

GENERIC Definition of NECESSARY (If Not Sufficiency) of So-Called “Complexity” as **UTTER-SIMPLICITY!!!**

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Ask: WHAT??, WHERE?, (+) WHEN? And WHY??? **Before!, During!!** and **After!!!**: How? And How Much?:
COGNITIVE-SEMANTICS and Its Path to EGO-ABANDONMENT

Physicists’, mathematicians’, engineers’, chemists’, and biologists’ traditional by-rote asking and often superbly answering traditional by-rote questions: How?, and How Much?, still leaves much to be desired, namely, the job is still not done. **Absolutely mandatory** is to ask ostensibly “orthogonal” questions; What?, Where?, (+) When?, Why??, (and perhaps even WHY???) both: **before!, during!,** and **after!!!** In other words, **principles** (both: **before!, during!,** and **after!!!**) over, (and always concomitant with!), practice!!! Such realization initially led this author, (in the field of generalizing (so called) disorder but actually symmetry-restoring!) from initial Siegel-Percus-Yevick (SPY) evolution towards merger into more illustrious classic (but *not* hardly classical): (always seminal; **The Master!!!**) Brillouin [Wave-Propagation in Periodic-Structure, Dover(1921); Wave-Propagation and Group-Velocity, Academic (1956); Science and Information-Theory, Academic (1962)]-(superfluid-liquid He): Landau-Feynman-(*extension to classical-liquids*): Hubbard and Beebe-Egelstaff-Percus and Yevick-Siegel[Phys. & Chem. Of Liquids: 4(4) (1975); 5(1) (1976)-8-papers!...]...-(powders & clusters): Kubo, Kubo and Siegel,-Matsubara, Matsubara and Siegel-Siegel-...-Sugano-(plasmas): Tsyтович-Kodomtsev-Sagdeev & Galeev-O’Neil-(plasmons in solids/metals): Platzman and Eisenberger-...-(magnons and Stoner-mode particle-hole pair-production “anharmonicity” in itinerant (Stoner, Hubbard,...) and localized (Heisenberg, Ising,...)-ferro-, antiferro-, and ferri-magnets): Ising-Heisenberg-Stoner and Wohlfarth -...-Siegel-...-(total-(G...P)-generalization): Siegel[J. Noncryst. Sol. 40, 453 (1980)-*best-summary with (then) best references-list!*] “generalized-disorder collective-boson negative-dispersion mode-softening universality-**principle**” (G...P), with its “law of corresponding-states” *automatically unifying*: liquids to glasses to powders to slushes to slurries to blends , then on to Siegel[Test and Measurement World Expo, San Jose (1985); Measurement Science Conf., Santa Clara (1985)] “Static-Synergetics”, then on to Siegel[Symp. on Fractals...., MRS Fall Mtg. (1989)-5-papers!;] “Synergetics Paradigm & Dichotomy” (SPD), and “finally”, via classic (and always seminal) Menger ostensibly pure-mathematics “dimension-theory”[Dimensiontheorie, Teubner (1929)] and Menger “fuzzy-logic” (predating Zadeh by at least a decade!) to Siegel “FUZZYICS”, and reinforced by Cohen and Stewart[The Collapse of Chaos: Discovering SIMPLICITY in a (So Called) “Complex” World(by not asking **at all times** the right questions!),Penguin (1994)] “complic-ity”(bottom-up “induction” and opposite “simple-xity” (top-down “deduction”) realization [which “SPD and sequel “FUZZYICS” do **together simultaneously**, and beyond, via Wierzbicka-Langacker-Fauconnier and Turner-Lakoff-Preditis-Bobrow-...-Hofstadter-...“Cognitive-Semantics”, to the Siegel-Stikleather-...-Davenport and Prusak “hierarchy of thinking” (HoT): upward from: data -to- information -to- knowledge -to- understanding -to- meaning -to- wisdom -to- “inspiration” -to- “spirituality” (a.k.a. “**EXCELSIOR!!!**”). This is science, any less is not getting the job done, to quote; K. Kaneko[The Collapse of Tori, World (1979)], Y. Nambu[in Symmetries in Particle-Physics, I. Bars ed., Plenum??? (1981)???, and Franck [Sir Charles Franck: FRS, OBE (1990)], paraphrasing: “it’s not the nitty-gritty little details in science, but the surprising, shocking, awe inspiring and ego crushing interconnections between ostensibly-disparate ‘specificity-of-complexity’ (SoC)-tactics in ostensibly-disparate ‘fields-of-endeavor (foes!) that we are too stupid to ab initio see that makes science so exciting and worth doing!” (a.k.a. “aha said the blind man, I see!”)

