accurately, of the dialectical **progression** -- of events, of "'**eventities**'", of '**kinds of being/becoming**', that constitute objective, empirical **nature as inherently temporal**, as **inherently dynamical**, as '**nature-al history**': that constitute the very empirical content of "'**concrete duration**'" [cf. Bergson]; of **concrete** "'**time**'".