“Blending”-Cognition Cognitive-Semantics *Between Pure-Mathematics to Physics Implementation in “FUZZYICS” SPD Automatic Optimality Simultaneous Implementation of “Complic-ity” \cap/\cup “Simple-xity”*

or

“Blending”-Cognition of Fauconnier-Turner Cognitive-Semantics Within Pure-Mathematics, Within Physics, and Between Pure-Mathematics and Physics *Automatic Optimality Implementation via Siegel “FUZZYICS” Automatic Optimality Implementation of Cohen-Stewart Bottom-Up Induction “Complic-ity” Intersection/Union With Top-Down Deduction “Simple-xity” Simultaneously.*

“Blending”-cognition: Fauconnier-Turner [Cog. Sci. 22(2), 133 (1998)]-Hofstadter[Fluid-Analogies and Creative-Thinking (1994)] cognitive-semantics is *automatic optimality* in Siegel[Symp. On Fractals..., MRS Fall Mtg.(1989)-5-papers!] **“FUZZYICS”**(SPD) *automatic optimality* implement Cohen-Stewart[Collapse of Chaos, Penguin (1994)] bottom-up induction **“Complic-ity” \cap/\cup top-down deduction “Simple-xity” simultaneously!** **“FUZZYICS”** SPD “common-functioning-principle” (“CFP”) **Parsimony-of-Dichotomy** (PoD)-**Strategy Dimensionality-Domination** (DD)-**Inevitability** \cap/\cup of: dimension-theory to “fuzzy-logic” to [Siegel-Pawlak] “rough-sets” to “knowledge-acquisition via “the literature”-database-mining via *semantic/linguistic clustering (of meaning!)*” into **up** Siegel-Stikleather-Davenport & Prusak] **hierarchy-of-thinking** (HoT): **“Complic-ity” “versus” \cap/\cup automatic optimality simultaneity with “Simple-xity”**: data **to** information **to** knowledge **to** understanding **to** meaning **to** wisdom **to** ”inspiration” **to** ”spirituality”. SPD *automatically purposely unifies* ostensibly-disparate (od) “specificity-of-complexity” (SoC)-tactics in (od) fields-of-endeavor, with discovery of physics’ **automatic unification** to pure-mathematics (a.k.a. “Natural-Philosophy”). Two (accompanying abstracts) newest examples: (a) “digits” “NeWBe-Logarithmic-Law” $P(d) = \log_{10}(1+1/d)$ **physics: INVERSION** to $d(P) = 1/[10^P - 1]$ “Bose-Einstein-like” “*spin(ℓ)less-BoZo’s*” (SB) *quantum-statistics*, with $(1+1/d)$ -skewed-argument and first significant-digit $d = 0$ logarithmic-singularity divergence **SB-Condensation**, and EXPANSION to $d(P) \equiv “1”/[-1+ [+P+...]] \equiv “1”/P+... \equiv “1”/\omega^{1.000...}$ **Hyperbolicity inevitability** indicative of density-of-states *linearity* indicative of Wigner-Dyson low-argument-skewed Gaussian-**Orthogonal**-ensemble (G.Q.E.) **inevitable quantum-chaos** “signature”,..., and (b) Fermat’s last-theorem (FLT) simple “analytic”-(**plane**)- geometry proof via **Fermat’s-principle** (FP)(of least-action)/**Noether’s-theorem** domination by *integer-only* (scale?)/*translational-invariance symmetry-breaking* 4-current (momentum?/ (scale?)) **non-conservation equivalent inequalities**: $\partial_{\mu}^{\mu} \text{translational} (= \text{momentum} (?)) \text{ (or } \text{scale?})^1 0 \text{ to } x^n (\equiv D > 2) + y^n (\equiv D > 2) + z^n (\equiv D > 2)$ with no possible solutions by definition! FIN Q.E.D.In then-unified "Natural Philosophy" (physics = mathematics), why should Fermat repeat his own “physics” **FP** to prove his own “mathematics” **FLT** when their **identical** “¹”s make them an **identity**? Hence *no* “proof” *needed* in his margin! Superset Shimura-Taniyam-Weil once-conjecture now theorem-with-proof *may* so simplify via “physics” so succinctly, if ab initio functionally-illiterate in mathematics non-conocce mere physicists could only understand even its statement! Throughout all, inspirations from the physics of magnetism are explicitly identified and manifestly-demonstrated.

“Blending”-cognition [Cog. Sci. 22(2), 133 (1998)] cognitive-semantics is *automatic optimality* in Siegel[Symp. On Fractals..., MRS Fall Mtg.(1989)-5-papers!] **“FUZZYICS”**(SPD) *automatic optimality* implement Cohen-Stewart[Collapse of Chaos, Penguin (1994)] bottom-up induction **“Complic-ity” \cap/\cup top-down deduction “Simple-xity” simultaneously!** **“FUZZYICS”** SPD “common-functioning-principle” (“CFP”) **Parsimony-of-Dichotomy** (PoD)-**Strategy Dimensionality-Domination** (DD)-**Inevitability** \cap/\cup of: dimension-theory to “fuzzy-logic” to [Siegel-Pawlak] “rough-sets” to “knowledge-acquisition via “the literature”-database-mining via *semantic/linguistic clustering (of meaning!)*” into **up** Siegel-Stikleather-Davenport & Prusak] **hierarchy-of-thinking** (HoT): **“Complic-ity” “versus” \cap/\cup automatic optimality simultaneity with “Simple-xity”**: data **to** information **to** knowledge **to** understanding **to** meaning **to** wisdom **to** ”inspiration” **to** ”spirituality”. SPD *automatically purposely unifies* ostensibly-disparate (od) “specificity-of-complexity” (SoC)-tactics in (od) fields-of-endeavor, with discovery of physics’ **automatic unification** to pure-mathematics (a.k.a. “Natural-Philosophy”). Two (accompanying abstracts) newest examples: (a) “digits” “NeWBe-Logarithmic-Law” $P(d) = \log_{10}(1+1/d)$ **physics: INVERSION** to $d(P) = 1/[10^P - 1]$ “Bose-Einstein-like” “*spin(ℓ)less-BoZo’s*” (SB) *quantum-statistics*, with $(1+1/d)$ -skewed-argument and first significant-digit $d = 0$ logarithmic-singularity divergence **SB-Condensation**, and EXPANSION to $d(P) \equiv “1”/[-1+ [+P+...]] \equiv “1”/P+... \equiv “1”/\omega^{1.000...}$ **Hyperbolicity inevitability** indicative of density-of-states *linearity* indicative of Wigner-Dyson low-argument-skewed Gaussian-**Orthogonal**-ensemble (G.Q.E.) **inevitable quantum-chaos** “signature”,..., and (b) Fermat’s last-theorem (FLT) simple “analytic”-(**plane**)- geometry proof via **Fermat’s-principle** (FP)(of least-action)/**Noether’s-theorem** domination by *integer-only* (scale?)/*translational-invariance symmetry-breaking* 4-current (momentum?/ (scale?)) **non-conservation equivalent inequalities**: $\partial_{\mu}^{\mu} \text{translational} (= \text{momentum} (?)) \text{ (or } \text{scale?})^1 0 \text{ to } x^n (\equiv D > 2) + y^n (\equiv D > 2) + z^n (\equiv D > 2)$ with no possible solutions by definition! FIN Q.E.D.In then-unified "Natural Philosophy" (physics = mathematics), why should Fermat repeat his own “physics” **FP** to prove his own “mathematics” **FLT** when their **identical** “¹”s make them an **identity**? Hence *no* “proof” *needed* in his margin! Superset Shimura-Taniyam-Weil once-conjecture now theorem-with-proof *may* so simplify via “physics” so succinctly, if ab initio functionally-illiterate in

mathematics non-conocce mere physicists could only understand even its statement! Throughout all, inspirations from the physics of magnetism are explicitly identified and manifestly-demonstrated.

Cognitive-semantics Fauconnier-Turner[Cognitive- Science. 22(2), 133 (1998)] “blending-cognition, with very-early pure-mathematics application and implementation to define complex-numbers, is *automatically optimality* performed via Siegel[Symp. On Fractals, Scaling...., MRS Fall Mtg., Boston (1989)-5-papers!; AMS Mtg., Santa Barbara (1990); Bull. APS March Mtgs.: Anaheim (1990); Indianapolis (1992); SIAM Ann. Mtg., San Diego (2001); AMS Ann. Mtg., San Diego (2002);...] Synergetics Paradigm & Dichotomy (SPD) “FUZZYICS” *automatic optimality* implementation of Cohen-Stewart[The Collapse of Chaos: Discovering Simplicity in a Complex World, Penguin (1994)-last-chapter!] bottom-up induction “Complic-ity” intersection/union with top-down deduction “Simple-xity” *simultaneously!* Yet no further pure-mathematics examples are given, nor are any physics examples even hinted at. It is herein manifestly-demonstrated that “FUZZYICS” SPD “common-functioning-principle” (“CFP”) PARSIMONY-of-Dichotomy (PoD)-STRATEGY Dimensionality-DOMINATION (DD)-INEVITABILITY “FUZZYICS” intersection/union of: classic pure-mathematics [Huygens-Riemann-Rayleigh-Hurwitz-Polya-Menger-Hurewicz-Hurewicz & Wallman-Arnol’d & Vassil’ev-Arnol’d-Picard & Lefschetz...] dimension-theory, with [Menger-Zadeh] “fuzzy-logic”, with [Siegel-Pawlak-Slowinski-Ziarko & Jackson-...] “rough-sets”/[membership-function crutch *free* fuzzy-logic] theory, with [Tyron-Tryon & Bailey] “knowledge-acquisition via [“the literature”] database-mining via *semantic/linguistic clustering* (of *meaning!*)”, with, up the [Siegel-Stikleather-Davenport & Prusak] hierarchy-of-thinking (HoT): Cohen & Stewart bottom-up induction “Complic-ity”: data→information→knowledge→understanding→meaning→wisdom→“inspiration”→“spirituality”→simplicity→optimality, “versus”/intersection/ union/ *automatic optimality simultaneity* with top-down deduction “Simple-xity”: data←information←knowledge←understanding ←meaning←wisdom ←“inspiration”←“spirituality” ←simplicity←optimality. Siegel[Symp. On Fractals, Scaling...., MRS Fall Mtg., Boston (1989)-5-papers!; AMS Mtg., Santa Barbara (1990); Bull. APS March Mtgs.: Anaheim (1990); Indianapolis (1992); SIAM Ann. Mtg., San Diego (2001); AMS Ann. Mtg., San Diego (2002);...] had applied “FUZZYICS” SPD to unify physics’ ostensibly-disparate “specificity-of-complexity” (SoC)-tactics: theories, models, mechanisms, processes, computer-simulations, number-crunchings, parameters, ..., assumptions (ad infinitum; ad nauseum!), via “FUZZYICS” SPD, with discovery of physics’ *automatic* unification to pure-mathematics: non-random graph-theory, random graph-theory, differential-geometry, topology (Jordan curve theorem,...), ... (a.k.a. “Natural Philosophy”). Cases in point are two accompanying abstracts on: (a) “digits” Newcombe-Weyl-Benford-Kac “NeWBeK-Logarithmic-Law” $P(d) = \log_{10}(+1+1/d)$: unique-argument $(+1+1/d)$ -only supersymmetry (SUSY)-*breaking*, INVERSION to $d(P) = 1/[10^{P(d)} - 1]$ “Bose-Einstein-like” “spin(0)less-BoZo’s” (“SoB”) quantum-statistics with $(+1+1/d)$ -skewed-argument and first significant-digit $d = 0$ logarithmic-singularity/simple-pole divergence “SoB”-Condensation, and EXPANSION to $d(P) = 1/[10^{P(d)} - 1] \cong “1”/[-1+1+P+...] \cong “1”/P+... \cong “1”/P^{1+...}$ - HYPERBOLICITY INEVITABILITY indicative of density-of-states *linearity* indicative of low-argument skewed-Gaussian indicative of Gaussian-ORTHOGONAL-ensemble (G.O.E.)/Wigner-Dyson distribution/level-density/statistics/distribution *inevitable* “signature” quantum-chaos’, and (b) Fermat’s last-theorem simple analytic-(plane)-geometry proof via Fermat’s-principle (of least-action)/Noether’s-theorem, in which: right-triangle in -plane Pythagorean-theorem exponent is identified with triangle plane-dimensionality $n = D = 2$, up-projection to any/all higher-dimensions/exponents $n = D > 2$, then all-possible back-projections to $n = D = 2$ revealing almost-always open-would-be/non-triangle gaps, translational/(scale?)-invariance symmetry-restoring 4-current (momentum?/(scale?)) conservation-law repairable for any/all non-integer-x, y, z, versus translational/(scale?)-invariance symmetry-*breaking* 4-current (momentum?/(scale?)) *non-conservation unrepairable* for any/all integer-x, y, z, whichsame *non-conservation* 4-current 4-divergence *inequality* making any/all such Diophantine-equations into an *inequalities*, thus having no solutions ab initio by definition!

GENERIC Definition of *NECESSARY* (If Not Sufficiency) of So-Called “Complexity” as *UTTER-SIMPLICITY!!!*

Here we take on such with, as opposed to doing (addictively with computers, at best *poor* experiments!) *purposely simple thinking*, a.k.a. *science*, a.k.a. PARSIMONY! [a.k.a. “K.I.S.S!” “keep it *simple*, stupids!”].

Badii and Polit[Complexity: Hierarchical-Structures and SCALING in Physics, Cambridge (1997)], following Bar-Yam[Dynamics of Complex-Systems, Addison-Wesley (1997)], valiant attempt to *understand* so-called “complexity” *generically* to ascertain *meaning* and thus gain *wisdom*, not: how?, how much? typical (biology) SoC-tactics questions, but *deeper* (and, in the light of “FUZZYICS” surprisingly *simpler!*) *orthogonal* questions: what?, where? (+) when?, why?? (and perhaps even WHY??), nevertheless fails for several reasons, the most salient being dependence upon too-much/many SoC-tactics: theories, mechanisms, processes, number-crunchings, computer-simulations (“only” at best *poor experiments!*), parameters, ..., assumptions (ad infinitum; ad nauseum), a.k.a. details!

Versus this is Siegel[Symposium on Fractals, Scaling...., M.R.S. Fall Mtg., Boston (1989)-5-papers!-summary!; *ibid.* (1990)-2] “FUZZYICS” Synergetics Paradigm and Dichotomy (S.P.D.) “common-functioning-principle” (“CFP”) PARSIMONY-of-DICHOTOMY (PoD)-STRATEGY DIMENSIONALITY-DOMINATION (DD)-INEVITABILITY, and its evolution into “INEVITABILITY -WEB”: *purposful PARSIMONY!*

Here Siegel "FUZZYICS" is applied sequentially critical-rereading critique of the Badii-Politi book, to manifestly-demonstrate sequentially just: how?, how much? questions, but more generic hence more relevant to generic "complexity" study, muchless even very definition: what?, when? (+) where?, why?!, and even WHY???

Siegel's⁴ (1997) definition, necessity (if not sufficiency?) of so-called "complexity" as UTTER-SIMPLICITY, *necessary* condition:

Necessary (if not sufficiency) *definition* of so-called "complexity" as UTTER-SIMPLICITY is trivial! Well documented throughout Nature is the so-called 1/f or (... $\frac{1}{w^{1.000\dots}}$ -HYPERBOLICITY...) *inverse-proportionality power-spectrum* so-called "noise" *misnomer*: ubiquity, universality,..., *inevitability*⁴, (most especially for stated purposes herein, throughout biology!).

Starting with elementary-calculus/analysis definition of verysame *logarithm* function: (*the only* function whose Taylor/power-series-expansion has leading-term 1/x *inverse-proportionality*!):

$$\left(\frac{d}{dx}\right) \log x = \frac{1}{x} = (\text{for arbitrary - base}) = \frac{1}{x}$$

which for $x = \omega$ is:

$$\left(\frac{d}{dx}\right) \log \omega = \frac{1}{\omega} = (\text{for arbitrary - base}) = \frac{1}{\omega}$$

whose interpretation/meaning is [a.k.a. "the slide-rule"!], sequentially:

$$\left(\frac{d}{d\mathbf{w}}\right) \left[\log \prod f(\mathbf{w}) \equiv \sum \log f(\mathbf{w}) \right] = \frac{1}{\mathbf{w}} = (\text{for arbitrary - base}) = \frac{1}{\mathbf{w}}$$

$$\left(\frac{d}{d\mathbf{w}}\right) [\text{the slide - rule}] = \frac{1}{\mathbf{w}} = (\text{for arbitrary - base}) = \frac{1}{\mathbf{w}}$$

$$\left(\frac{d}{d\mathbf{w}}\right) [\text{SCALE - In variance Symmetry - RESTORING}](\mathbf{w}) = \frac{1}{\mathbf{w}} = (\text{for arbitrary - base}) = \frac{1}{\mathbf{w}}$$

which, by Noether's-theorem [...-Invariance Symmetry-*RESTORING*] $\Leftrightarrow [\partial_{\mu} J^{\mu} \dots = 0]$, is:

$$\left(\frac{d}{d\mathbf{w}}\right) [J_m^m J_{SCALE}^m = 0](\mathbf{w}) = \frac{1}{\mathbf{w}} = (\text{for arbitrary - base}) = \frac{1}{\mathbf{w}}$$

$$\left(\frac{d}{d\mathbf{w}}\right) [\text{SCALE - 4 - Current 4 - "DI" vergence}](\mathbf{w}) = \frac{1}{\mathbf{w}} = (\text{for arbitrary - base}) = \frac{1}{\mathbf{w}}$$

$$\left(\frac{d}{d\mathbf{w}}\right) [\text{SCALE - 4 - Current 4 - CONvergence}](\mathbf{w}) = \frac{1}{\mathbf{w}} = (\text{for arbitrary - base}) = \frac{1}{\mathbf{w}}$$

$$\left(\frac{d}{d\mathbf{w}}\right) [\text{SCALE - 4 - Current 4 - CONSERVATION}](\mathbf{w}) = \frac{1}{\mathbf{w}} = (\text{for arbitrary - base}) = \frac{1}{\mathbf{w}}$$

i.e.

"*INTER*-(FREQUENCY/ENERGY/...-BIN)-SCALE INFORMATION or DATA-TRANSMITTAL CONSERVATION IS *UNIQUELY*

ENSURED BY $\frac{1}{w^{1.000\dots}}$ -HYPERBOLICITY POWER-LAW POWER-SPECTRUM *INVERSE*-PROPORTIONALITY FREQUENCY-MODULATION "ALGEBRAICITY"!

Badii and Politi mention *both all-important* SCALE-Invariance Symmetry-*RESTORING* and *equally important* so-called
 “complexity” in/”as”(?) $\frac{\text{"I"}}{\mathbf{w}^{1.000\dots}}$ -HYPERBOLICITY so-called (pejorative-misnomer!) “noise”(fluctuation-dissipation theorem
 equivalence to generalized-susceptibility) power-law power-spectrum *INVERSE*-proportionality frequency-modulation (FM)
ALGEBRAICITY, of Montroll-Shlesinger-West[Intl. J. Mod. Phys. (1989)]-Handel[Phys. Rev. A22, 2, 745 (1980)...;]-Ngai[Comm. on S.-
 S, Phys.: 9, 4, 127 (1979); 9, 5, 141 (1980);]-Lindenberg-Klimontovich[J.E.T.P. Lett. 51, 51 (1990); Statistical-Physics, Pitman (1978);...]-
 Siegel... INEVITABILITY, but *never* implement its true power to solve problems and provide deep insights, muchless nor its place in
 the grand scheme of things, that Siegel “FUZZYICS” does *automatically* with *optimality*!